The Foundation Coalition
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WRITING LEARNING OBJECTIVES AND CLASSROOM ASSESSMENT TOOLS

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Workshop Objectives, Schedule & Format

- **Participants will gain experience in writing**
  - **Learning objectives**
  - **Classroom assessment tools**
- **Workshop intended for beginners**
- **Workshop schedule**
  - **One hour on learning objectives**
  - **One hour on classroom assessments**
- **Workshop format**
  - **"Working" workshop**
  - **½ to ¾ of time in team and individual activities**

Learning Objectives

Schedule -- Learning Objectives

- **Presentation**
  - **Learning objectives**
- **Team Exercise**
  - **Write guidelines for learning objectives**
- **Individual Exercise**
  - **Write learning objectives**
- **Team Exercise**
  - **Review individual objectives**
- **Individual Exercise**
  - **Rewrite learning objectives**

Learning Objective Pre-assessment

- **Write a one-sentence answer to the following question:**
  - **What is a learning objective?**

Learning Objective for Session

At end of session, participants will be able to:
  - **Define a learning objective**
    - **An instructional objective**
  - **Discuss the importance of learning objectives in the teaching-learning process**
  - **Write learning objectives for their courses**

Web Sites -- Learning Objectives

- www.hcc.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/writeobj.htm
- sheridan-center.stg.brown.edu/publications/SyllabusHandbook/syllabus.shtml#coura
- ublib.buffalo.edu/libraries/projects/tlr/importance.html
- faculty.washington.edu/krumme/giodes/bloom

Importance of Objectives

University of Buffalo Web Site

ublib.buffalo.edu/libraries/projects/tlr/importance.html

Purpose of Learning Objectives

- **Communicate expectations for a course**
- **Provide a context for what will be learned**

ublib.buffalo.edu/libraries/projects/tlr/importance.html

Objectives and Students

- **Objectives help students**
  - **Clarify their personal goals**
  - **Provide framework for measuring their success.**
  - **Reduce their anxiety**
  - **Improve their studying effectiveness**

- **Objectives help instructors**
  - **Guide preparation of classroom material**
  - **Make homework assignments**
  - **Aid in test design**

Modified from ublib.buffalo.edu/libraries/projects/tlr/importance.html

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Form of Learning Objectives

- **Write objectives as student outcome statements**

- **Objectives should answer the questions**
  - **"What must students do to prove that they have succeeded?"**
  - **"What should students be able to do as a consequence of instruction?"**

ublib.buffalo.edu/libraries/projects/tlr/importance.html

Elements of an Objective

- **Objective must contain three basic elements:**
  - **Verb describing an observable action**
  - **Conditions of this action**
    - **"When given x you will be able to..."**
  - **Level of acceptable performance**

ublib.buffalo.edu/libraries/projects/tlr/importance.html

Constructing a Syllabus – M. Woolcock – Brown University

Verbs for constructing concrete objectives:

analyze	compute	classify	collaborate
compare	appreciate	contrast	define
demonstrate	direct	derive	designate
discuss	display	evaluate	know
identify	infer	integrate	interpret
justify	list	understand	organize
grasp	report	respond	solicit
state	synthesize	name	explain

Modified from
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Modified from
sheridan-center.stg.brown.edu/publications/SyllabusHandbook/syllabus.shtml#coura

Learning Objectives Verbs for Categories in Bloom's Taxonomy

- **Knowledge**
  - **Define, describe, list, reproduce, enumerate**
- **Comprehension**
  - **Classify, explain, discuss, give example, summarize**
- **Application**
  - **Determine, develop, compute, chart, utilize**
- **Analysis**
  - **Correlate, diagram, distinguish, outline, infer**
- **Synthesis**
  - **Adapt, combine, compare, contrast, design, generate**
- **Evaluation**
  - **Compare & contrast, critique, justify, conclude**

Modified from faculty.washington.edu/krumme/giodes/bloom

Some Personal Observations

Complex Versus Simple Objectives

- **One complex objective versus several simple ones?**
  - **High-level versus low-level objectives**

Example
- **One complex objective (4 or 5 weeks of classes)**
  - **"Given a verbal description of a digital module, develop an implementation using any of 7 different logic devices"**

- **15 to 20 simpler objectives (1 or 2 per class)**
  - **"Given a verbal description, draw the truth table"**
  - **"Given a truth table, obtain a minimum-cost equation"**
  - **…**
  - **"Draw the the NAND-gate implementation for an equation"**

Comparison Of Complex & Simple Objectives

- **Multiple simple objectives**
  - **More manageable "chunks" for students**
  - **Explicit objective(s) for each class**
  - **Simple (more manageable) homework problems and test questions**

