Writing Measurable Learning Outcomes

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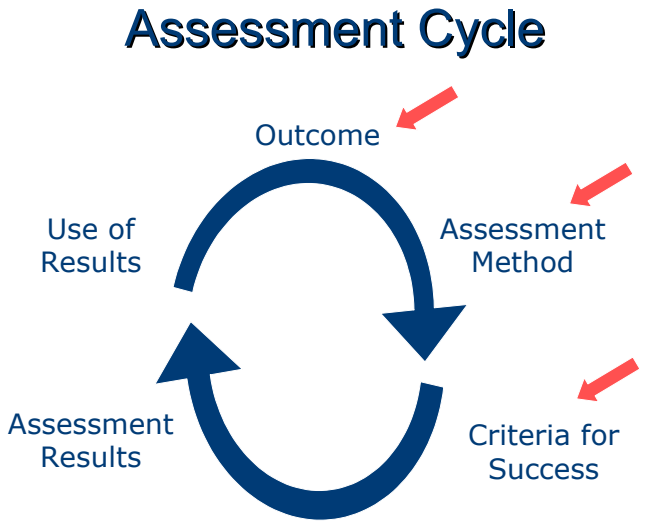
You got to be careful if you don't know where you're going, because you might not get there – Yogi Berra

Assessment is a systematic and on-going process of collecting, interpreting, and acting on information relating to the goals and outcomes developed to support the institution's mission and purpose. It answers the questions: (1) What we are trying to do? (2) How well are we doing it? And (3) How can we improve what we are doing? Assessment begins with the articulation of outcomes. Writing measurable outcomes involves describing the first three components: outcome, assessment method, criteria for success, in the assessment cycle.



Broadly speaking, there are two types of outcomes: learning outcomes and program outcomes. Learning outcomes describe what students are expected to demonstrate and program outcomes describe what a program is expected to accomplish.

Learning Outcomes

Learning outcomes describe what students are able to demonstrate in terms of knowledge, skills, and values upon completion of a course, a span of several courses, or a program. Clear articulation of learning outcomes serves as the foundation to evaluating the effectiveness of the teaching and learning process.

The Components of a Measurable Learning Outcome. Three essential components of a measurable learning outcome are:

- ❑ Student learning behaviors
- ❑ Appropriate assessment methods
- ❑ Specific student performance criteria / criteria for success

When writing a measurable learning outcome, it is important to:

- focus on student behavior
- use simple, specific action verbs
- select appropriate assessment methods
- state desired performance criteria

Focus on Student Behavior. Learning outcomes are about what students are able to demonstrate upon completion of a course or a span of courses or a program. Learning outcomes are not about what the instructors can provide but what the students can demonstrate. The following are not learning outcomes:

- ✘ Offer opportunities for students to master integrated use of information technology.
- ✘ The program will engage a significant number of students in a formalized language/cultural studies program.
- ✘ Students who participate in critical writing seminars will write two essays on critical thinking skills.
- ✘ Students will be exposed to exceptionality in learning disabilities including visual and perception disabilities.

Use Simple, Specific Action Verbs. When writing learning outcomes, focus on student behavior and use simple, specific action verbs to describe what

students are expected to demonstrate. The wording should be something as follows:

Students will be able to <action verbs> . . . ."

The following are examples of learning outcomes:

a. Students will be able to collect and organize appropriate clinical data (history, physical exam, laboratory assessments including technology advancements in diagnostic such as PCR).
b. Students will be able to apply principles of evidence-based medicine to determine clinical diagnoses, and formulate and implement acceptable treatment modalities.
c. Students will be able to articulate cultural and socioeconomic differences and the significance of these differences for instructional planning.
d. Students will be able to use technology effectively in the delivery of instruction, assessment, and professional development.
e. Students will be able to evaluate the need for assistance technology for their students.
f. Graduates will be able to evaluate educational research critically and participate in the research community.
g. Students will appreciate the value of outcomes assessment in assuring quality across the veterinary medical profession and in facilitating movement of the veterinary medical professionals across national borders.

