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Reflections on Bloom's Revised Taxonomy

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Abstract

In the application of the *Original* Bloom's taxonomy since its publication in 1956, several weaknesses and practical limitations have been revealed. Besides, psychological and educational research has witnessed the introduction of several theories and approaches to learning which make students more knowledgeable of and responsible for their own learning, cognition, and thinking. Hence, a group of researchers revised the *Original* taxonomy in order to overcome its weaknesses and to incorporate the recent developments. The purpose of the present article is to present a concise and critical review of both the *Original* and *Revised* taxonomy with reference to their underlying philosophy, rationale, structure and potential pedagogic uses.

Keywords: Bloom's original taxonomy, Bloom's revised taxonomy, Bloom's taxonomy and instruction, Bloom's taxonomy and curriculum, potential uses of Bloom's taxonomy.

Introduction

The *original* "Bloom's Taxonomy" was published by Bloom and his associates in 1956 (Bloom, et al., 1956). IT included six major categories in the Cognitive Domain: *knowledge, comprehension, application, analysis, synthesis and evaluation.* It was intended to provide for classification of educational system goals, especially to help teachers, administrators, professional specialists, and research workers to discuss curricular and evaluation problems with greater precision (Bloom, 1994, p.10). One of the most frequent uses of the *Original Taxonomy* (OT) has been to classify curricular objectives and test items in order to show the breadth, lack of breadth, of the objectives and items across the spectrum of the six categories. Krathwohl (2002, p. 212) states that Bloom saw the OT as more than a measurement tool. Bloom believed it could serve as a:

- Common language about learning goals to facilitate communication across persons, subject matter, and grade levels.
- Basis for determining for particular course or curriculum the specific meaning of broad educational goals, such as those found in the currently prevalent national, state, and local standards.
- Means for determining the congruence of educational objectives, activities, and assessment in a unit, course, or curriculum.
- Panorama of the range of educational possibilities against which the limited breadth and depth of any particular educational course or curriculum could be considered.

A group of cognitive psychologists, curriculum and instructional researchers, and testing and assessment specialists revised the OT (Anderson et al., 2001). In order to understand the rationale and philosophy underlying the *Revised Taxonomy* (RT), we have to highlight the assumptions underlying the OT. The structure of the OT was a "cumulative hierarchy: hierarchy because the classes of objectives were arranged in order of increasing complexity, and cumulative because each class of behaviors was presumed to include all the behaviors of the less complex classes" (Krietzer et al., 1994, p. 66). It was assumed that mastery of each simpler category was prerequisite to mastery of the next more complex one (Krathwohl 2002, p. 213).

Weaknesses in the Original Taxonomy

In the application of the OT, several weaknesses and practical limitations have been revealed. A notable weakness is the assumption that cognitive processes are ordered on a *single* dimension of simple-to-complex behavior (Furst,1994, p. 34). As required in a cumulative hierarchy, the categories were presumed not to overlap. As Anderson et al., (2001, p. 309) suggest "cumulative hierarchy" which indicates that “mastery of a more complex category required prior mastery of all the less complex categories below it” is a “stringent standard.” However, in applying the OT, Ormell (1974) reported contradictions in the frequent inversion of various objectives and tasks. For example, certain demands for *Knowledge* are more complex than certain demands for *Analysis* or *Evaluation*. Also, *Evaluation* is not more complex than *Synthesis*; *Synthesis* involves *Evaluation* (Krietzer et al., 1994, p. 65).