- **Single complex objective**
  - **Student's attention directed to the overall process**
    - **May lead to higher level learning**
  - **Students must deal with complexity**
  - **Students must subdivide problem on their own**

Advantages Of Simple Objectives

- Advantages of simple objectives are more important in
  - Large classes rather than small classes
  - Introductory courses rather than advanced courses

How To Deal With "Understand" In Objectives

- How do you write objectives when you want students to "understand" a complex concept, system, or process

- Identify specific tasks that indicate "understanding"
  - Specify objectives for each task

How To Deal With "Understand" In Objectives -- Example

- In our computer architecture course we want students to "understand" a sample architecture made up of several modules
- What would students be able to do if they "understood"
- Objectives –
  - Students should be able to identify:
    All the modules and interconnecting signals
    Modules involved in a given system-level operation
    Output values for a given input values for each module
    Sub-module changes given a system level change
    …

Writing Objectives – Piecemeal Approach

- Writing low-level objectives for a whole course may be overwhelming

- Use a "piecemeal" approach
  - Write your lectures and define the homework as usual
  - After each class -- write down what you expect the students to be able to do
  - These become a list of objectives
    - Give them to the students before each exam
    - Use them to write the exam

- As semester progresses -- may become comfortable writing the objectives before you prepare your lecture

Evolving Objectives

- In a 3-credit course
  - I started with over 100 objectives
  - Four offerings later -- down to about 50

- Eliminated peripheral "stuff" that was not central
  - Broadening, informational, perspective material

Objectives and Homework Assignments

- Homework assignments should match objectives
  - Students need to practice and explore the skills, knowledge, and attitudes defined in objectives

- Frequently require supplementary homework problems
  - In some of my courses
    - 1/3 of homework is from textbook
    - Rest are supplementary problems
  - With well defined objectives
    - Writing homework problems is straightforward
    - Same is true for exam questions

Student's Use Of Objectives

- **Survey in 400-level required course**

- *Did you find the objectives helpful?*
    - **Yes --- 52 %**
    - **No ---- 48%**

- *Did you read the objectives?*
    - **Frequently ------ 22 %**
    - **Occasionally -- 37 %**
    - **Never ------------ 41 %**

Team Exercise

Guidelines For Learning Objectives

Strategies For Team Operation

- **Assign team roles & follow through on responsibilities**
    - **Coordinator -- Coordinates discussion & develops consensus**
    - **Recorder -- Writes down the ideas & reports them**
    - **Gatekeeper -- Keeps the team on the subject**
    - **Timer -- Makes sure the team stays on schedule**

- **With smaller teams – combine gatekeeper & timer**

Strategies For Team Operation

- **Be positive, supportive, and cooperative**
    - **Limit critical or negative comments**

- **Be brief and concise in discussions**
    - **Avoid lengthy comments, stories, or arguments**

- **Stay focused**

Team Roles

- **For first exercise**
    - **Coordinator – Individual with largest class last semester**
    - **Recorder/Reporter – Individual on left of coordinator**
    - **Gatekeeper/timer -- Individual on left of recorder**
    - **Timer -- Individual on left of gatekeeper**

- **Roles rotate clockwise on subsequent exercise**

Guidelines For Learning Objectives

- **Task**
    - **Write 3 or 5 guidelines for good learning objectives**
        - **What are the common features?**
        - **What should objectives look like?**
    - **Think of guidelines as specifications**

- **Methodology**
    - **Brain storm individually -- 2 minutes**
    - **Establish consensus as a team -- 5 minutes**
    - **Report team results -- 3 minutes**
    - **Revise guidelines as a team-- 2 minutes**

Individual Exercise

Writing Learning Objectives

Writing Learning Objectives

- **Individually write a set of objectives for a topic representing a few classes**
  - **Something that you recently did in class**

- **Follow your team's guidelines**

- **Questions to consider about your objectives**
  - **Do they define student behavior?**
  - **Are they observable, measurable?**
  - **Can you write homework problems & exam questions?**
  - **Are they consistent with the instructor's intent?**

- **5 minutes**

Team Exercise

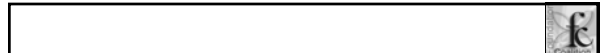**Reviewing Learning Objectives**

Reviewing Learning Objectives

- **Review each other's objectives**

- **Questions to consider in reviewing objectives**
  - **Do they follow your team's guidelines**
  - **Do they define student behavior?**
  - **Are they observable, measurable?**
  - **Can you write homework problems & exam questions?**
  - **Are they consistent with the instructor's intent?**

