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# The Role of Assessment in the Revised Taxonomy

AS MENTIONED PREVIOUSLY, one of the major differences between the original Taxonomy and the revised Taxonomy is that the original Taxonomy consisted of a single dimension; the revised Taxonomy 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 power of assessments, regardless of whether they take the form of a classroom quiz, a standardized test, or a statewide assessment battery, resides in their close connection to objectives and instruction. The Taxonomy Table is a useful tool for carefully examining and ultimately improving this connection.

## **Assessment Implications of the Revised Taxonomy**

Regarding assessment, the two-dimensional Taxonomy Table 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. It also provides a way to better understand a broad array of assessment models and ap-

plications. Finally, the Taxonomy Table reinforces the perspective of the authors of the original Taxonomy that different types of objectives require different types of assessment, whereas similar types of objectives (regardless of subject matter) require similar approaches to assessment.

The Cognitive Process dimension calls our attention to the need to find ways of validly and reliably assessing so-called “higher-order” processes. One of the purposes of the original Taxonomy was to illustrate how multiple-choice test items could be used to test various taxonomic levels. Are these tests still useful in this regard, or are new assessment techniques needed? The Knowledge dimension emphasizes the need to find ways of validly and reliably assessing metacognitive knowledge. 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. The need to assess higher-order cognitive processes and metacognitive knowledge poses challenges for all who are engaged in the assessment field.

It is generally understood, but it bears repeating, that the information obtained during the assessment process is influenced to a great extent by what has preceded it during the instructional process, particularly as both processes (instruction and assessment) are aligned with the stated objective. If

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the three components are well aligned, the assessment results are likely to be reasonably valid. Conversely, if the three components are not well aligned, the assessment results will be of questionable validity.

Consider an educational 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 multiple ways students can learn to state a main idea. For example, 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 Taxonomy Table). 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 Taxonomy Table, students would learn by analyzing. In a classroom or statewide 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.

To avoid this confusion, we have suggested that the 19 cognitive processes identified in the revised Taxonomy (or, alternatively, the six process categories) should be used as the verbs when stating objectives. Ambiguous verbs such as "state," "list," "demonstrate," and so on, should be used with great care because many of these terms are more applicable to assessment than to learning. For example, students can *demonstrate* that they have remembered what they should have remembered. At the other end of the spectrum, they can *demonstrate* the results of an extremely creative process. In between, they can *demonstrate* their ability to understand, apply, analyze, and evaluate.

Another benefit of the revised Taxonomy is to focus on methods of assessment linked with par-

ticular types of objectives. Consider, for example, the following three objectives:

- Students can remember addition facts totaling 40.
- Students can recall definitions of social studies terms.
- Students can recall important dates in the Civil War.

Each of these objectives focuses on a different subject area: mathematics, social studies, and history. Yet, because all three objectives are examples of remembering factual knowledge, the appropriate test items or assessment tasks will all be quite similar. For example:

- List all pairs of whole numbers that sum to 40.
- List the social studies terms that match the following definitions.
- List the dates on which the following events in the Civil War took place.

Thus, objectives as varied as remembering the alphabet, remembering the names for parts of a cell, remembering the location of cities on a map, remembering key facts about various countries, and other "remember factual knowledge" objectives will typically be assessed by asking students to "state," "list," "label," or "name" the relevant factual knowledge.

There are similar generalized assessment formats and approaches for understanding conceptual knowledge and applying procedural knowledge. We know from the revised Taxonomy that conceptual knowledge includes categories, principles, and models. One way to determine if students understand a particular category, for example, is to have them determine whether a particular instance or example falls within the category. In the revised Taxonomy, this cognitive process would be termed *classifying*, which lies within *Understand*. It is important to note that this approach to assessment is applicable regardless of the specific category included in the objective (e.g., rational numbers, sonnets, arachnids, civil law, or impressionist paintings). One possible assessment format for all of these would be: "Here is an example. Is this an example of X?" where X could be replaced by a rational number, sonnet, and so on.