Rationale for the Revised Taxonomy

In addition, the RT has to take into consideration the recent developments in the educational and psychological literature. At the time of the publication of the OT in 1956, *behaviourist learning theories* extensively influenced school curriculum and instruction. Since the publication of the OT in 1956, psychological and educational research has witnessed the introduction of several theories and approaches to learning which make students more knowledgeable of and responsible for their own learning, cognition, and thinking (e.g., *Constructivism, Metacognition, Self-regulated learning).* All these theories and approaches see learning as “a proactive activity, requiring self-initiated motivational and behavioural processes as well as metacognitive ones” (Zimmerman, 1998, p. 1). The RT has to incorporate these new learner-centered learning paradigms into its structure. *Constructivism*, for example, assumes that students must discover, construct and transform knowledge if they are to make it their own. *Self-regulated learning* (SRL) is the ability to use and develop knowledge, skills and attitudes acquired in one context in another context (Boekaerts, 1999, p. 446). Self-regulated learners identify what task requires in terms of cognitive, motivational, and environmental strategies and determine if their personal resources are adequate to effectively accomplish the task (Ertmer and Newby, 1996, p. 18). Self-awareness, self-monitoring, and self-evaluation are crucial to effective SRL and performance (McCobs, 1989). Metacognition is central to SRL (Kriewaidt, 2001). Some researchers have suggested that SRL is synonymous with metacognition (Brown, Hedberg, & Harper, 1994).

In order to address the weaknesses in the OT and respond to the recent educational and psychological developments, a group of cognitive psychologists, curriculum and instructional researchers, and testing and assessment specialists revised the OT (Anderson et al., 2001). The Revised Taxonomy (RT) includes several significant changes with reference to assumptions, structure and terminology.

Table (1): The Original Taxonomy

1.0 Knowledge
1.10 Knowledge of specifics
1.11 Knowledge of terminology
1.12 Knowledge of specific facts
1. 20 Knowledge of ways and means of dealing with specifics
1.21 Knowledge of conventions
1.22 Knowledge of trends and sequences
1.23 Knowledge of classifications and categories
1.24 Knowledge of criteria
1.25 Knowledge of methodology
1.30 Knowledge of universals and abstractions in a field
1.31 Knowledge of principles and generalizations
1.32 Knowledge of theories and structures
2.0 Comprehension
2.1 Translation
2.2 Interpretation
2.3 Extrapolation
3.0 Application
4.0 Analysis
4.1 Analysis of elements
4.2 Analysis of relationships
4.3 Analysis of organizational principles
5.0 Synthesis
5.1 Production of a unique communication
5.2 Production of a plan, or proposed set of operations
5.3 Derivation of a set of abstract relations
6.0 Evaluation
6.1 Evaluation in terms of internal evidence
6.2 Judgments in terms of external criteria

Revised Taxonomy Structure

The most notable change in the revised taxonomy is the move from *one dimension* to *two dimensions.* Instructional objectives are usually formulated in terms of a *verb-noun* relationship. Thus, statements of objectives typically consist of (a) some subject matter content (i.e. noun or noun phrase) and (b) a description of what is to be done with or to that content (i.e. verb or verb phrase). The verb or verb phrase describes the *cognitive process* involved. In the OT, the *knowledge* category embodied both noun and verb aspects. The noun or subject matter aspect was specified in the *knowledge*'s extensive subcategories. The verb aspect or the *cognitive process* was included in the definition given to *knowledge* in that the learner was expected *to be able to recall or recognize knowledge.* This brought *unidimensionality* to the framework at the cost of the *knowledge* category that was dual in nature (Krathwohl, 2002, p. 213). The Revised Taxonomy separates the *noun* and *verb* components of the original *knowledge* category into *two separate dimensions*: the *Knowledge Dimension* (noun aspect) (Table 2) and the *Cognitive Process Dimension* (verb aspect) (Table 3) (Anderson et al., 2001, p. 308). The OT is presented in table (1) in order to enable readers to grasp the differences between the OT and the RT.

Table (2): Structure of the Knowledge Dimension in the RT

A. Factual Knowledge: The basic elements that students must know to be acquainted with a discipline or solve problems in it.

Aa. Knowledge of terminology

Bb. Knowledge of specific details and elements

B. Conceptual Knowledge: The interrelationships among the basic elements within a larger structure that enable them to function together.