- **15 minutes**

Individual Exercise

Revising Your Learning Objectives

Revising Your Learning Objectives

- **Rewrite your learning objectives based on your team's review**

- **Report on biggest improvement**

- **5 minutes**

Learning Objectives
Post-assessment

- **Write a one-sentence answer to the following question:**
  - **What is the "muddiest point" about learning objectives?**
    - **(What is the most confusing point?)**

Classroom Assessment

Schedule -- Classroom Assessment

- **Presentation**
  - **Classroom assessment tools**
- **Team Exercise**
  - **Write guidelines for classroom assessment tools**
- **Individual Exercise**
  - **Write classroom assessment tools**
- **Team Exercise**
  - **Review individual classroom assessment tools**
- **Individual Exercise**
  - **Rewrite classroom assessment tools**

Classroom Assessment ---- Pre-Assessment

- **Write a one-sentence answer to the following question:**
  - **How would you determine whether or not your class as a whole learned what you taught that day?**

Learning Objective for Session on Classroom Assessment

- **At end of session, participants will be able to:**
  - **Define several classroom assessment tools**
  - **Discuss the importance of using classroom tools in the teaching-learning process**
  - **Write assessment tools for their classes**

Web Site -- Classroom Assessment

- www.hcc.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/assess-2.htm
- www.hcc.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/assess-1.htm
- www.siue.edu/~deder/assess/catmain.html

Types Of Assessment

- Assessment used in many contexts

- Classroom assessment
  - Concerns your performance

- Performance assessment
  - Concerns individual student's performance

- Outcomes assessment (ABET-type assessment)
  - Concerns program's performance

Types Of Assessment

- Classroom assessment
  - **Question** -- How effective was a lecture, assignment, lab?
  - **Tools** -- One-minute paper, student survey

- Performance assessment
  - **Question** – Did a specific student achieve the learning objectives?
  - **Tools** -- Exams, reports, presentation

- Outcomes assessment (ABET-type assessment)
  - **Question** -- How well did a group of students achieve a set of objectives (outcomes) in a program or course?
  - **Tools** -- Standardized test, alumni & employee surveys

Classroom Assessment Techniques

Thomas A. Angelo and K. Patricia Cross
From *Classroom Assessment Techniques, A Handbook for College Teachers*, 2nd Ed.

University of Hawaii Web Site

www.hcc.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/assess-1.htm

Classroom Assessment

- Two fundamental questions:
  - How well are learners learning?
  - How effectively are teachers teaching?

- Deals with better learning and more effective teaching
  - Provides feedback about effectiveness as teachers
    - How students learn
    - How they respond to particular teaching approaches.
  - Gives students a measure of their progress as learners

Modified from www.hcc.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/assess-1.htm

Incorrect Assumptions About Teaching & Learning

- Instructors assume students learn what they teach
  - Tests and term papers provide disappointing evidence to the contrary

- Students have not learned as much or as well as expected
  - Gaps between what was taught and what was learned
    - Sometimes considerable gaps

- Instructors notice gaps too late to remedy the problems

- Classroom assessment can uncover gaps earlier

www.hcc.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/assess-1.htm

Getting Started In Using Classroom Assessment Techniques -- Three Steps

- Planning
  - Select one, and only one, of your classes
  - Choose a simple and quick technique

- Implementing
  - Make sure the students understand the procedure
  - Analyze student's responses as soon as possible

- Responding -- "Close the feedback loop"
  - Tell students what you learned and what you will do about it
    - Motivates students to become actively involved

www.hcc.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/assess-1.htm

Classroom Assessment – Five Suggestions

- Don't use any technique that does not appeal to you
- Don't make it into a self-inflicted chore or burden.
- Try it yourself before you use it with students
- Allow more time than you think you will need
  - To carry out the assessment
  - To respond to it
- Make sure to "close the loop"
  - Let students know
    - What you learned from their feedback
    - How you and they can use that information to improve learning

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Classroom Assessment Technique Examples

Thomas A. Angelo and K. Patricia Cross
From *Classroom Assessment Techniques: A Handbook for College Teachers*, 2nd Ed.

University of Hawii Web Site

Examples of Assessment Techniques

- **Background Knowledge Probe**
  - **Students respond to short-answers or multiple-choice questions**
    - **General information on their level of preparation**

- **Minute Paper (most widely used)**
  - **Students write brief response to**
    - **"What was the most important thing you learned during this class?"**
    - **"What important question remains unanswered?"**

Examples of Assessment Techniques (Cont.)

- **Muddiest Point (simplest technique, remarkably efficient)**
  - **Students jot down a quick response to one**
    - **"What was the muddiest point in .... ?"**
      - **A lecture, a discussion, a homework assignment**

- **One-Sentence Summary**
  - **Students answer the questions "Who does what to whom, when, where, how, and why?" (WDWWWWHW)**
    - **Synthesize answers into a simple, informative, grammatical sentence.**

Examples of Assessment Techniques (Cont.)