Note: Bloom's Taxonomy can be a useful resource in developing learning outcomes. The following are action verbs that can be used for various levels of cognitive, affective, and psychomotor learning.

ACTION VERBS

Concrete verbs such as "define," "apply," or "analyze" are more helpful for assessment than verbs such as "be exposed to," "understand," "know," "be familiar with."

Cognitive Learning	**Action Verbs:**
Knowledge - to recall or remember facts without necessarily understanding them	arrange, define, duplicate, label list, memorize, name, order, recognize, relate, recall, reproduce, list, tell, describe, identify, show, label, collect, examine, tabulate, quote
Comprehension – to understand and interpret learned information	classify, describe, discuss, explain, express, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend, translate, review, restate, locate, recognize, report
Application – to put ideas and concepts to work in solving problems	apply, choose, demonstrate, dramatize, employ, illustrate, interpret, operate, practice, schedule, sketch, solve, use, calculate, complete, show, examine, modify, relate, change, experiment, discover
Analysis – to break information into its components to see interrelationships and ideas	analyze, appraise, calculate, categorize, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test, separate, order, connect, classify, arrange, divide, infer
Synthesis – to use creativity to compose and design something original	arrange, assemble, collect, compose, construct, create, design, develop, formulate, manage, organize, plan, prepare, propose, set up, rewrite, integrate, create, design, generalize
Evaluation – to judge the value of information based on established criteria	appraise, argue, assess, attach, defend, judge, predict, rate, support, evaluate, recommend, convince, judge, conclude, compare, summarize
Affective Learning	appreciate, accept, attempt, challenge, defend, dispute, join, judge, praise, question, share, support
Psychomotor Learning	bend, grasp, handle, operate, reach, relax, shorten, stretch, differentiate (by touch), express (facially), perform (skillfully)

Select Appropriate Assessment Methods. Assessment methods are tools and techniques used to determine the extent to which the stated learning outcomes are achieved. A variety of methods, qualitative and quantitative, direct and indirect, should be used. The following are examples of direct and indirect assessment methods:

Examples of Direct Assessment Methods:	Examples of Indirect Assessment Methods:
▪ Comprehensive exams ▪ Performance assessment for graduating seniors ▪ Writing proficiency exams ▪ National Major Field Achievement Tests ▪ GRE subject exams ▪ Certification exams, licensure exams ▪ Locally developed pre- and post- tests ▪ Senior thesis / major project ▪ Portfolio evaluation ▪ Reflective journals ▪ Capstone courses ▪ Internship evaluations ▪ Grading with scoring rubrics*	▪ Peer institutions comparison ▪ Job placement ▪ Employer surveys ▪ Graduate school acceptance rates ▪ Performance in graduate school ▪ Student graduation/retention rates ▪ Exit interviews ▪ Focus group discussions ▪ Alumni surveys ▪ Tracking of alumni awards, achievements (national, state, international, etc.) ▪ Curriculum/syllabus analysis

*Note: Grades alone do not provide adequate feedback to students' performance. However, if grading is tied to rubrics, it can be a useful tool to identify strengths and weaknesses of student performance.

State Desired Performance Criteria. Performance criteria express in specific and measurable/observable terms that are acceptable to a specific course or program. Note that grades alone do not provide adequate feedback to students' performance because grades represent overall competency of students and do not identify strengths and weaknesses on specific learning outcomes. However, if the grading system is tied to rubrics, it can be a useful tool to identify areas for improvement that should be addressed. The following is not an acceptable measurable learning outcome:

- ✘ Students will be able to communicate effectively, as demonstrated by obtaining at least a "C" grade in the course.

With slight modification, the above learning outcome can be stated in measurable terms.

