Writing Measurable Learning Outcomes

Criteria for Quality Outcome Statements [1,2]

- Define the *purpose* of the course for you and your students
- Have *action words* that describe what the student will KNOW and be able to DO differently as a result of your course
- Describe *meaningful* learning
- Are *measurable* - you can observe and measure students' ability to achieve them
- Represent a *high level* of learning, rather than trivial tasks
- Are written in *clear* language students can understand

Types of Outcomes [2,3]

Competency – what can someone do at the end of the course and at what level?
Movement or Growth – how much improvement is expected in a particular skill?
Accomplishment – what resume worthy result will come from the course?
Experience – what happened with enough emotional impact to cause serious reflection?
Integrated performance – how have students combined many forms of knowledge and skills in a professional performance without direct guidance or assistance?

Example outcomes [1,2,3,4]

- (Competency) Demonstrate the addition of sine waves using physical devices, instrumentation, and graphs.

- (Competency) Use physical and chemical properties to determine the quality of paper samples and make recommendations based on specific requirements.

- (Movement) Improve assessment skills and process usage by elevating at least one level on the rubric "Assessor Performance".

- (Accomplishment) You will produce and document a major system incorporating at least 10 processes, 2-3 inputs, and 6 reports; addresses a real client's needs; meets industry specifications for quality; and includes a design manual and user manual.

- (Experience) Upon completing this course you will have reflected seriously upon the emotional impact of planning and interpreting formal discussions about contemporary and technically complex nuclear issues with the general public.

- (Integrated performance) Contrasts the theories presented in this course to explain why the motivation to become president is different for each of the primary candidates.

1. http://www.league.org/gettingresults/web/module2/learning/index.html, accessed 2008
2. Curriculum Design Handbook, Daniel K. Apple and Karl Krumsieg– Pacific Crest, 2003
3. Faculty Guidebook: A Comprehensive Tool for Improving Faculty Performance, 4th ed., Steven W. Beyerlein, Carol Holmes, Daniel K. Apple eds., Pacific Crest, 2007
4. Utschig – Introduction to Nuclear Engineering, Course Planning Notes, Georgia Institute of Technology, 2007

Dr. Tristan Utschig (CETL) and Dr. Jonathan Gordon (OOA), Georgia Tech
Georgia Tech Global Learning Center - April 24, 2009   **Handout 2**

1

Example Outcomes – Thinking critically about criteria for quality [1]

Consider the following outcome statements. Based on what you've just read, which of the following meet the criteria listed above, and which need to be revised or totally rewritten? Compare your answers to those offered on the next page.

1. Understand Newton's three laws of motion. (competency)

2. Express numbers in scientific notation using the correct number of significant digits. (competency)

3. Diagnose failures in the vacuum, mechanical components, and controls of HVAC systems and determine necessary action for repairs. (competency or accomplishment)

4. Identify unknown bacteria using gram stain, biochemical, and other microbiological methods for identification. (competency)

5. Appreciate the difference between various forms of graphical representation. (competency)

Example Outcomes – Improvements based on applying criteria [1]

1. "Understand" is not an action word and does not describe what students will be able to do differently as a result of the course.

    A better outcome might be: Use Newton's three laws of motion to predict motion in three dimensions.

2. This statement describes a discrete skill, but not an overarching goal of a class.

    A better outcome might be: Express and manipulate numbers effectively using the concepts of scientific notation, significant digits, and SI unit measurements.

3. This statement meets all the criteria.

4. This statement meets all the criteria.

5. This statement is vague and is not measurable.

    A better outcome might be: Given a set of data, construct a time series, scatterplot, or histogram to show relationships between quantities.

1. http://www.league.org/gettingresults/web/module2/learning/index.html, accessed 2008

Dr. Tristan Utschig (CETL) and Dr. Jonathan Gordon (OOA), Georgia Tech
Georgia Tech Global Learning Center - April 24, 2009   *Handout 2*

2

Bloom's Taxonomy and McBeath's Action Verbs [1,2]

Bloom's levels of learning and McBeath's action verbs can be used to support writing quality, non-trivial learning outcomes.

Level	Definition	Action Verbs
Knowledge	recalling or remembering something without necessarily understanding, using, or changing it	Count, define, describe, draw, identify, label, list, match, name, outline, point, quote, read, recall, recite, recognize, record, repeat, reproduce, select, state, write
Comprehension	understanding something that has been communicated without necessarily relating it to anything else	Associate, compute, convert, defend, discuss, distinguish, estimate, explain, extend, extrapolate, generalize, give examples, infer, paraphrase, predict, rewrite, summarize
Application	using a general concept to solve problems in a particular situation; using learned material in new and concrete situations	Add, apply, calculate, change, classify, complete, compute, demonstrate, discover divide, examine, graph, interpolate, manipulate, modify, operate, prepare produce, show, solve, subtract, translate, use
Analysis	breaking something down into its parts; may focus on identification of parts or analysis of relationships between parts, or recognition of organizational principles	Analyze, arrange, breakdown, combine, design, detect, develop, diagram, differentiate, discriminate, illustrate, infer, outline, point out, relate, select, separate, subdivide, utilize
Synthesis	creating something new by putting parts of different ideas together to make a whole	Categorize, combine, compile, compose, create, drive, design, devise, explain, generate, group, integrate, modify, order, organize, plan, prescribe, propose, rearrange, reconstruct, related, reorganize, revise, rewrite, summarize, transform, specify
Evaluation	judging the value of material or methods as they might be applied in a particular situation; judging with the use of definite criteria	Appraise, assess, compare, conclude, contrast, criticize, critique, determine, grade, interpret, judge, justify, measure, rank, rate, support, test

1. http://www.ssdd.bcu.ac.uk/outcomes/UCE%20Guide%20to%20Learning%20Outcomes%202006.pdf, accessed 2008
2. Another good resource articulating the same things with different language: http://eceserv0.ece.wisc.edu/~morrow/ECE353/blooms_taxonomy.pdf

Methodology for Writing Course Outcomes:

1. Inventory course context
    a. Identify major concepts, tools, skills, and behaviors that make up the course

    b. Identify difficult performance challenges for the students in the course

    c. Identify important prerequisites for following courses (if any)

2. Rank the most important 3-8 items arising from the list above
3. Categorize each item as an outcome type (see list on page 1)
4. Draft outcomes - On successful completion of the course, you will be able to …
    1.

    2.

    3.

5. Revise outcomes to more fully incorporate relevant context (think of performance situations where students utilize the knowledge and skills identified in the outcome)
6. Revise outcomes to utilize blooms taxonomy and associated action verbs (see list on page 3)
7. Review to ensure criteria for quality outcomes are met (see list on page 1)

Learning Outcomes - Peer Review Form

Please take a few minutes to help a colleague create the best possible outcome(s) by assessing one or more of their outcomes using this form. The format shown here is a common assessment reporting method called the SII method[1].

- Identify one **strength**
    - Which criteria for quality outcomes is exemplified? (name it)

    - What is the evidence for this? (prove it)

    - Why was this aspect of the outcome(s) important? (explain it)

- Identify one **area for improvement**
    - What might limit the value of the outcome(s) as written? (concern)

    - How would the outcome be different upon improvement? (a change)

    - What realistic advice can you give towards achieving the change? (action plan)

- Identify one **insight**
    - What have you discovered about writing learning outcomes just now?

    - Why might that discovery be important?

1. Faculty Guidebook: A Comprehensive Tool for Improving Faculty Performance, 4th ed., Steven W. Beyerlein, Carol Holmes, Daniel K. Apple, eds., Pacific Crest, 2007