- **What's the Principle?**
  - **Students state the principle that best applies to a few problems**

Some Personal Observations

Relating Student Performance On Exams To Objectives

- Write exam using objectives
  - Select objectives for exam questions from lsist
    - Many objectives -- test questions represent a sample
    - Exam question may involve more than one objective
    - Use some "hard" and some "easy" questions

- Identify questions (& objectives) a high percentage missed
  - Review idea in class -- give additional work
  - Modify lecture, reading, or homework for future
  - Change the objective

Assessment With Cooperative Learning In-class Exercises

- Examine students work during the in-class exercise
  - If all have a good approach -- may be wasting time
  - If all are lost -- may need more explanation
  - If one-half to two-third have a good approach -- level and pace are right

- Collect and show a few solutions to in-class exercises
  - If all have correct approach -- may be wasting time
  - If all are wrong -- may need more explanation
  - If one or two are correct -- level and pace are right

"One-Minute Papers

- Common questions
  - What one thing should be changed about ____?
  - What one thing should not be changes about ____?
  - What do you think about ____?
  - What is the "muddiest' point about ____ ?

- Ask about
  - Course or lecture
  - Text or chapter
  - Assignment or test
  - Teaching style or class activity

Some Colleagues' Observations

Informal Assessment Techniques

- General Guidelines
  - Keep them anonymous
  - Use then frequently – better feedback
  - Close the loop
    - Let students know results of the process

David Cordes

Informal Assessment Techniques Daily Activities

- One-minute paper
  - At the end of the lecture, ask students for:
    - The most important topic that we covered today
    - The one topic you are still confused about
  - Single sheet of paper, no names
  - Can read on the way back to the office
    - Look for "common problems"
    - Look for "did they understand my focus?"

David Cordes

ME 360 - Plus / Delta Assessment #1

- **On one side of "sticky" pad**
  - **Put a "+" in upper left hand corner**
  - **What is something that worked well or made more sense <u>in lab</u> this week?**
- **On other side of "sticky" pad**
  - **Put a "Δ" in upper left hand corner**
  - **What is something that could have been done better <u>in lab</u> this week?**
- **"Stick" on the door on your way out**

Joey Parker

ME 372 - 1st Day of Class

- **What are a valid set of units for a mass moment of inertia? (*Dynamics concept*)**
- **What is the difference between a capacitor and a resistor? (*Circuits concept*)**
- **What is the equation of the straight line that passes through the points X=2, Y=7 and X=7, Y=2? (*Math concept*)**

Joey Parker

Team Exercise

Guidelines For Assessment Tools

Guidelines For Writing Assessment Tools

- **Task**
  - **Write 3 to 5 guidelines for good assessment tools**
    - **What are the common features?**
    - **What should they look like?**
    - **Do all guidelines have to apply to all tools?**
  - **Think of guidelines as specifications**

- **Methodology**
  - **Brain storm individually -- 2 minutes**
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  - **Report team results -- 3 minutes**
  - **Revise guidelines as a team -- 2 minutes**

Individual Exercise

Writing Assessment Tools

Writing Assessment Tools

- **Individually write a set of assessment tools for a class or a topic representing a few classes**

- **Follow your guidelines**

- **Consider the following questions about your tool**
  - **Can your students understand the task?**
  - **Can your students do the task quickly?**
  - **Can you analyze the results quickly?**
  - **Can you summarize and report the results easily?**
  - **Does it assess student learning?**

- **<u>5 minutes</u>**

Team Exercise

Reviewing Assessment Tools

Reviewing Assessment Tools

- Review each other's objectives and assessment tools

- Consider the following questions
  - Does the tool follow your guidelines?
  - Can your students understand the task?
  - Can your students do the task quickly?
  - Can you analyze the results quickly?
  - Can you summarize and report the results easily?
  - Does it assess student learning?

- 15 minutes

Individual Exercise

Revising Your Assessment Tools

Revising Your Assessment Tools

- Rewrite your assessment tools based on your team's review

- Identify the major improvement

- 5 minutes

Learning Objectives
Post-Assessment

- Write a one-sentence answer to the following question:
  - What is the muddiest point about classroom assessment?

Workshop Objectives,
Accomplishments & Action Items

- Recall objectives
  - At end of session, participants will be able to define, discuss, & write
    - Learning objectives for their courses
    - Assessment tools for their classes
- Workshop provided a structure for & experience in writing
  - Learning objectives
  - Assessment tools
- Your charge – In one of your courses next semester use
  - Learning objectives
  - Classroom assessment tools

Questions?

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