Ba. Knowledge of classifications and categories

Bb. Knowledge of principles and generalizations

Bc. Knowledge of theories, models, and structures

C. Procedural Knowledge: How to do something; methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.

Ca. Knowledge of subject-specific skills and algorithms

Cb. Knowledge of subject-specific techniques and methods

Cc. Knowledge of criteria for determining when to use appropriate procedures

D. Metacognitive Knowledge: Knowledge of cognition in general as well as awareness and knowledge of one's own cognition.

Da. Strategic knowledge

Db. Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge

Dc. Self-knowledge

1) Knowledge Dimension:

As has been mentioned above, the RT has taken into consideration the new developments in cognitive and educational psychology. Thus, the *knowledge* dimension in the RT includes four instead of three categories (Table 2). Three of them include the substance of the knowledge subcategories in the OT, but they were reorganized and renamed to use the terminology, and to recognize the distinctions of cognitive psychology that developed since the publication of the OT. The *new* names for those three *Knowledge* categories are: *Factual, Conceptual, and Procedural*.

The fourth new category, *Metacognitive Knowledge* (Table 2), provides a distinction that was not recognized at the time the OT was developed. *Metacognitive Knowledge* involves knowledge about cognition in general as well as awareness of and knowledge about one's own cognition (Pintrich, 2002).

2) *Pedagogic significance of metacognitive knowledge:*

Metacognitive knowledge of learning strategies enables students to perform better and learn more. Students who know about the different kinds of strategies for learning, thinking, and problem solving will be more likely to use them. Students who know their own strengths and weaknesses can adjust their own cognition and thinking to be more adaptive to diverse tasks and, thus, facilitate learning. It is noteworthy that metacognitive knowledge seems to be related to the transfer of learning, that is, the ability to use knowledge gained in one setting or situation in another (Bransford et al., 1999).

Authors of the RT used Flavell's classification of metacognition (1979): knowledge of strategy, task, and person variables. In the RT, this classification was represented in terms of three types of metacognitive knowledge: (a) Strategic knowledge: students' knowledge of general strategies for learning and thinking, (b) Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge, and (c) Self-knowledge.

Although there are many definitions and models of metacognition, an important distinction is one between (a) knowledge of cognition and (b) the processes involving the monitoring, control, and regulation of cognition (Pintrich, 2004; Pintrich, Wolters, & Baxter, 2000; Schneider & Pressly, 1997). The basic distinction between metacognitive knowledge and metacognitive control or self-regulatory processes *parallels* the two dimensions in the

two-dimensional Taxonomy Table. Metacognitive control and self-regulatory processes are cognitive processes that learners use to monitor, control, and regulate their cognition and learning. As such, they fit under the six cognitive process categories and specific cognitive processes in the RT (Table 2). These processes are well represented in tasks such as checking, planning, and generating. Accordingly, on the *Knowledge* dimension, *Metacognitive knowledge* categories refer only to knowledge of cognitive strategies, not the actual use of those strategies (Pintrich, 2002, p.119).

3) *Cognitive Process Dimension:*

With reference to the *Cognitive Process Dimension*, the number of categories in the OT was retained (i.e. six) but with significant changes. Three categories were renamed, the order of two was interchanged, and those category names retained were changed to verb form to fit the way they are used in instructional objectives. *Knowledge* was renamed *Remember*, *Comprehension* was renamed *Understand*, and *Synthesis* was re-titled *Create. Application, Analysis,* and *Evaluation* were retained, but in their verb forms as *Apply, Analyze,* and *Evaluate.* All the original subcategories were replaced with gerunds, and called *"cognitive processes"* (Table 2).

In addition, the order of *Synthesis/Create* and *Evaluation/evaluate* was interchanged. Anderson et al., (2001, p. 310) indicated that "induction (involved in creating) is a more complex process than deduction. Deduction involves breaking a whole into subparts, evaluating them, and determining whether criteria are met. Induction, on the other hand, involves finding things that could fit together, judging their appropriateness, and assembling them to best meet criteria." This is supported by Ormell (1974, p. 4) who stated that "Synthesis implies more than … mere assembly;… it implies…[that the bits] form an 'organic unity.' And clearly this can not be achieved without…awareness of what will fit together, i.e., of prior imaginative evaluation."