### Using the Taxonomy Table to Examine Assessment

In order to critically examine and refine the revised Taxonomy, we asked six teachers, working at a variety of grade levels, to describe actual instructional units they had taught in their main subject area. A great deal of information about the teachers' units and the usefulness of the revised Taxonomy, particularly the Taxonomy Table, derived from our examination of these written vignettes. In particular, the use of the Taxonomy Table on the teachers' vignettes provides useful information about the validity of classroom and statewide assessments as evidenced by the alignment of the assessments with both objectives and instructional activities.

We illustrate this feature of the Taxonomy Table by analyzing the Parliamentary Acts vignette in terms of the stated objectives, the instructional activities, and the assessments. Figure 1 summarizes the placement of the teacher's four stated objectives in the Taxonomy Table. Note that one of the objectives is placed in two cells of the Taxonomy Table. This objective states that students should be able to choose a colonial character or group and write a persuasive editorial stating his/her/its position. Writing such an editorial is a creative process that requires two types of knowledge: factual knowledge (e.g., specific details about various colonial characters) and conceptual knowledge (e.g., criteria that define good persuasive writing). Brief statements of all four objectives are included at the bottom of Figure 1.

Subsequent to identifying the intended objectives, the teacher turned her attention to instruction. The planned instructional activities required 10 days to complete. Since instructional activities are not the primary focus of this article, they are simply listed in terms of the sequence and number of days for sets of activities. These are shown in Figure 2. To examine the connection between the activities and objectives, the objectives shown in Figure 1 are repeated in Figure 2.

In most cases, the instructional activities are closely aligned with the objectives. Specifically, there are instructional activities related to each of the four objectives (cells A1, A6, B2, B5, and B6). There are two cells of the table (B4 and C3) that have instructional activities but no stated objectives.

The final piece of the vignette concerns the assessments. The placement of the assessments used by the teacher in terms of the Taxonomy Table is shown in Figure 3. The placement of both the objectives and instructional activities in the Taxonomy Table as shown in Figure 1 and Figure 2 are reproduced in Figure 3.

As the key at the bottom of Figure 3 indicates, the teacher used three assessments: classroom questions and informal observations (Assessment A), a quiz (Assessment B), and a performance assessment (namely, the writing of a persuasive editorial) (Assessment C). As shown in the figure, the quiz was intended to assess student mastery of the first objective ("Remember specific parts of the Parliamentary Acts"). Classroom questions and informal observations were intended to assess student mastery of the second objective ("Explain the consequences of the Parliamentary Acts for different colonial groups"). And, the performance assessment was intended to assess student mastery of the third objective ("Choose a colonial character or group and write a persuasive editorial stating his/her/its position").

The completed Taxonomy Table shown in Figure 3 indicates strong alignment of assessment, objectives, and instruction in the unit, particularly evidenced in cells A1, A6, B2, and B6. It is noteworthy that the performance assessment is in multiple cells because 10 criteria are involved in evaluating the editorial. One or more of the criteria are placed in A6, one or more in B6, and one or more in C3.

In light of this high degree of alignment, two of the other cells, C3 and B5, are worthy of comment. In Cell C3, we have some activities and one or more criteria related to the persuasive essay, but we do not have an explicitly stated objective. In B5, on the other hand, we have an explicitly stated objective and several days of activities, but we do not have any direct assessment. Finally, we could envision a cell in which we have an explicitly stated objective and a direct assessment, but no instructional activities. These three cells indicate three types of misalignment involving assessment. Cell C3 illustrates what has been termed "instructional sensitivity" (i.e., the assessment is "sensitive" to instruction) (Haladyna & Roid, 1981). Cell

**The Cognitive Process Dimension**

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

Key

Objective 1: Remember the specific parts of the Parliamentary Acts.

Objective 2: Explain the consequences of the Parliamentary Acts for different colonial groups.

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

Objective 4: Self- and peer edit the editorial.

