**Assessing Learning Objectives with Bloom's Revised Taxonomy**

**Why is it a Good Practice?**

Updating and reimagining Agricultural Education and Training (AET) programs and curriculum should begin with a clear specification of the educational goals and objectives that will drive instructional activities that will be used to support learning. Instruction and learning activities must align with written goals and objectives in order to ensure that learning activities and assessments are focused and germane to future AET employment and entrepreneurial challenges. Bloom's revised taxonomy is an effective tool for writing, organizing, and analyzing learning goals and objectives. Bloom's revised taxonomy allows AET faculty and instructors to effectively work with large amounts of complex information in order to bring more precision to applied practice.

**How is Bloom's Revised Taxonomy Used?**

Practitioners employing Bloom's revised taxonomy can describe and represent learning objectives using the two-dimensional taxonomic structure illustrated in Table 1. Table 1 illustrates that the intersection of the six categories of the cognitive process dimension and four categories of the knowledge dimension form twenty-four discrete cells which afford educators the opportunity to precisely classify learning objectives based upon the level (cognitive process) and type (knowledge dimension) of cognitive processing they require of learners. Practitioners can then assess whether or not the learning objectives they are using are requiring sufficient levels of cognitive engagement and complexity.

Table 1. *A two-dimensional illustration of the relationship between the knowledge and cognitive processing dimensions of Bloom's revised taxonomy*

| | Cognitive Process Dimension | | | | | |
|---|---|---|---|---|---|---|
| Knowledge Dimension | Remember | Understand | Apply | Analyze | Evaluate | Create |
| Factual | A1 | A2 | A3 | A4 | A5 | A6 |
| Conceptual | B1 | B2 | B3 | B4 | B5 | B6 |
| Procedural | C1 | C2 | C3 | C4 | C5 | C6 |
| Metacognitive | D1 | D2 | D3 | D4 | D5 | D6 |

Note. Adapted from Krathwohl, 2002. p. 216.

Any individual learning objective will fall under one of the six discrete categories of cognitive processing and at the same time will also be linked to one of the four discrete categories of knowledge dimension. The object in a learning objective statement is used to determine whether the learning objective is supporting factual, conceptual, procedural, or meta-cognitive knowledge acquisition and the verb in a learning objective statement is used to determine which cognitive process dimension is being applied in the learning process: remembering, understanding, applying, analyzing, evaluating, or creating. Learning objectives placed in the upper left hand corner of the taxonomic table tend to be more concrete, simple, structured, and require less learner independence. And as the taxonomic niches traverse the table diagonally toward the lower right hand corner the learning objectives tend to be more abstract, complex, open, multifaceted, and require greater learner independence.

Table 2 illustrates three example learning objectives and their classifications. Table 2 illustrates that the object in learning objective one was as follows: the 16 essential elements all plants need for life, growth and reproduction. Learning objective one required learners to demonstrate a type of knowledge that represents a basic building block which would be utilized in the construction of different types of knowledge. More specifically the object of the learning objective sentence required students to demonstrate knowledge of technical vocabulary, a type of factual knowledge. Therefore, learning objective one was classified as being within the factual knowledge category of the knowledge dimension of Bloom's revised taxonomy.

Table 2. *Example learning objective statements and their classifications*

| Learning Objective Statement | Classification |
|---|---|
| Identify the 16 essential elements all plants need for life, growth, and reproduction | A1 |
| Analyze the relationship between the design of a landscape and its impact on the surrounding ecosystem | B4 |
| Evaluate the efficacy of animal care plans based on real-time data | C5 |

Table 2 demonstrates that the verb in learning objective one required learners to identify information. In this case, to identify the required information depends only on the learners' ability to recognize or recall, therefore, learning objective one was classified as being within the remember category of the cognitive process dimension of Bloom's revised taxonomy. Once both dimensions of a learning objective have been classified it can be placed into one of the 24 cells created by the intersection of the knowledge and cognitive process dimensions of the taxonomic table illustrated in Table 1. Using Table 1 as a guide, objective one would most appropriately be placed in cell A1 at the upper left hand corner of the taxonomic table.

Table 2 illustrates that the object in learning objective three was as follows: the efficacy of animal care plans based on real-time data. The object of the learning objective sentence required students to demonstrate knowledge of subject specific techniques, as well as, knowledge of criteria for determining when to use appropriate medical procedures. Therefore, learning objective three was classified as being within the procedural knowledge category of the knowledge dimension of Bloom's revised taxonomy. Table 2 demonstrates that the verb in learning objective three required learners to evaluate situations based upon data. In order to demonstrate the ability to complete the required evaluations learners must be able to enact appropriate interpretation and appraisal techniques that lead to accurate judgments. Therefore, learning objective three was classified as being within the evaluate category of the cognitive process dimension of Bloom's revised taxonomy. Utilizing Table 1 as a guide, objective three would most appropriately be placed in cell C5 at the lower right hand corner of the taxonomic table.

Table 3 lists verbs that can be utilized to design learning objectives that target the six levels of cognitive processing described in Bloom's revised taxonomy. Including appropriate action verbs into learning objectives will help AET faculty and instructors ensure that they are explicitly defining the level of cognitive processing they are requiring of their students.

Table 3. *Example learning objective action verbs*

| Remember | Understand | Apply | Analyze | Evaluate | Create |
|---|---|---|---|---|---|
| listing | explaining | calculating | attributing | scoring | generating |
| defining | interpreting | demonstrating | differentiating | critiquing | composing |
| reciting | Comparing | operating | detecting | justifying | integrating |
| matching | Classifying | implementing | contrasting | valuing | transforming |

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