In the RT, the *Cognitive Process Categories* no longer form a cumulative hierarchy. The framework remains a 'kind of ' hierarchy, in the sense that the six major categories of the *Cognitive Process Dimension* are presumed to be ordered in terms of increasing complexity, with *Remember* being less complex than *Understand*, which is less complex than *Apply*, and so on. However, unlike the OT, the six categories are allowed to overlap on a scale of *judged* complexity (Anderson et al., 2001, p. 309). As Krathwohl (2002, p. 215) points out, the categories are allowed to overlap one another. This is most clearly evident in the category *Un-*

derstand. Because its scope has been considerably broadened over *Comprehend* in the OT, some cognitive processes associated with *Understand* (e.g. *Explaining*) are more cognitively complex than at least one of the cognitive processes associated with *Apply* (e.g. *Executing*).

Table (3): Structure of the Cognitive Process Dimension in the RT

1.0 Remember: Retrieving relevant knowledge from long-term memory.
- 1.1 Recognizing
- 1.2 Recalling

2.0 Understand: Determining the meaning of instructional messages. Including oral and graphic communication.
- 2.1 Interpreting
- 2.2 Exemplifying
- 2.3 Classifying
- 2.4 Summarizing
- 2.5 Inferring
- 2.6 Comparing
- 2.7 Explaining

3.0 Apply: Carrying out or using a procedure in a given situation.
- 3.1 Executing
- 3.2 Implementing

4.0 Analyze: Breaking material into constituent parts and detecting how the parts relate to one another and to an overall structure or purpose.
- 4.1 Differentiating
- 4.2 Organizing
- 4.3 Attributing

5.0 Evaluate: Making judgment based on criteria and standards.
- 5.1 Checking
- 5.2 Critiquing

6.0 Create: Putting elements together to form a novel, coherent whole or make an original product.
- 6.1 Generating
- 6.2 Planning
- 6.3 Producing

It is noteworthy that whereas the six categories in the OT were given far more attention than the subcategories, in the RT the 19 *cognitive processes* (Table 3) within the six *cognitive processes* receive the major emphasis.

The move from one dimension to two dimensions in the RT has led to another notable change in the structure of the taxonomy, i.e., the formation of the *Two Dimensional Taxonomy Table* (TT) (Table 4). This table is the *analytical tool* of the revised taxonomy. The TT

reflects a dual perspective on learning and cognition. Having two dimensions to guide the processes of stating objectives and planning and guiding instruction leads to sharper, more clearly defined assessments and a stronger connection of assessment to both objectives and instruction.

The Cognitive Process Dimension

Table (4): The Two Dimensional Taxonomy Table

The Knowledge Dimension	**1. Remember**	**2. Understand**	**3. Apply**	**4. Analyze**	**5. Evaluate**	**6. Create**
A. Factual Knowledge						
B. Conceptual Knoledge						
C. Procedural Knowledge						
D.Metacognitive Knowledge						

The TT emphasizes the need for assessment practices to extend beyond discrete bits of *knowledge and individual cognitive processes* to focus on more complex aspects of learning and thinking. The *cognitive process dimension* calls our attention to the need to find ways of validly and reliably assessing 'higher-order' and metacognitive processes. Knowledge of cognitive strategies, cognitive tasks, and self not only requires different ways of thinking about assessment, but, in the latter case, reintroduces the need to engage in *affective assessment* (Airasian and Miranda, 2002, p. 249).

Potential uses of the taxonomy table

As has been indicated above, the TT has two dimensions: the *knowledge dimension* forms the *vertical axis* and the *cognitive process dimension* forms the *horizontal axis*. The intersections of the two axes form the *cells*. *Rows* represent the *noun(s)* or *noun phrases* in the objective whereas *columns* represent the *verb(s)* in the objective. The TT can be used to:

A) *Analyze the objectives of a unit or a syllabus.*

This analysis provides a *clear, concise, visual representation* of the unit or syllabus which can be used to examine the relative emphasis given to each objective in terms of the two dimensions of the TT. One of the strengths of the RT is the inclusion of annotated authentic teaching vignettes. Authors of the RT collected teachers' descriptions of their everyday teaching to be used to clarify the categories and classifications of the RT and how it can be used to analyze objectives. They report the example of Ms. Airasian, a fifth grade teacher, who described a classroom unit in which she integrates *history* (*Pre-revolutionary War*) with a persuasive *writing* assignment. She listed four objectives. She wanted her students to:

1- Remember the specific parts of the Parliamentary Acts;

2- Explain the consequences of the Parliamentary Acts for different colonial groups;

3- Choose a colonial character or group and write a persuasive editorial stating his/her/its position on the Acts; and

4- Self-and peer edit the editorial.

