Writing Student Learning Outcomes with the Help of Bloom's Taxonomy
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Editor's note: Robert Nash is an educational media writer and instructional designer. Michelle Wild is a computer science instructor. The following article is an excerpt taken from a training manual being written by Bob and Michelle. Their article explains how to write good student learning outcome statements. They also show how Bloom's famous taxonomy can be incorporated into the process.

Problem:
    Your students don't seem to understand what they are supposed to study and learn in your course.
    Your dean is pressuring you to produce more specific and measurable student learning outcomes.
    Your students are doing well on multiple-choice and true/false tests, but are not as successful on essay tests or test items that require them to break down or apply concepts learned in class.

Theory:
    Following the 1948 Convention of the American Psychological Association, Benjamin Bloom took a lead in formulating a classification of intellectual behaviors important in learning. This became a taxonomy that included three overlapping domains: the cognitive, psychomotor, and affective.
    For the cognitive domain, Bloom identified six levels—from the simple recall or recognition of facts (the lowest level) to the more complex synthesis and evaluation of ideas (the highest levels). For each level, specific learning behaviors were defined as well as appropriate descriptive verbs that could be used for writing instructional outcomes. For example:

Level 1 – *Knowledge* -- Basic recall of information: define, identify, label, list, match, name, order, recall, recognize, state.
Level 2 – *Comprehension* -- Understand the meaning and interpretation of information and problems: classify, describe, discuss, explain, express, report, restate, review, translate.
Level 3 – *Application* -- Apply what was learned in the classroom to novel situations: apply, choose, demonstrate, dramatize, employ, illustrate, interpret, operate, practice, schedule, sketch, solve, use, write.
Level 4 – *Analysis* – Break down material or concepts into component parts so that the organizational structure may be understood: analyze, appraise, categorize, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test.
Level 5 – *Synthesis* – Use component parts to form a new whole, with emphasis on creating a new meaning or structure: arrange, assemble, collect, compose, construct, create, design, develop, formulate, manage, organize, plan, prepare, propose, set up.
Level 6 – *Evaluation* -- Judge the value of material: appraise, argue, assess, defend, estimate, judge, predict, rate, support, value, evaluate.

    Bloom found that over 95% of the test questions students encounter require them to think only at the lowest possible level—knowledge—the simple recall of information, requiring only rote memorization. While most quizzes and exams assess performance at the lowest levels of the taxonomy, research has shown that students remember more when they have learned to handle (process) the topic at higher levels of the taxonomy.

Application:

    Teaching students to learn course material at a higher level requires the instructor to not only evaluate students using exam questions that involve more than rote memorization and basic comprehension, but also requires faculty to present information in class and create activities that require higher-order thinking skills.

The following steps can be used to help integrate higher-order thinking skills into your classes as they are being created:

1. Analyze your course content, determine what you want students to be able to do after completing the course successfully, and identify what level of learning they should reach in Bloom's taxonomy.
2. Write course-level learning outcomes and lesson-level learning outcomes using appropriate verbs.
3. Present content using teaching and learning strategies that are appropriate for the outcomes and the level of learning expected.
4. Design and or recommend practice exercises and assignments to help students achieve the appropriate level of learning.
5. Assess and evaluate assignments and provide feedback to improve student learning.

    If test and evaluation items are used that only require lower-level thinking skills such as knowledge and comprehension, students will not develop and use their higher-order skills even if instructional methods that employ these skills are implemented. This follows the maxim that individuals do not do what is expected, only what is inspected. (See "What you measure is what you get" at http://chiron.valdosta.edu/whuitt/papers/wymiwyg.html)

    A key step in this procedure is writing effective learning outcomes. A comprehensive or "operational" student learning outcome often includes three elements:

A. Behavior: A description of the behavior or actions that will demonstrate learning has occurred. (Use action verbs from the appropriate level of Bloom's taxonomy.) Examples
    - Define the terms…
    - Identify the concept that explains…
    - List the steps in the process of…
    - Compare and contrast the two ideas…
    - Compute the correct…
    - Explain the central argument of…
    - Describe the difference between…
    - Differentiate among …
    - Construct a lesson plan…
    - Design a computer network…

B. Conditions: A description of the conditions under which the behavior is demonstrated. This includes any tools or information the students will receive when they are asked to demonstrate what they've learned. Examples:
    - Given ten drawings of geometric figures…
    - Given a paragraph…
    - Given data for the first two variables…
    - Given an illustration of the concept…

C. Standard: A description of the standard or criteria that will be used to evaluate success, that is, how well the learner must perform for you to say he or she has achieved the outcome. Examples:
    - All of the…
    - At least 80% of…
    - In the correct order…
    - The correct answer…
    - That reflects the principles of…

