

Writing Measurable Student Learning Outcomes

STUDENT LEARNING OUTCOMES are the measurable knowledge or skills that students will walk away with after completing your course. These outcomes may involve knowledge (cognitive), skills (behavioral), or attitudes (affective) that display evidence that learning has occurred, at a specified level of competency, as a result of a course or program. Learning outcomes are clear and assessable statements that define what a student is able to DO at the completion of a course or program.

Best practices in writing student learning outcomes (SLOs) are summarized below:

1. The SLOs are specific to the course/program they are associated with.
2. The SLOs focus on what is critical to the course/program.
3. The SLOs describe what a student will be able to do with the knowledge, skills, abilities, and attitudes gained as a result of completing the course/program. Doing involves some sort of observable student performance. Observable performances are most clearly described through the use of concrete action verbs. One acronym useful to remember when writing goals, objectives or outcomes is S.M.A.R.T. — Specific, Measurable, Attainable, Realistic, and Tangible.
4. The SLOs are realistic given the capacities of the typical student who enters the program, the expected level of rigor in program courses, and the resources available to support student learning. Outcomes describe what the student can do or how they will be able to apply what they have learned at a level appropriate to the expectations of the course. SLOs can draw upon many discreet skills and/or areas of content. The difficulty level of doing is correlated to a scale, called a taxonomy, with easier performances reflecting lower-order thinking and harder performances reflecting higher-order thinking skills. Concrete action verbs such as “define”, “classify” or “formulate” are more informative than more abstract action verbs like “understand” or “know.”
5. The SLOs are robust enough to drive the curriculum; reading the SLOs would provide a faculty member within the discipline the needed information to determining appropriate learning and assessment activities within the course.
6. The SLOs are observable, measurable and, thus, are assessable. It should be feasible to measure the outcome directly or to measure things that reasonably indicate that students have attained the outcome. The student learning outcomes are written in a manner that is clear and understandable to both faculty within the discipline and students who may be interested in taking the course.

Learning Domains

In the 1950's the American educational psychologist Benjamin Bloom and a committee of colleagues identified three “domains” of learning—the “cognitive,” the “psychomotor,” and the “affective.” These three domains are displayed a little further below.

The columns within each domain refer to levels of complexity. The level of cognitive, psychomotor, or affective complexity described increases as one moves from left to right. In the cognitive domain, for example, knowing something requires less thinking and is therefore a less complex action, than evaluating something based on knowledge previously acquired.

In each column, directly below the term which designates the complexity level is a description of behavior typical of students who have achieved that level. Beneath that is a list of verbs that can be used to expand that description and thereby to tailor it to a given course.

As a means of applying this research to your student learning outcomes, we suggest that you proceed in something like the following manner:

- Read through the descriptions in all three domains until you find the one that comes closest to the behavior you have in mind for students successfully completing your course. Generally speaking, the

more advanced the course, the further to the right within a given table will be found the description that best fits that course.

- Use that description, or a version that you tailor to your course, to generate one or more student learning outcomes.
- Write student learning outcomes that grammatically complete the sentence beginning with the phrase: “Upon successful completion of this course, students should be able to:” After years of deliberation, the Curriculum and the Instructional Standards and Practices Committees have decided this must appear, word for word, at the beginning of every list of course student learning outcomes;
- Start each student learning outcome with a verb, written with all lower-case letters. Use the list of verbs further down that same column, or verbs similar to them, for starting off each student learning outcome that you write for that domain and level.

Cognitive Domain
Learning outcomes related to knowledge

KNOWLEDGE	COMPREHENSION	APPLICATION	ANALYSIS	SYNTHESIS	EVALUATION
Student remembers or recognizes information or specifics as communicated with little personal assimilation.	Student grasps the meaning behind the information and interprets, translates, or comprehends the information.	Student uses information to relate and apply it to a new situation with minimal instructor input.	Student discriminates, organizes, and scrutinizes assumptions in an attempt to identify evidence for a conclusion.	Student creatively applies knowledge and analysis to integrate concepts or construct an overall theory.	Student judges or evaluates information based upon standards and criteria, values and opinions.
cite label list enumerate identify imitate match name quote recall reproduce state write	convert define describe discuss estimate explain generalize identify illustrate locate paraphrase restate summarize	apply chart compute demonstrate determine dramatize establish make manipulate prepare project solve use	Analyze compare contrast correlate diagram dissect differentiate distinguish infer investigate limit outline separate	assemble create construct design develop formulate generate hypothesize initiate invent modify reframe synthesize	access appraise conclude critique decide defend diagnose evaluate judge justify rank recommend support