Based on the *Knowledge Dimension* table (Table 2) and the *Cognitive Processes* table (Table 3) in the RT, the first objective **Remember** is the cognitive process, and 'specific parts of the Parliamentary Acts' is **Ab. Knowledge of specific details or elements,** a subcategory of **A. Factual Knowledge.** Thus, this objective is placed, in the TT (Table 4), in *cell A1*. **Explain,** in the second objective, is the seventh *cognitive process*, **2.7 Explaining,** under **2. Understand.** Since the students is asked to explain the 'consequences of the Parliamentary Acts,' we can *infer* that 'consequences' refers to generalized statements about the Acts' after-effects and is closest to **Bc. Knowledge of theories, models, and structures.** The type of knowledge, then, would be **B. Conceptual Knowledge.** This objective would be classified in the TT in *cell B2*.

The key verb in the third objective is **'Write.'** Writing is **6.3 Producing**, a process within **6. Create**. To describe ' his/her/its position on the Acts' would require some combination of **A. Factual Knowledge** and **B. Conceptual Knowledge**, so this objective would be classified in *two cells: A6* and *B6*. Finally, the fourth objective involves the verbs '*self-edit'* and '*peer-edit.'* **Editing** is a type of **evaluation**, so the process involved is **5. Evaluate.** The

process of evaluation will involve *criteria*, which are classified as **B. Conceptual Knowledge,** so the fourth objective would fall in *cell B5*.

The completed TT for this unit's objectives is shown in Table 5. From this table, one can quickly *visually* determine the extent to which the more complex categories are represented. Only one objective deals with the **Remember** category; the others involve cognitive processes that are generally recognized as the more important and long-lasting fruits of education- the more complex ones.

The Cognitive Process Dimension

Table (5): The classification of objectives in the Taxonomy Table

The Knowledge Dimension	**1. Remember**	**2. Understand**	**3 Apply**	**4. Analyze**	**5. Evaluate**	**6. Create**
A. Factual Knowledge	Objective 1					Objective 3
B. Conceptual Knowledge		Objective 2			Objective 4	Objective 3
C. Procedural Knowledge						
D.Metacognitive Knowledge						

Besides showing what was included, the TT also shows *what might have been included.* Thus, in table (5), the two blank bottom rows raise questions about whether there might have been procedural or metacognitive knowledge objectives that could have been included. For instance, are there procedures to follow in editing that the teacher could explicitly teach the students. Alternatively, is knowledge of the kinds of errors common in one's own writing and preferred ways of correcting them an important metacognitive outcome of self-editing that could have been emphasized? (Krathwohl, 2002, p. 217). Hence, the TT causes teachers to look at blank areas and *reflect* on their instruction. Teachers can improve their instruction by 'raising the learning targets' (Raths, 2002) in terms of *cognitive complexity* (i.e., focusing on

increasingly more complex cognitive processes, particularly *Analyze, Evaluate, and Create*) and *type of knowledge* (particularly *metacognitive* knowledge). Raising the learning targets may lead to *meaningful learning*. Meaningful learning requires that instruction go beyond simple presentation of *Factual Knowledge* and that assessment tasks require more of students than simply *recalling* or *recognizing Factual Knowledge* (Mayer, 2002,p. 227).

B) *Help teachers not to confuse activities with objectives.*

The TT can be used to classify the instructional and learning activities used to achieve the objectives, as well as the assessments employed to determine how well the objectives were mastered by the students (Krathwohl, 2002, p. 217)). Examination of the *annotated authentic teaching vignettes* revealed an important observation. As teachers cited their unit's goals, they wrote down *activities*, not *objectives*. For example, the third objective in Ms. Airasian's unit, mentioned above, was: *'students will write persuasive editorials stating their opinions about the Parliamentary Acts'*. This is an *activity* and not an *objective.* Authors of the RT *presumed* that the *actual objective* of the unit would be reflected in her answer to the question *'What do you want students to learn as a result of writing these editorials?'* In short, her *real objective* is more *tacit* than *explicit*. Implicit objectives make the assessment phase of teaching more difficult (Raths, 2002, p. 234).