See if you can identify the three elements in each of these sample learning outcome statements:

Learning Outcome Statement 1: Given a list of 10 proposed hypotheses, correctly classify at least eight as either "testable" or "not testable" according to accepted scientific method.

a. Behavior: Classify "testable" and "not testable" hypotheses (Bloom Level 2, comprehension)
b. Condition: Given a list of 10 proposed hypotheses
c. Standard: Correctly classify 8 of the 10

Learning Outcome Statement 2: Given a sample Web page, correctly recode all instances of text formatting using the font element to use appropriate inline styles, via the style attribute.
a. Behavior: Recode text formatting using the font element to use appropriate inline styles (Bloom Level 3, application)
b. Condition: Given a sample Web page
c. Standard: 100%

Learning Outcome Statement 3: Revise a poorly-written instructional goal to ensure it includes all three of the elements required of an "operational" learning outcome.
a. Behavior: Revise a learning goal to make it operational (Bloom Level 5, Synthesis)
b. Condition: Given a poorly-written learning goal
c. Standard: An "operational" learning outcome that includes all three of the critical elements

Writing learning outcomes is as much art as science, but these guidelines will help:
- Collaborate with other faculty in your discipline; identify what you believe are the most important outcomes for students to achieve.
- Be student-centered and learning-centered: Focus on what students will learn, rather than what content you will "cover."
- A good learning outcome should state what the students are expected to _**do**_ after successfully completing the course or lesson. Outcomes are about observable and measurable performance. It is impossible for instructors to step into the minds of their students and detect how much has actually been learned. Instead, they must gather indirect evidence that learning has occurred through the use of assessment tools that will elicit observable and measurable behaviors.
- Avoid verbs that can't be measured, like "know," "understand," or "appreciate" because they don't relate to specific student behaviors that can be observed.
- Use verbs that relate to the level of learning you want students to achieve in Bloom's taxonomy. One might be "define" (level 1). But, if you want students to reach level 4 in the taxonomy, you'll also need to write outcomes using verbs like "explain" (level 2) "use" (level 3) and "examine" (level 4).

When collaborating in the development of outcomes, it is a good idea to include overall course outcomes as well as lesson-level outcomes. As an example, the following web design course includes these course-level outcomes:

Course Outcomes

The broad outcomes for the course are presented below. Specific outcomes are provided within each lesson.

After successfully completing this course, the student will be able to:

1. Identify the various phases of Web site design and the critical activities within each phase. (Level 1)
2. Use HTML/XHTML to hand-code Web pages, including basic tags for lists, hyperlinks, basic tables, basic frames, and inclusion of images. (Level 3)
3. Create basic cascading style sheets to control the presentation of a Web page or Web site. (Level 5)
4. Identify accessibility issues and "fix" HTML/XHTML code related to each of the following: page organization, text formatting, images, hyperlinks, tables, and frames. (Level 1)
5. List at least three usability issues and describe how they influence Web site design. (Level 1)

6. Identify at least two legal or ethical issues which must be considered prior to publishing a Web site. (Level 1)
7. Use FTP to publish a Web site. (Level 3)

Note that the above course-level outcomes address several levels of Bloom's Taxonomy. It is not important, nor perhaps appropriate to cover each level of Bloom's Taxonomy in every lesson. The goal should be to cover as many levels as is appropriate during the class. Below is an example of lesson-level outcomes from the same course.

Lesson Outcomes

After successfully completing this lesson, you will be able to:

1. Distinguish between container elements and empty elements and give at least two examples of each. (Level 4)
2. Explain the relationships among elements, attributes, and values, and give an XHTML example using the proper syntax. (Level 2)
3. List at least four XHTML standards that differ from HTML. (Level 1)
4. Define the terms *deprecated* and *obsoleted* as they apply to HTML elements. (Level 1 & Level 3)
5. Explain the purpose of each of the following XHTML elements: h1 through h6, p, br, hr, and comments. (Level 2)
6. Use the following elements appropriately when hard-coding XHTML: h1 through h6, p, br, hr, and comments. (Level 3)

For more on Bloom's Taxonomy, go to:
http://tip.psychology.org/taxonomy.html
http://www.officeport.com/edu/blooms.htm
http://www.coun.uvic.ca/learn/program/hndouts/bloom.html
http://chiron.valdosta.edu/whuitt/col/cogsys/bloom.html

For more on Bloom's Taxonomy and writing outcomes as they relate to higher-order and critical thinking:
http://chiron.valdosta.edu/whuitt/papers/wymiwyg.html

