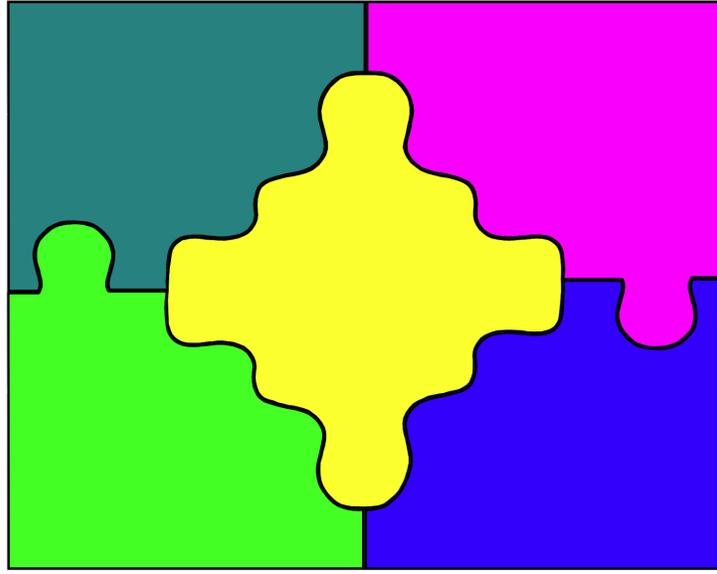


# Using Classroom Assessments to Improve Student Learning



Center for the Enhancement of Teaching and Learning (CELT)  
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Welcome



## Assessment: The Key to Successful Student Learning

Welcome to classroom assessment for engaging students actively in their learning! One of the most important responsibilities we have as teachers is to improve the learning of our students. We have designed this booklet to assist faculty in incorporating assessment activities into your courses.

Assessment is valuable and often challenging, it is the key to unlocking what has actually been learned! This booklet will take you through the steps, complete with examples, to implement these active assessment activities into your course to enhance your students' educational experience. The index is set up so you can easily refer to the sections that will be most relevant to your course.

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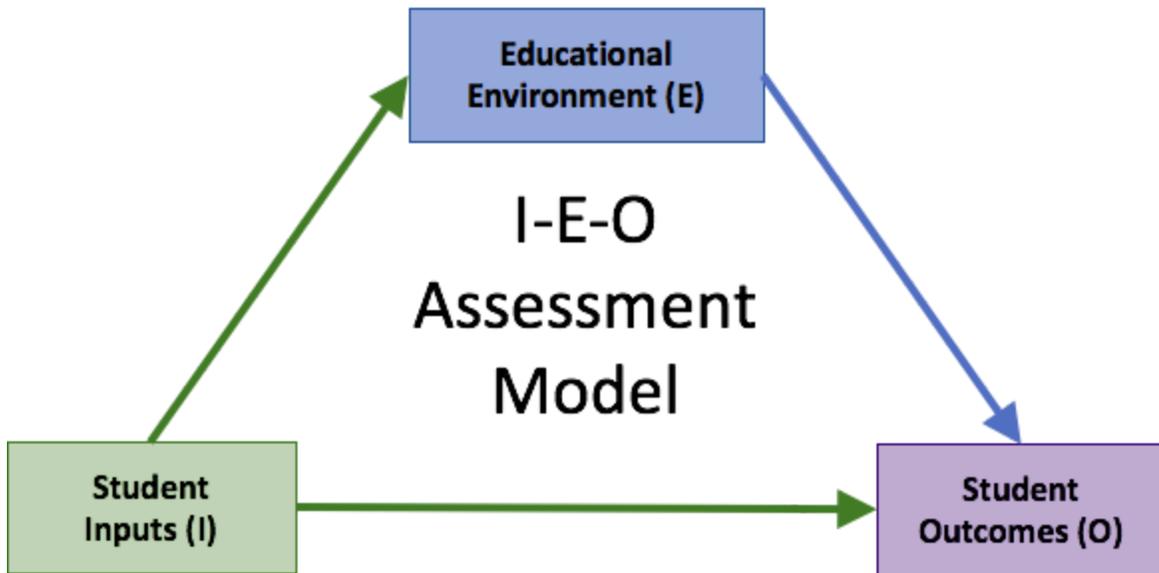
# Introduction:

Assessment is an ongoing process whose goal is understanding and improving student learning. The more we know about students and their experiences during the learning process, the better we can meet learning needs and establish a positive learning environment. This booklet is designed to assist you in implementing an outcome based assessment model in your course that is simple, efficient, and beneficial to both the teacher and the learner.