**Figure 1.** An analysis of the Parliamentary Acts vignette based on stated objectives.

**The Cognitive Process Dimension**

<b>The Knowledge Dimension</b>	<b>1. Remember</b>	<b>2. Understand</b>	<b>3. Apply</b>	<b>4. Analyze</b>	<b>5. Evaluate</b>	<b>6. Create</b>
<b>A. Factual Knowledge</b>	<b>Objective 1</b> Days 2, 3, & 5 Activities					<b>Objective 3</b> Days 8-10 Activities
<b>B. Conceptual Knowledge</b>		<b>Objective 2</b> Days 1, 4-7 Activities		Days 6-7 Activities	<b>Objective 4</b> Days 8-10 Activities	<b>Objective 3</b> Days 8-10 Activities
<b>C. Procedural Knowledge</b>			Day 4 Activities			
<b>D. Metacognitive Knowledge</b>						

Key

Objective 1: Remember the specific parts of the Parliamentary Acts.

Objective 2: Explain the consequences of the Parliamentary Acts for different colonial groups.

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

Objective 4: Self- and peer edit the editorial.

**Figure 2.** An analysis of the Parliamentary Acts vignette based on stated objectives and instructional activities.

**The Cognitive Process Dimension**

<b>The Knowledge Dimension</b>	<b>1. Remember</b>	<b>2. Understand</b>	<b>3. Apply</b>	<b>4. Analyze</b>	<b>5. Evaluate</b>	<b>6. Create</b>
<b>A. Factual Knowledge</b>	<b>Objective 1</b> Days 2, 3, & 5 Activities <i>Assessment B</i>					<b>Objective 3</b> Days 8-10 Activities <i>Assessment C</i>
<b>B. Conceptual Knowledge</b>		<b>Objective 2</b> Days 1, 4-7 Activities <i>Assessment A</i>		Days 6-7 Activities	<b>Objective 4</b> Days 8-10 Activities	<b>Objective 3</b> Days 8-10 Activities <i>Assessment C</i>
<b>C. Procedural Knowledge</b>			Day 4 Activities <i>Assessment C</i>			
<b>D. Metacognitive Knowledge</b>						

Key

Objective 1: Remember the specific parts of the Parliamentary Acts.

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Objective 4: Self- and peer edit the editorial.

*Assessment A*: Classroom Questions and Informal Observations

*Assessment B*: Quiz

*Assessment C*: Performance Assessment (editorial, with 10 evaluation criteria)

**Figure 3.** An analysis of the Parliamentary Acts vignette based on stated objectives, instructional activities, and assessments.

B5 illustrates what might be termed “assessment-free” curriculum and instruction. The “envisioned cell” illustrates the traditional concept of “content validity,” where concerns for students’ opportunities to learn the content are minimal.

### Conclusion

Severe misalignment of assessment, objectives, and instruction can cause numerous difficulties. If, for example, instruction is not aligned with assessment, even the highest quality instruction will likely not lead to high student performance on the assessments. As mentioned previously, by focusing on the Taxonomy Table we can increase the alignment of assessment with both objectives and instruction.

In addition to its use in classroom instruction and assessment, the Taxonomy Table can also be used to analyze the results of statewide assessments in terms of their possible and likely impact on curriculum and instruction. Increasingly, teachers and their students are confronted with statewide standards and corresponding statewide assessments. These high-stakes assessments have become consequential for both students and teachers. Using the Taxonomy Table to increase the alignment of school-wide or district-wide curriculum and instruction with state standards and state-mandated assessments will enable teachers to focus on the standards without “teaching to the test.”

Because the Taxonomy Table focuses on student learning rather than student performance, it

emphasizes the need to focus on the cognitive processes and types of knowledge required to achieve the standards, rather than the specific or general types of items included on the statewide assessments. Once determined, this knowledge of relevant cognitive processes and types of knowledge (a kind of educator metacognitive knowledge) can be used to make necessary adjustments in curriculum and in-

struction that are needed to improve the effectiveness of the entire educational system.

### **Reference**

Haladyna, T. & Roid, G. (1981). The role of instructional sensitivity in the empirical review of criterion-referenced test items. *Journal of Educational Measurement*, 18, 39-53.

**TIP**