C) *Help teachers realize the relationship between assessment and teaching/learning activities*

Airasian and Miranda (2002, p. 250) provide an interesting example to show how assessment is influenced by instruction. Consider an objective frequently given by English teachers: "*Students will learn to state the main idea of a short story*." In this objective the critical verb is "state" and the noun phrase is "main idea of a short story." But there are many ways students can learn to state a main idea:

- Students can state the main idea by remembering what the teacher has told them about the story's main idea during instruction (e.g., "This is the main idea of short story A.").

- Students can also state the main idea based on inferences they make from key information provided in the short story. In this case, students learn by understanding (since *inferring* lies within *Understand* in the TT).

- Alternatively, students can state a story's main idea by following a set of steps the teacher has taught them to help find main ideas, or *applying procedural knowledge*.

- Finally, students can state the main idea by differentiating key points from supporting details. In this case, because *differentiating* lies within *Analyze* in the TT, students would learn by analyzing.

In a classroom assessment, then, test items or assessment tasks for the objective "Students will learn to state the main idea of a short story" could focus on *remembering factual knowledge, understanding, applying procedural knowledge, or analyzing*.

D) *Examine Curriculum alignment*

Curriculum alignment is the process of organizing three key elements in a classroom so that they are closely matched (aligned). The three elements are (a) instruction and materials, (b) objectives or standards and (c) tests. The supposition is that the most efficient and effective student learning will result when classroom instruction and materials align with objectives or standards and these align with tests (Gorin and Blanchard, 2004, p. 2). English (1992) considers curriculum alignment a process that improves the agreement between the written, the taught, and the tested curriculum. Research on curriculum alignment tends to favour alignment as a positive influence on achievement (English & Steffy, 2001).

Anderson (2002, p. 258) proposes that the Taxonomy Table can be a useful framework for estimating curriculum alignment in all subject matters at virtually every grade or school level. By replacing topics with types of knowledge, the Taxonomy Table can be used with all subject matters. Alignment estimates using the Taxonomy Table are based on curriculum units or entire courses, not individual lessons.

First, each objective is placed in its appropriate cell or cells of the Taxonomy Table. The verbs and nouns included in the statement of the objective are used to place the objective in the proper cell. Second, each instructional activity (and accompanying support materials) is similarly placed in its appropriate cell, based once again on clues provided by verbs and nouns included in the description of the activity. Third, using clues from included verbs and nouns, each assessment task (whether it be a performance assessment or one of a series of test items) is placed in its appropriate cell. In the case of traditional tests, each item is considered an assessment task and placed appropriately. Fourth, the three completed Taxonomy Tables,

one each derived from the analysis of the objectives, instructional activities and materials, and assessments, are compared. Complete alignment is evidenced when there are common cells included on all three completed Taxonomy Tables. That is, the objective, instructional activities and materials, and assessments all fall into the same cell (e.g., understand conceptual knowledge). Partial alignment also exists. For example, the objective, instructional activities and materials, and assessments may all fall into the same row (i.e., type of knowledge), but differ in terms of the column in which they are classified (i.e., cognitive process category). Similarly, the objective, instructional activities and materials, and assessments may all fall into the same column, but differ in terms of the row in which they are classified. Partial alignment provides potentially useful diagnostic information to teachers who want to improve their curricular alignment. Moving an instructional activity from an emphasis on factual knowledge to an emphasis on procedural knowledge, or from understand to analyze may be worth the effort if alignment is substantially improved.

Authors of the RT (Anderson, et al., 2001) provide the Parliamentary Acts vignette (Table 6) as an example of curriculum alignment. We can observe from the table strong alignment of assessment, objectives, and instruction in some cells (e.g., cells A1, A6, B2, and B6) and partial alignment in others (e.g., B2 and B5). We can also observe a blank row (i.e., *metacognitive knowledge*). Hence, the TT causes teachers to look at partial alignment, misalignment, and blank areas and *reflect* on their instruction to improve *curriculum alignment*.