Psychomotor Domain
Learning outcomes related to skills

OBSERVE	MODEL	RECOGNIZE STANDARDS	CORRECT	APPLY	COACH
Students translate sensory input into physical tasks or activities.	Students are able to replicate a fundamental skill or task.	Students recognize standards or criteria important to perform a skill or task correctly.	Students use standards to evaluate their own performances and make corrections.	Students apply this skill to real life situations.	Students are able to instruct or train others to perform this skill in other situations.
Hear identify observe see smell taste touch watch *Usually no outcomes or objectives written at this level.	attempt copy follow imitate mimic model reenact repeat reproduce show try	check detect discriminate differentiate distinguish notice perceive recognize select	adapt adjust alter change correct customize develop manipulate modify practice revise	build compose construct create design originate produce	demonstrate exhibit illustrate instruct teach train

Affective Domain
Learning outcomes related to attitudes, behaviors, and value

RECEIVING	RESPONDING	VALUING	ORGANIZING	CHARACTERIZING
Students become aware of an attitude, behavior, or value.	Students exhibit a reaction or change as a result of exposure to an attitude, behavior, or value.	Students recognize value and display this through involvement or commitment.	Students determine a new value or behavior as important or a priority.	Students integrate consistent behavior as a naturalized value in spite of discomfort or cost. The value is recognized as a part of the person's character
accept attend describe explain locate observe realize receive recognize	behave comply cooperate discuss examine follow model present respond show studies	accept adapt balance choose differentiate defend influence prefer recognize seek value	adapt adjust alter change customize develop manipulate modify practice revise	authenticate characterize defend display embody habituate internalize produce represent validate verify

Adapted from
<http://www.morningside.edu/academics/research/assessment/documents/Writingstudentlearningoutcomes.pdf>
 Tables of verbs developed by Janet Fulks and Kate Pluta, Bakersfield College, CA

Evaluating Student Learning Outcomes

[courtesy of <http://cstl.semo.edu/SLO/SLOWriting.htm>]

We can evaluate a student learning outcome by asking two simple questions:

“Can it be measured?” and “Is learning demonstrated?”

Take a look at the following examples:

- Participants will understand the nine reasons for conducting a needs assessment.
(Learning is demonstrated, but this student learning outcome will be difficult to measure.)
- Student will arrive on time daily.
(This can be easily measured, but learning is not necessarily being demonstrated.)

Use the following good examples to a guide to writing SLOs:

GOOD	POOR
ART:	
<p>Upon successful completion of this course, students should be able to:</p> <ul style="list-style-type: none"> • articulate the role art plays in society using a written critique of an art work, • identify the formal elements and principles of art, which apply to the creation, and discussion of an artwork, • identify the connection of historical or current events, which contextualize the making of an artwork. 	<ul style="list-style-type: none"> • <i>Students will appreciate art.</i> • <i>Students will learn how to discuss a work of art.</i> • <i>Students will be familiar with culture and the relationship of art making.</i>
BIOLOGY:	
<p>Upon successful completion of this course, students should be able to:</p> <ul style="list-style-type: none"> • list enzymes involved in DNA replication and explain their roles, • apply principles of scientific inquiry, differentiate a theory from a hypothesis, and differentiate fact from opinion in regard to biological sciences. (Laney College) 	<ul style="list-style-type: none"> • <i>Students will understand the process of DNA replication.</i> • <i>Students will know the scientific process.</i>
ENGINEERING:	
<p>Upon successful completion of this course, students should be able to:</p> <ul style="list-style-type: none"> • apply and demonstrate the principles of engineering design, formulating requirements and constraints, following an open-ended decision process involving tradeoffs, and completing a design addressing an aerospace engineering need. (Southern Polytechnic St. U.) 	<ul style="list-style-type: none"> • <i>Students completing the undergraduate program in Hypothetical Engineering will have knowledge of engineering principles. (Southern Polytechnic St. U.)</i>

