Assessment Workbook for Academic Programs

Office of Institutional Effectiveness

August 11, 2008

Section 3: Creating Learning Outcomes

Now that you have completed your program's mission statement, you are ready to start developing student learning outcomes. This section provides guidelines for developing and reviewing learning outcome statements and will serve as a foundation for the remaining steps in the assessment process. Sample learning outcome statements from a variety of academic disciplines are included on pages 17 and 18 for your information. A group exercise for program faculty is provided on page 20 to assist in the development of three to five learning outcomes for your program, including a curriculum map on page 21 for you to use to tie the outcomes to specific courses in the program. Once completed, use the checklist on page 23 to review them to ensure that they are sufficient.

What Are Student Learning Outcomes?

Learning outcomes are statements of the knowledge, skills and abilities individual students should possess and can demonstrate upon completion of a learning experience or sequence of learning experiences. Before preparing a list of learning outcomes consider the following recommendations:

Learning outcomes should be specific and well defined. When developing a list of student learning outcomes, it is important that statements be specific and well defined. Outcomes should explain in clear and concise terms the specific skills students should be able to demonstrate, produce, and know as a result of the program's curriculum. They should also exclude the greatest number of possible alternatives so that they can be measured. For example, the learning outcome "Students completing the BS in Chemistry should be well practiced in the relevant skills of the field" is too vague. In this example, we do not know what the relevant skills of the field of chemistry include. This will create problems in measuring the behavior of interest and drawing valid conclusions about the program's success.

Learning outcomes should be realistic. It is important to make sure that outcomes are attainable. Outcomes need to be reviewed in light of students' ability, developmental levels, their initial skill sets, and the time available to attain these skill sets (i. e, 4 years). They should also be in line with what is being taught.

Learning outcomes should rely on active verbs in the future tense. It is important that outcomes be stated in the future tense in terms of what students should be able to do as a result of instruction. For example, the learning outcome "Students have demonstrated proficiency in…" is stated in terms of students' actual performance instead of what they will be able to accomplish upon completion of the program. Learning outcomes should also be active and observable so that they can be measured. For example, outcomes like "Students will develop an appreciation of, and will be exposed to…" are latent terms that will be difficult to quantify. What does it mean to have an appreciation for something, or to be exposed to something?

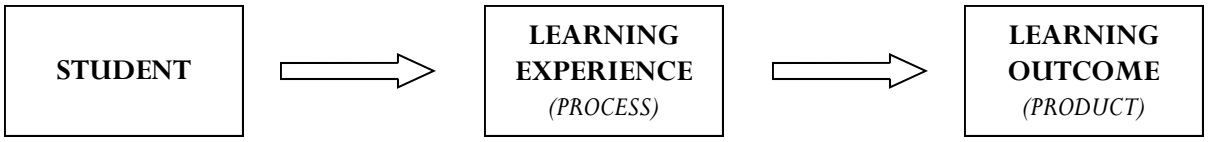
Learning outcomes should be framed in terms of the program instead of specific classes that the program offers. Learning outcomes should address program goals and not specific course goals since assessment at the University is program-focused. For example, the learning outcome "Students completing Chemistry 101 should be able to…" is focused at the course level. It does not describe what a graduating senior in Chemistry should be able to demonstrate as a result of the program.

There should be a sufficient number of learning outcomes. You should include between three to five learning outcomes in your assessment plan. Fewer than three will not give you adequate information to make improvements, more than five may be too complicated to assess. It is important to note that not all programs will assess all learning outcomes in all classes. The program may choose to focus on one or two per class.

Learning outcomes should align with the program's curriculum. The outcomes developed in your plan need to be consistent with the curriculum goals of the program in which they are taught. This is critical in the interpretation of your assessment results in terms of where changes in instruction should be made. Using curriculum mapping is one way to ensure that learning outcomes align with the curriculum. A curriculum map is a matrix in which learning outcomes are plotted against specific program courses. Learning outcomes are listed in the rows and courses in the columns. This matrix will help clarify the relationship between what you are assessing at the program level and what you are teaching in your courses. A blank curriculum map is included on page 19 for you to complete as part of the group exercise on page 18.