The Cognitive Process Dimension

Table (6): Analysis of the Parliamentary Acts vignette based on stated objectives, instructional activities, and assessment.

The Knowledge Dimension	**1. Remember**	**2. Understand**	**3. Apply**	**4. Analyze**	**5. Evaluate**	**6. Create**
A. Factual Knowledge	Objective 1 Activities Assessment					Objective 3 Activities Assessment
B. Conceptual Knowledge		Objective 2 Activities Assessment		Activities	Objective 4 Activities	Objective 3 Activities Assessment
C. Procedural Knowledge			Activities Assessment			
D. Metacognitive Knowledge						

Implications for prospective teachers and teachers

The taxonomy table may provide a framework within which prospective teachers as well as teachers can model not only the way they teach but also the way they examine and analyze their teaching. They should learn that they can only judge the effectiveness of their teaching in terms of what students actually learn. Hence, the RT moves prospective teachers away from a "best practice" approach to teaching (Byrd 2002, p. 248). Prospective teachers, as well as teachers, should ***collaboratively*** engage in meaningful dialogues about answers to such questions: "What is the student supposed to learn from his or her participation in this activity? What knowledge is to be acquired or constructed? What cognitive processes are to be employed?" Without answers to these questions, it is impossible to properly classify instructional activities in terms of the Taxonomy Table. This provides a good exercise in reflective practice (Amer, 2004).

Conclusion

The Original Bloom's taxonomy and the Revised Bloom's taxonomy were compared with reference to their underlying assumptions and structures in order to show how the Revised taxonomy overcame the limitations and weaknesses of the Original taxonomy. The pupose is to highlight the pedagogically significant features of the Revised taxononmy (e.g., the move from one dimension to two dimensions, the inclusion of the metacognitive knowlege catogory, the inclusion of the taxonomy table). The potential uses of the Revised taxonomy with referente to curriculum and instruction were also highlighted.

References

Airasian, W. & Miranda, H. (2002). The role of assessment in the Revised Taxonomy. *Theory Into Practice, 41* (4), 249-254.

Amer, Aly. (2004). A Lifelong Learning Approach to Pre-Service Teacher Education and In-Service Professional Development. Paper Presented at: The Third International Conference: "Towards Better Education of Prospective Teachers" Sultan Qaboos University, College of Education, Muscat, Oman, 1-3 March 2004.

Anderson, L. (2002). Curricular realignment: A re-examination. *Theory Into Practice, 41* (4), 255-260.

Anderson, L., Krathwohl, R., Airasian, P., Cruikshank, K., Mayer, R., Pintrich, P., Raths, J., & Wittrock, M. (Eds.) (2001). *Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy.* New York, NY: Longman.

Bloom, B. (1994). Reflections on the Development and Use of the Taxonomy. In Anderson, L. Sosniak, L (Eds.) *Bloom's Taxonomy: A Forty-Year Retrospective*. Chicago: The National Society for the Study of Education, pp.1-8.

Bloom, B., Engelhart, M., Furst, E., Hill, W., & Krathwohl, D. (Eds.) (1956). Taxonomy of Educational Objectives: *The Classification of Educational Goals, Handbook I: Cognitive Domain.* New York: David McKay.

Boekaerts, M. (1999). Self-regulated learning: where are we today? *International Journal of Educational Research, 31*, 445-457.

Bransford, J., Brown, A., & Cocking, R. (1999). *How people learn: Brain, mind, experience, and school.* Washington, DC: National Academy Press.

Brown, C., Hedberg, J., & Harper, B. (1994). Metacognition as a basis for learning support software. *Performance Improvement Quarterly, 7* (2), 3-26.

Byrd, P. (2002). The revised taxonomy and prospective teachers. *Theory Into Practice*, *41* (4), 244- 248.

English, F. (1992). *Deciding what to teach and test: Developing, aligning, and auditing the curriculum.* Newbury Park, CA: Corwin Press.

English F., & Steffy, B. (2001). *Deep curriculum alignment.* Lanham, Maryland: Scarecrow.