GOOD	POOR
ENGLISH:	
<p>Upon successful completion of this course, students should be able to:</p> <ul style="list-style-type: none"> • demonstrate the ability to communicate effectively in both oral and written forms. (University of Toledo) 	<ul style="list-style-type: none"> • <i>Students will learn how to effectively communicate in both oral and written forms. (Univ. of Toledo)</i>
GEOSCIENCES:	
<p>Upon successful completion of this course, students should be able to:</p> <ul style="list-style-type: none"> • interpret unfamiliar tectonic settings based on information on physiography, seismicity, and volcanic activity.(from Barbara Tewksbury’s “Designing Effective and Innovative Courses” tutorial) 	<ul style="list-style-type: none"> • <i>Students will understand plate tectonics. (from Barbara Tewksbury’s Designing Effective and Innovative Courses Tutorial.)</i>
HISTORY:	
<p>Upon successful completion of this course, students should be able to:</p> <ul style="list-style-type: none"> • give examples of, describe, and explain significant trends, movements, and events in European history; • compare and contrast historical perspectives of our world and describe the contributions of these historical perspectives. (Univ. of Toledo) 	<ul style="list-style-type: none"> • <i>Students should be able to understand significant trends, movements, and events in European history.</i> • <i>This course will provide learners with an overview of historical perspectives of our world and help them develop an appreciation for the contribution of these various perspectives. (Univ. of Toledo)</i>
Psychology:	
<p>Upon successful completion of this course, students should be able to:</p> <ul style="list-style-type: none"> • recognize and articulate the foundational assumptions, central ideas, and dominant criticisms of the psychoanalytic, Gestalt, behaviorist, humanistic, and cognitive approaches to psychology. (UCF) 	<ul style="list-style-type: none"> • <i>Students should know the historically important systems of psychology. (UCF)</i>

The following page contains more examples of student learning outcomes together with a more detailed analysis.

A Review Panel within Curriculum Committee reviews the SLOs on each new or revised course outline to ensure the SLOs are measurable and that learning is demonstrated by the SLO. The following is an example of the kind of feedback the panel might give.

Upon successful completion of this course, students should be able to:

- improve their ability to read, listen to, and/or follow directions,
- design experiments and interpret data according to the scientific method in order to evaluate a hypothesis, and
- write papers that:
 - develop a thesis,
 - present coherent and logical claims,
 - are organized with clear links between claims and support,
 - are well developed with sufficient and relevant evidence,
 - use standard American English correctly,
 - make stylistic choices in persona, syntax, and diction; and
 - gauge the needs of and address a specific audience.
- demonstrate knowledge of disabilities and accommodations and services available for students in the DSP&S program.
- demonstrate Social Responsibility.

- It is hard to measure 'improve' without pre and post testing.
- Are the students only going to listen OR follow directions?
- The whole concept is vague and unclear, what must the students do?
- What criteria would be used for this?
- While we would all like to see this in our courses, is it an overarching outcome for any other than basic skills courses?

- This SLO has jargon and hidden expectations.
- The SLO could be rewritten to read: *Design experiments and interpret data according to the scientific method in order to evaluate a hypothesis. This includes the ability to: (a) approach the scientific method in a variety of ways; (b) formulate questions; (c) design experiments that answer the questions; and (d) manipulate and evaluate the experimental data to reach conclusions*

- This is specific but some of the language is unclear.
- What is standard American English?
- Good measurable outcome criteria.
- Clear direction for the students.

- This is measurable, but could be written with more specific expectations.
- What are the criteria?

- Too general, no way to measure outcomes.
- What does this mean anyway?, terms are unclear.

Adapted from

<http://www.morningside.edu/academics/research/assessment/documents/Writingstudentlearningoutcomes.pdf>

Student Learning Outcome Checklist	Yes	No
Do the SLOs include active verbs?		
Do the SLOs suggest or identify an assessment?		
Do the SLOs address the expected level of learning for the course using Bloom's Taxonomy as a guideline?		
Do the SLOs address more than one domain (cognitive, psychomotor, and affective)? If yes, consider creating multiple SLOs.		
<p>Are the SLOs written as outcomes rather than as objectives?</p> <ul style="list-style-type: none"> • Language indicates an important overarching concept versus small lesson or chapter objectives. • Outcomes address what a student will be able to do at the completion of the course. • SLOs address student competency rather than content coverage. 		
<p>Are the SLOs appropriate for the course?</p> <ul style="list-style-type: none"> • Consistent with the curriculum document of record • Represents a fundamental result of the course • Aligns with other courses in a sequence, if applicable • Represents collegiate level work 		
Will students understand the SLOs?		
Comments or suggestions:		

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