For more on student learning outcomes, go to:
http://css.rpgroup.org/ka.php?ka_id=7&PHPSESSID=d2ce1d0443947f0c4333260c4a67a097
http://www.msjc.edu/accreditation/steering04/docs/committee/bscroggins.doc
http://vcs.ccc.cccd.edu/senate/curriculum/verbs.htm

For more on writing learning objectives, go to:
http://www.cvc3.org/Telelearning2001web/LessonIntro.htm#Objectives
http://edtech.tennessee.edu/~bobannon/objectives.html
http://chiron.valdosta.edu/whuitt/col/plan/behobj.html
http://www.adprima.com/objectives.htm
- http://www.utmem.edu/grad/MISCELLANEOUS/Learning_Objectives.pdf
- http://captain.park.edu/facultydevelopment/writing_learning_objectives.htm
- http://www.ceph.org/LearningObj.f00.PDF
- http://www.edci.purdue.edu/vanfossen/InstructionalObjectives.html
- http://www.provost.cmich.edu/assessment/toolkit/writingoutcomes.htm

- http://instructionaldesign.gordoncomputer.com/Objectives.html
- http://www.ksu.edu/apr/Learning/HowTo.htm
- http://tip.psychology.org/mager.html

WORKSHEET
SLO PEER-MENTOR TRAINING
WRITING COURSE OR PROGRAM LEVEL SLOs
(Based upon criteria specified in the Bob Nash & Michelle Wild article)

A comprehensive or "operational" student learning outcome often includes at least three elements:

A. <u>Behavior</u>: A description of the behavior or actions that will demonstrate learning has occurred. (Use action verbs from the appropriate level of Bloom's taxonomy.) Examples:
- Define the terms…
- Identify the concept that explains…
- List the steps in the process of…
- Compare and contrast the two ideas…
- Compute the correct…
- Explain the central argument of…
- Describe the difference between…
- Differentiate among …
- Construct a lesson plan…
- Design a computer network…

B. <u>Conditions</u>: A description of the conditions under which the behavior is demonstrated. This includes any tools or information the students will receive when they are asked to demonstrate what they've learned. Examples:
- Given ten drawings of geometric figures…
- Given a paragraph…
- Given data for the first two variables…
- Given an illustration of the concept…

C. <u>Standard</u>: A description of the standard or criteria that will be used to evaluate success, that is, how well the learner must perform for you to say he or she has achieved the outcome. Examples:
- All of the…
- At least 80% of…
- In the correct order…
- The correct answer…
- That reflects the principles of…

1. LEARNING OUTCOME STATEMENT:

_____
_____
_____
_____

What is the behavior? _____

What are the conditions? _____

What is the standard of satisfactory performance?_____

2. LEARNING OUTCOME STATEMENT:

_____
_____
_____
_____

What is the behavior? _____

What are the conditions? _____

What is the standard of satisfactory performance?_____

3. LEARNING OUTCOME STATEMENT:

_____
_____
_____
_____

What is the behavior? _____

What are the conditions? _____

What is the standard of satisfactory performance?_____

4. LEARNING OUTCOME STATEMENT:

_____
_____
_____
_____

What is the behavior? _____

What are the conditions? _____

What is the standard of satisfactory performance?_____

Lead Presenter	Time	Cumulative Time	
	10	10	**1. Welcome and introductions**
	10	20	**2. Why are we here?** What would you like to get out of this workshop? Record responses on the board.
	5	25	**3. Review Standard II of the accreditation standards** Point out the need for faculty to identify learning outcomes at the course, program, and institutional level
			4. Core or institutional level learning outcomes
	5	30	a. Funny video – "The five minute university"
	5	35	b. Core outcomes for IVC – very brief
	15	50	**5. Vocabulary associated with SLOs**
			a. Instructional goals - defined
			b. Instructional objectives - defined
			c. Learning outcomes – defined (handout)
			d. Types of learning outcomes: typical content knowledge outcomes versus robust outcomes
			e. The robust outcome rubric (handout)
			6. Focus on robust outcomes
	5	55	a. Examples of robust outcomes
	10	65	b. Participants will use the rubric to judge and critique robustness of different examples of outcomes statements (handout)
	30	95	c. Participants – with colleagues from similar or same discipline, write a few robust outcomes
	10	105	**7. Break**
	30	135	**8. Participants share and critique one-another's robust outcomes**
			9. Return to the Core outcomes
	10	145	a. Review the core outcomes in greater depth
			b. Place charts (one for each of the 10 core outcomes) on the walls
	15	200	c. Participants, working with colleagues in the same discipline, discuss which of the 10 core outcomes are addressed by their courses and/or programs (handout with matrix)
	5	205	d. Participants place color post-its for their program indicating two things: the core outcome their program address and the extent to which their program addresses the core outcome (e.g., introduces, reinforces, mastery)
	15	220	e. Each discipline now has a speaker who reviews with everyone, which of the core outcomes his or her program addresses.
	10	230	**10. Break**
			11. Wrap up and assignment
	5	235	a. Over the next two week period, each participant will work with the presenters, facilitators to put the final touches on their robust outcome(s)
			b. This will be done using the SLO website, or email, phone, or in person
	15	250	c. Demo the SLO website and SharePoint
			d. The robust outcomes must be finalized for the next workshop