Using an **Input/Experience/Output (I.E.O.)** model<sup>1</sup> that is integrated into your course, you will be able to use the information from these activities to improve learning, adjust the curriculum and increase the effectiveness of your own teaching. In other words, the more you know about what knowledge, skill and attributes the students enter your class with (**INPUT, “I”**), how students are tackling the learning in your course (**EXPERIENCE, “E”**), and what knowledge, skills and attitudes they have at the end of the course (**OUTPUT, “O”**), the more effectively and efficiently you will teach and students will learn. Feedback from assessment is used by students to adjust their study to be more effective and by faculty in the design of course activities.

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<sup>1</sup> The IEO model was developed by Alexander Astin (Assessment for Excellence: The Philosophy and Practice of Assessment and Evaluation in Higher Education, 1993).



These activities are an integral part of the learning process. It is important that you have a clear understanding of what you want to assess and then be sure you communicate that understanding to your students. Assessment is a collaborative process, it is not something “done to students” but rather something “done with students” in which they gain valuable information about their own learning.

## Why do assessment?

There are many documented benefits in the literature for having a learning assessment plan: increased discourse over curriculum, increased energy and renewal about teaching, curriculum and program revision, improved faculty-student communication and improved student satisfaction. Taking the time and energy to assess learning has benefits for faculty, students and the department.

### ***Instructor Benefits:***

- Assessment efforts leads to ongoing course revision that increases student learning and satisfaction
- Improves individual teaching, monitoring student learning leads to new and different ways of presenting material
- Provides positive re-enforcement for faculty; knowing the amount of student learning on and on-going basis as opposed to end of the semester is rewarding for faculty
- Leads to revision and change for course improvement in the future

### ***Student Benefits:***

- Increases students' ability to self-assess their knowledge and skills
- Creates a positive affect in the classroom; students feel their faculty really care about their learning
- Allows them to study more efficiently and effectively, thus saving them valuable time

### ***Departmental Benefits:***

- Increases discussion about teaching
- Leads to new and innovative ways to teach
- Increases student learning and retention of materials in later years

## **Things to consider BEFORE you begin:**

While implementing assessment is valuable, there are a few things to think about *before* you begin the process. This is a change, for you and the students. As in any endeavor involving change there is resistance, so be prepared for it. Students often have concerns about why they are doing activities and it is EXTREMELY IMPORTANT to make students aware of what you are doing and why you are doing it. Helping them to see the value of these activities to improve their learning allows them to adjust to these new activities and to see the value in these exercises. Finding assessment activities that are meaningful in the context of your course can be challenging. Assessment for assessment's sake is a waste of everyone's time. A systems approach to the whole course, while taking more time, is often more useful and effective than just adding one or two activities. But again, each faculty member must find the level of comfort and usability for their course.

Remember; as you add something to a course there are always time, energy, and tradeoffs. Until you and the students are comfortable with the change in the classroom there will be a tension between content and process. But the process of preparing for assessment often helps you identify the most important objectives for your course, and allows you to focus on those so that it is easier to find content areas that can be modified to accommodate these activities. At first, until you've designed activities, and are comfortable with the rhythm and flow of these activities in your course, it will take time and energy on your part. However, as in most changes, once you've become accustomed to it, you will develop efficient systems that may actually save you time. There are many tips and suggestions in this booklet to help you do assessment as efficiently as possible.

## Getting Started!

There are many resources at Tufts University to help you get started on “doing assessment.”

The Center for the Enhancement of Learning and Teaching has a large library of practical resources that can be adapted to any content area. CELT also has experience in incorporating active learning and engagement activities into a variety of disciplines and is available to consult with individuals and departments.

*The first rule is to begin small!*

## Classroom Assessment Activities:

There are two types of classroom assessment activities: formative and summative.

*Formative assessment* refers to those activities that are used to improve student learning. They may be graded or ungraded, but they provide students with information that allows them to learn something about their own knowledge or skills, make a change and ultimately improve their learning. Formative activities include, quizzes, problems, concept quizzes, muddy point cards and so forth.

*Summative assessment* measures are those which are graded and judge a student’s ability. Though the student may use the information to improve future learning there is not opportunity within the course to improve. Summative activities include final exams, final projects, portfolios, and critical design reviews.

Here are examples of useful formative assessment techniques:

## In-Coming Assessment (I)

### Student Questionnaire

Passing out a brief questionnaire at the beginning and end of the course allows you to tailor classwork to students' need and allows both faculty and students to visibly see the perceived benefits and gains in a course. These can accomplish the following:

- Provide baseline data about student knowledge and skills
- Allows tailoring of material to meet class needs
- Allows student to see value added at the end of the course

Process: Ask a combination of the following with an online survey or in-class handout

- Demographic information
- Perception of students' understanding of core knowledge and skills for the course
- Pertinent past education
- Pertinent past experiential experience

## On-Going Experience Assessments (E)

### Turn-to-Your-Partner Activities

Turn-to-your-partner activities allow you to present situations that accomplish the following:

- Solve a problem
- Discuss a question
- Predict or explain what will happen in a novel situation
- Summarize key ideas of a lecture
- Reflect on material

Process: During class time

- Form groups of two
- Students think about or work on the question or task (*5 minutes*)
- Students explain their answer to their partner and listen to their ideas (*4 minutes*)
- Students work together to synthesize the best answer (*3 minutes*)
- Check in with groups to present solutions (*2 minutes*)

## Peer Instruction with Concept Quiz

Concept quizzes can be used as part of process called *Peer Instruction* advocated by Mazur. This process allows continual feedback to both students and teacher on the classes understanding of key concepts.