Learning outcomes should be simple and not compound.
The outcomes stated in your plan should be clear and simple. Avoid the use of bundled or compound statements that join the elements of two or more outcomes into one statement. For example, the outcome "Students completing the BS in mathematics should be able to analyze and interpret data to produce meaningful conclusions and recommendations and explain statistics in writing" is a bundled statement. This outcome really addresses two separate goals, one about analyzing and interpreting data and another about writing.

Learning outcomes should focus on learning products and not the learning process. Learning outcomes should be stated in terms of expected student performance and not on what faculty intend to do during instruction. The focus should be on the students and what they should be able to demonstrate or produce upon completion of the program. For example, the learning outcome "Introduces mathematical applications" is not appropriate because its focus is on instruction (the process) and not on the results of instruction (the product).



(Diagram adapted from Linn & Miller, 2005.)

Constructing Learning Outcomes

Considering Taxonomies

Taxonomies of educational objectives can be consulted as useful guides for developing a comprehensive list of student outcomes. Taxonomies attempt to identify and classify all different types of learning. Their structure usually attempts to divide learning into thee types of domains (cognitive, affective, and behavioral) and then defines the level of performance for each domain. Cognitive outcomes describe what students should know. Affective outcomes describe what students should think. Behavioral outcomes describe what students should be able to perform or do. (Adapted from OAPA Handbook PROGRAM-Based Review and Assessment. UMass Amherst)

Bloom's Taxonomy of Educational Objectives (1956) is one traditional framework for structuring learning outcomes. Levels of performance for Bloom's cognitive domain include knowledge, comprehension, application, analysis, synthesis, and evaluation. These categories are arranged in ascending order of cognitive complexity where evaluation represents the highest level. The table below presents a description of the levels of performance for Bloom's cognitive domain.

Level	**Description**
Knowledge *(represents the lowest level of learning)*	To know and remember specific facts, terms concepts, principles or theories
Comprehension	To understand, interpret, compare, contrast, explain
Application	To apply knowledge to new situations to solve problems using required knowledge or skills
Analysis	To identify the organizational structure of something; to identify parts, relationships, and organizing principles
Synthesis	To create something, to integrate ideas into a solution, to propose an action plan, to formulate a new classification scheme
Evaluation *(represents the highest level of learning)*	To judge the quality of something based on its adequacy, value, logic or use

Adapted from California State University, Bakersfield, PACT Outcomes Assessment Handbook (1999)

Using Power Verbs

When composing learning outcomes, it is important to rely on concrete action verbs that specify a terminal, observable, and successful performance as opposed to passive verbs that are not observable. For example, the statements "be exposed to," "be familiar with," and "develop an appreciation of," are not observable and would be difficult to quantify. The table below provides a list of common active verbs for each of Bloom's performance levels.

Knowledge	**Comprehension**	**Application**	**Analysis**	**Synthesis**	**Evaluation**
define/state	classify	apply	analyze	arrange	appraise
identify	describe	compute	appraise	assemble	assess
indicate	discuss	construct	calculate	collect	choose
know	explain	demonstrate	categorize	compose	compare
label	express	dramatize	compare	construct	contrast
list/label	identify	employ	contrast	create	decide
memorize	locate	give examples	criticize	design	estimate
name	paraphrase	illustrate	debate	formulate	evaluate
recall	recognize	interpret	determine	manage	grade
record	report	investigate	diagram	organize	judge
relate	restate	operate	differentiate	perform	measure
duplicate	review	organize	distinguish	plan	rate
select	suggest	practice	examine	prepare	revise
underline	summarize	predict	experiment	produce	score
tell	translate	inspect	propose	select	argue
translate	cite	inventory	set up	value	critique
sketch	question	articulate	infer	model	interpret
read	distinguish	assess	solve	perform	criticize
use	solve	collect	test	integrate	defend

Adapted from California State University, Bakersfield, PACT Outcomes Assessment Handbook (1999)

Other Sources for Learning Outcomes

When creating learning outcomes, it may also be helpful to consult professional organizations, similar programs at other universities, methods books, peer institution websites, or banks of learning outcomes on-line. It is also useful to develop ideas for student learning outcomes based on what students have accomplished in previous semesters.

Sample Learning Outcomes

Languages and Literature:

Students will be able to apply critical terms and methodology in completing a literary analysis following the conventions of standard written English.