Comment: This plan needs tightening. The current iteration is 4 hours and 10 minutes.

Outcomes: Each participant will…

- Be familiar with IVC's core outcomes and the extent to which his or her program contributes to them.
- Be able to describe a robust SLO.
- Have a draft of 1-2 robust learning outcome statements for their discipline area (course or program level) which are amenable to assessment using a scoring rubric.

Workshop 2 of 2

Development of Scoring Rubrics and Learning Outcomes Assessment Plans

Lead Presenter	Time	Cumulative Time	
	5	5	1. **Review of the robust outcomes submitted –** give gratuitous praise to participants
	5	10	a. Use robust rubric to judge a few and assure they indeed are robust (handout)
			2. **Assessment**
	15	25	a. Overview – sources of evidence – direct and indirect
	5	30	b. Funny video clip on obviously invalid assessment
			3. **The Scoring Rubric**
			a. Sample rubric on PowerPoint
	5	35	b. Develop a rubric for a resume – brief (handout – rubric form)
	40	75	c. Activity
			o Develop a rubric for chocolate chip cookies (handout-rubric form)
			o Distribute 4 different types of chocolate chip cookies
			o Each person rates 4 cookies using rubric
			o Project Excel sheet on screen and input scores
			o Discuss patterns and trends
	5	80	d. The many benefits of rubrics for teachers and students
			e. Participants now design a rubric for at least one of the robust SLOs (rubric form)
	10	90	4. **Break**
			5. **Other assessment strategies and tools**
	10	100	a. Embedded assessment
	10	110	b. Self-rating surveys
			6. **Implementation discussion and plan**
	20	130	1. **Complete a form** (a sort of contract) having prompts for who, what, when and where they will implement the SLO and assessment plan (handout – assessment implementation form)

Total time: 2 hours and 10 minutes

Outcomes: Each participant will…
- Be able to create and use a scoring rubric for assessing student progress on robust SLOs.
- Have a SLO assessment plan detailing when, where, and how they will measure their highest priority learning outcomes for their course(s) and/or program.

COASTLINE COMMUNITY COLLEGE
Instruction
A Rubric for Rating the Quality of "Robust" Student Learning Outcomes (SLOs)
Pat Arlington & Jerry Rudmann

The learning outcome statement…	No or Unsure (0)	Not Quite (1)	Clearly YES (2)	Points
Describes a behavior or skill that is beyond recognition or recitation of content knowledge.				
Uses action verbs from Bloom's level 3 or higher* (see Bloom guide below).				
Specifies the conditions (e.g., given a case study, a set of data, tools, materials, media explanations of behavior).				
Is a real life skill that students will use beyond the end of the course.				
Would be considered a high priority learning outcome by most experts in the discipline.				
Has an explicit or implied standard of performance (e.g., a benchmark for excellence).				
Is amenable to assessment using a scoring rubric.				
Is an overarching outcome (course or program) rather than smaller in scope (lesson or unit)				
Is a skill that represents thinking and/or behaving like the discipline expert (e.g., historian, neurologist, biologist, author)				
			Total Points =	

Level 3 – Application	*Apply* what was learned in the classroom to novel situations (e.g., apply, choose, demonstrate, dramatize, employ, illustrate, interpret, operate, practice, schedule, sketch, solve, use, or write).
Level 4 – Analysis	Break down material or concepts into component parts so that the organizational structure may be understood (e.g., analyze, appraise, categorize, compare, contrast, criticize, differential, discriminate, distinguish, examine, experiment, question, test).
Level 5 – Synthesis	Use component parts to form a new whole, with emphasis on creating a new meaning or structure (e.g., arrange, assemble, collect, compose, construct, create, design, develop, formulate, manage, organize, plan, prepare, propose, set up).
Level 6 – Evaluation	Judge the value of material (e.g., appraise, argue, assess, defend, estimate, judge, predict, rate, support, value, evaluate).