- ✓ Students will be able to communicate effectively, as exhibited by scoring at least 8 out of 10 for all the components within the grading criteria on the final writing assignment. (see below for an example of grading rubric and how it can help identify areas for improvement)

Example of a Grading Rubric

Grading Criteria	Student										
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Ave
1. State the purpose clearly	9	8	8	7	7	8	6	9	8	9	7.9
2. Clearly understand the audiences' values, attitudes, goals, and needs	8	8	7	8	7	7	6	7	8	8	7.4*
3. Consider how an audience will use the information	8	8	9	7	7	9	6	9	8	8	7.9
4. Use vocabulary appropriate to their subject and purpose(s)	9	8	8	8	7	9	6	9	9	7	8.0
5. Use correct reference forms	9	8	7	7	6	8	6	7	9	6	7.3*
6. Use correct grammar, syntax (word order), punctuation, and spelling	8	8	9	6	6	9	9	9	9	6	7.9
7. Present accurate information	7	8	9	8	6	9	8	9	9	6	7.9
8. Develop patterns or organization for ideas	9	8	9	9	9	8	8	8	9	9	8.6
9. Demonstrate good reasoning in writing	9	8	9	9	9	8	8	8	9	9	8.6
10. Summarize the main idea(s) clearly	9	8	8	8	7	9	6	9	9	7	8.0

Areas for Improvement

Examples of criteria for success:

Grading with a scoring rubric:

All Students will score an average of 8.00. Of the ten grading criteria, none will score less than 7.50.

Standardized test:

Sixty-five percent of all students will score at or above the national average. No more than 20% will score lower than one standard deviation from the national average.

Survey:

Eighty percent of students surveyed will demonstrate an increase in appreciation for . . . .

Examples of Measurable Learning Outcomes. The following examples are taken from the Doctor of Veterinary Medicine program from Texas A&M.

Direct method used: Standardized Exams

Learning Outcome (knowledge based):

- Students will *demonstrate* mastery of basic principles of gross and microscopic anatomy, physiology, biochemistry, immunology, microbiology/virology (including knowledge of foreign diseases such as foot and mouth disease and bovine spongioform encephalopathy (mad cow disease) and diseases with bioterrorism potential such as anthrax) . . . .

Assessment Method:

- The National Board of Medical Examiners (NBME) Subject (Shelf) Exams will be used. The NBME is given to medical students in preparation for a Phase I (preclinical) exam administered at the end of the second year of a professional medical curriculum. The exam provides a multiple choice exam(s) that addresses the core competencies noted in pre-clinical learning outcomes, provides national norming and a psychometrically sound and legally defensible test preparation method, and concentrates on integration of knowledge rather than simple recall of isolated facts.

Outcomes Criteria:

- Ninety percent of all students will score at least 70% or better on this exam. Of the ten categories represented on the exam, students will achieve the passing mark of 70% on at least 8 of 10 categories.
- Sixty-five percent of all will score at or above the national average established using data collected from second year medical students. No more than 20% will score lower than one standard deviation from the national average.

Indirect method used: Survey

Learning Outcome (attitude based):

- Students will *appreciate* the value of outcomes assessments in assuring quality across the veterinary medical profession and in facilitating movement of veterinary medical professionals across national borders.

Assessment Method:

- The appreciation for the value of standard setting to promote veterinary medical globalization and international opportunities will be assessed at the beginning and end of the professional curriculum through completion of an appropriately designed survey.

Outcomes Criteria:

- Eighty percent of students surveyed will demonstrate an increase in appreciation for outcomes assessment to assure quality across the profession and facilitating movement of the profession across national borders.

Direct method used: pre- and post- evaluation of written cases

Learning Outcomes (skill based):

- Students will be able to *collect* and *organize* appropriate clinical date (history, physical exam, laboratory assessments including technological advancements in diagnostics such as PCR).
- Students will be able to *apply* principles of evidence-based medicine to determine clinical diagnoses . . . .

Assessment Method:

- A series of written cases (based on medical records) as well as actual clinical cases will be utilized to assess clinical competencies of students immediately prior to and at the end of their fourth (clinical) year. The written cases are developed using established expertise. A system for utilization of actual clinical cases for pre- and post- assessment will be developed for a cohort of students.

Outcomes Criteria:

- All students will show substantial improvement in stated learning outcomes as indicated by pre- and post- evaluation of written cases.