Students will be able to locate, apply and cite effective secondary materials in their own texts.

Students will be able to analyze and interpret texts within the contexts they are written.

French students will be able to demonstrate oral competence with suitable accuracy in pronunciation, vocabulary, and language fluency.

French students will be able to produce written work that is substantive, organized, and grammatically accurate.

French students will be able to accurately read and translate French texts.

Humanities and Fine Arts:

Students will be able to demonstrate fluency with formal vocabulary, artistic techniques and procedures of two-dimensional and three-dimensional art practice.

Students will demonstrate in-depth knowledge of artistic periods used to interpret works of art including the historical, social and philosophical contexts .

Students will be able to critique and analyze works of art and visual objects .

Students will be able to identify musical elements, take them down at dictation, and perform them at sight.

Students will be able to communicate both orally and verbally about music of all genres and styles in a clear and articulate manner.

Students will be able to perform a variety of memorized songs from a standard of at least two foreign languages.

Students will be able to apply performance theory in the analysis and evaluation of performances and texts.

Students will be able to analyze and interpret scripts.

Students will demonstrate in-dept knowledge and understanding of contemporary theatre forms and artists.

Students will be able to demonstrate proficiency in a variety of dance styles, including ballet, modern dance, jazz, and tap.

Sample Learning Outcomes

Physical and Biological Sciences:

Students will be able to demonstrate an understanding of core knowledge in biochemistry and molecular biology.

Students will be able to apply critical thinking and analytical skills to solve scientific data sets.

Students will be able to apply the scientific method to solve problems.

Students will be able to demonstrate written, visual, and/or oral presentation skills to communicate scientific knowledge.

Students will be able to acquire and synthesize scientific information from a variety of sources.

Students will be able to apply techniques and instrumentation to solve problems.

Mathematics:

Students will be able to translate problems for treatment within a symbolic system.

Students will be able to articulate the rules that govern a symbolic system.

Students will be able apply algorithmic techniques to solve problems and obtain valid solutions.

Students will be able to judge the reasonableness of obtained solutions.

Social Sciences:

Students will be able to write clearly and persuasively to communicate their scientific ideas clearly.

Students will be able to test hypotheses and draw correct inferences using quantitative analysis.

Students will be able to evaluate theory and critique research within the discipline.

Business:

Students will be able to work in groups and be part of an effective team.

Students will be able to communicate business knowledge both orally and written.

Students will be able to recognize and respond appropriately to an ethical and regulatory dilemma.

Students will be able to recognize and diagnose accounting problems.

Students will demonstrate disciplinary competence in a field of business.

(NOTE: These samples were gathered from a variety of sources including UR assessment plans, program assessment statements at other institutions, etc.)

Assessment Plan Checklist

Mission Statement	**YES**	**NO**
Mission statement is identified for the degree program		
Mission statement is brief and memorable		
Mission statement is distinctive		
Mission statement clearly states the purpose of the program		
Mission statement indicates the primary functions or activities that program offers		
Mission statement describes how program will prepare students for future careers /study		
Mission statement supports University and School missions		
Learning Outcomes	**YES**	**NO**
Three to five learning outcomes are identified		
Learning outcomes are clear		
Learning outcomes are directly measurable		
Learning outcomes focus on student learning and not teaching activity		
Learning outcomes align with curriculum		
Learning outcomes rely on action verbs		
Criteria/Target	**YES**	**NO**
Performance criteria are identified for all learning outcomes		
Performance criteria are set at a reasonable level		
Data Source	**YES**	**NO**
Where data will be collected is identified		
How students will be selected is identified		
Approximate number of students to be selected is identified		
Means of Assessment	**YES**	**NO**
Assessment measures are identified for every objective		
Assessment measures are clearly specified		
Assessment measures relate to learning outcomes		
Direct measures of student learning are emphasized		
Approaches are likely to lead to credible findings (validity)		
Means of Scoring	**YES**	**NO**
Scoring procedures are identified for each outcome		
If applicable, rubrics are provided as an appendix		
Scoring procedures will produce adequate information		
Dissemination and Use	**YES**	**NO**
Describes how data will be used		
Describes how data will be shared		