Ertmer, P. & Newby, T. (1996). The expert learner: Strategic, self-regulated and reflective. *Instructional Science, 24*, 1-24.

Flavell, J. (1979). Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist,34*, 906-911.

Furst, E. (1994). "Bloom's Taxonomy: Philosophical and Educational Issues." In Anderson, L. and Sosniak, L. (Eds.) *Bloom's Taxonomy: A Forty-Year Retrospective* (pp. 28-40) Chicago: The National Society for the Study of Education.

Gorin, J. & Blanchard, J. (2004). *The Effect of Curriculum Alignment on Elementary Mathematics and Reading*. Paper presented at the 2004 Annual Meeting of the American Educational Research Association in San Diego, CA, April 12- 16.

Krathwohl, D. (2002). A revision of Bloom's taxonomy: An overview. *Theory Into Practice, 41*(4), 212-218.

Kreitzer, A. and Madaus, G. (1994). "Empirical Investigations of the Hierarchical Structure of the Taxonomy." In Anderson, L. and Sosniak, L. (Eds.) *Bloom's Taxonomy: A Forty-Year Retrospective* (pp. 64-81).Chicago: The National Society for the Study of Education.

Kriewaldt, J. (2001). A thinking geography curriculum. *Interaction, 29*, 4. Retrieved on 22/3/05

at:http://www.gtav.asn.au/Interaction/issues/v29n4_dec01/metacognition.htm

McCombs, B. (1994). Self-regulated learning and academic achievement: A phenomenological view. In B. Zimmerman & D. Schunk. (Eds.) *Self-regulated learning and academic achievement: Theory, research, and practice* (pp. 51-82). New York: Springer Verlag, Publishers,

Ormell, C.P. (1974-1975). Bloom's Taxonomy and the Objectives of Education. *Educational Research, 17*, 3-18.

Pintrich, P. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review, 16*, 4, 385-407.

Pintrich, P. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. *Theory Into Practice, 41, 4*, 119-225.

Pintrich, P., Wolters, C., & Baxter, G. (2000). Assessing metacognition and self-regulated learning. In G. Schraw and J. Impara (Eds.) *Issues in the measurement of metacognition* (pp. 43- 97). Lincoln. NE: Buros Institute of Mental Measurements,

Rath, J. (2002). Improving Instruction. *Theory Into Practice*, 41, 4, 233-237.

Schneider, W. & Pressley, M. (1997). *Memory development between two and twenty.* Mahwah, NJ: Lawrence Erlbaum Associates.

Zimmerman, B. (1998). Developing self-fulfilling cycles of academic regulation: An analysis of exemplary instructional method. In D. Schunk and B. Zimmerman (Eds.) *Self regulated learning: From teaching to self-reflective practice.* New York: The Guilford Press.

1. To examine the reflection of Bloomâ€™s revised In Secondary School Certificate Examination of taxonomy in the social science questions of Bangladesh, the pattern of questioning which is Secondary School Certificate Examination of being used is open ended questions (subjective) and Dhaka board. multiple choice questions (objective).Earlier the 2. To compare the level of applying Bloomâ€™s trend of items selected. for the questions was mostly revised taxonomy in the questions before and knowledge based. However, from 2011, the after creative question has been set. questioning pattern has been changed to creative questioning which involves use of the sub-domains 4. Rationale of cognitive domain of Bloomâ€™s revised taxonomy. A revised version of Bloomâ€™s Taxonomy was released by a group of cognitive psychologists, curriculum theorists and instructional researchers in 2001 with the title A Taxonomy for Teaching, Learning, and Assessment. This title draws attention aside from the somewhat static concept of â€œeducational objectivesâ€ (in Bloomâ€™s original title) and points to a more dynamic perception of classification. THEORY INTO PRACTICE / Autumn 2002 Revising Bloomâ€™s Taxonomy. David R. Krathwohl. A Revision of Bloomâ€™s Taxonomy: An Overview. Downloaded by [Orta Dogu Teknik Universitesi] at 12:19 04 November 2012. T.Â Bloom saw the original Taxonomy as more than a measurement tool. He believed it could serve as a. â€¢ common language about learning goals to facili-tate communication across persons, subject matter, and grade levels