Program and Performance Outcomes

Program and performance outcomes describe what you want a program to do or accomplish rather than what you want students to know, do or value. Program outcomes can be as simple as a completion of a task or activity, although this is not as meaningful as it could be and does not provide you information for improvement. To accomplish the latter, you should try to assess the effectiveness of what you want your program to accomplish. Performance outcomes usually have quantitative targets.

<u>The Components of a Measurable Program Outcome</u> are the same as for learning outcomes except the actor is the program not the student. Some of the more commonly used assessment methods for evaluating program outcomes include the following:

Examples of Direct Assessment Methods:	Examples of Indirect Assessment Methods:
▪ Tracking use of services (attendance, ticket sales, clients, etc.) ▪ Tracking program participation by desired demographics ▪ Satisfaction surveys ▪ Focus group discussions ▪ GPA ▪ Timelines and budgets ▪ Certificates of completion/compliance	▪ Peer institutions benchmarking ▪ Observation ▪ Former student surveys ▪ Student leadership transcripts

The following are examples of program/performance outcomes:

Performance outcome: Increase the size of the Rec Center's Weight & Fitness room and purchase additional equipment to increase access for Rec Center members. (Dependent on the successful passage of the student fee referendum.)

Means of assessment: Completion of project by September 1, 2005, within budgetary constraints; a customer satisfaction survey both pre- and post-construction; comparison of hourly counts of users pre- and post-construction

Criteria for Success: Completion of project by September 1, 2005, within budgetary constraints; Minimum inconvenience to current weight room users during construction; aesthetically pleasing addition; increase in number of participants and pieces of equipment in weight room; increased level of customer satisfaction with the weight room.

Performance outcome: Develop and expand the Student Health Services web page in order to increase student access to health information, information regarding patient services and educational programming available from Student Health Services

Means of assessment: (1) Data retrieval from webpage interactions; (2) Annual patient survey to determine student utilization of website; (3) Survey instruments utilized by Health Education when scheduling of evaluating Health Education programs to determine student utilization of website.

Criteria for Success: Increase in the utilization of the Student Health Services webpage regarding health information, patient services and educational programming

Performance Outcome: Corps of Cadets semester GPA will increase by 1% a semester for three years beginning with the Spring of 2003

Means of Assessment: Computing GPA at the end of each semester and comparing it to the previous spring or fall semester as appropriate.

Criteria for Success: Spring for Spring 03 will be 2.7213; Spring 04 will be 2.7485; Spring 05 will be 2.7760; Fall of 03 will be 2.6913; Fall 04 will be 2.7182; Fall 05 will be 2.7454.

Summation

1. Be very clear about what you are trying to assess. Do you want to assess what your program is accomplishing and the degree to which it is being accomplished (program outcomes)? Do you want to assess what students are learning or what staff is learning as a result of the curriculum or training your program is offering (learning outcomes)?

2. Are your outcomes measuring something useful and meaningful? Will relevant parties find the information generated credible and applicable to decisions that need to be made?

3. Is the outcome measurable? If it is not, you need to redefine your outcome.

4. Be patient. Try not to be frustrated with the process and seek assistance from others. Asking others to evaluate your outcomes is a good way to improve them. Writing good outcomes takes practice, and it takes time.

5. Practice, practice, practice.

6. Celebrate your accomplishments. Writing good outcomes will suggest good measurements. Good measurements will provide the information to continuously improve your program.

On-line Resources:

http://www.ncgia.ucsb.edu/education/curricula/giscc/units/format/outcomes.html
http://www.depts.washington.edu/grading/slo/designing_outcomes.htm
http://www.aahe.org/assessment/assessmentplan.htm
http://www.ac.wwu.edu/~assess/slo.htm (includes books on assessment and student learning)

Contact Us: Please feel free to contact Simone Tiu at simone-tiu@tamu.edu or Sandi Osters at sandio@tamu.edu, we would be happy to provide feedback on your effort in articulating measurable learning outcomes.