Process: Before moving on from a key concepts

- The instructor poses a simple conceptual question with multiple choice answers (*1 min*)
- Silence: the students are given time to think (*1 min*)
- Students share their answers through Poll Everywhere, holding up flashcards, etc. and the answers are tallied (1min)
  - If everyone has answered the question correctly, the instructor can move on - otherwise:
- Students are asked to “convince” their neighbors why their answer is correct (*1 min*)
- Students share their post-discussion answers / Instructor provides insight into the correct answer (*2+ min*)

### **Example Concept Question: Buoyancy**

Imagine holding two bricks under water. Brick A is just beneath the surface of the water, while brick B is at a greater depth. The force needed to hold brick B in place is

1. Larger
2. The same as
3. Smaller than the force required to hold brick A in place.

## Free Writing or Minute Paper: e.g. Muddies Point

A free writing or drawing exercise asking the students to respond to a prompt is a quick assessment feedback mechanism that:

- Gives instant feedback to Instructor
- Provide students the opportunity to reflect and organize their thoughts
- Allows the instructor to identify questions and misconceptions
- Is more effective than “are there any questions?”

Process: At the end of a class or when wrapping up a key concept

- Prompt students with a question, e.g., “What was the muddiest point (most unclear) in today's lecture?” or “What was the most important/interesting/surprising thing you learned during today's class?”
- Clearly describe the process to students, and provide them with index cards, slips of paper, online survey that will allow them to record and share their answers.
- Allow students time to write and turn in their answers.
- Review responses and provide students with feedback (e.g., highlighting common responses or answering key questions).

## Questioning

In an effort to engage students in their own learning, faculty often construct a dialogue mode for their classes. Through questioning we hope students will think about material, synthesize concepts and become actively involved in their learning.

Tips for good questioning: to make questioning a successful assessment technique remember the following:

- Clearly present the question so that students know what they are thinking about. Target key concepts.
- WAIT before you seek answers or ask another question
- Probe and shift questions so that you understand student's deeper levels of thinking, not just the answer. Ask them to clarify their ideas, to support their answer, or to think “out of the box”
- Be careful not to stack questions. Multiple questions asked in rapid-fire order leaves students unclear about what question to answer and faculty unclear about whether a student knows the information or forgot the question.

## Cold Calling

Calling on students by name, being sure to target students randomly to seek input from a diverse array of students in the course and communicate that all students ideas and thinking processes matter. Cold Calling is a method that allows you to:

- Quickly assess in real time the understanding of complex concepts
- Assess general understanding, not just those who raise their hands
- Communicate to students that everyone should be engaging with the material.

Process

- Create a list of student names (e.g, each name on a 3x5 card).
- As you ask questions, pause and allow students time to think about their answer.
- Then select one student at random (Shuffling the ‘deck’ of cards or selecting different areas of the room), pick out a name and “cold call” the student.

A caution with this technique is to clearly explain the purpose of this procedure to students. They need to know that it is not a judgment of their ability, but rather a way to understand how they comprehend class material. Don't be afraid to model that you don't know every answer either and that it's perfectly acceptable to acknowledge that. Emphasize that the point of this activity is to understand the classes thinking process and not to 'evaluate' an individual student's knowledge.

### One Word Reading Summaries

Asking students to summarize readings in a word or phrase encourages students to engage with readings they are responsible for completing before class. This technique encourages students to think about and recall the readings and allows instructors to quickly gain feedback on student thinking about the material.

Process:

- Assign outside class reading
- Ask students to summarize the reading in one word or short phrase
- Students can pair up and share why they chose that word or phrase
- Teachers can randomly call on students to share their word/phrase and explanation.

## Student Outcomes Assessments (O)

At the end of the course or a unit, a summative assessment, often connected to a grade, can be used to demonstrate the student's learning with respect to course learning goals and outcomes. Examples include final exams and papers or videos demonstrating their achievement of the learning objectives or goals. When developing assessments such as exams or quizzes, it can be important to tie questions to various levels of thinking and to make sure that they match each of the key learning outcomes of the course.

## Rubrics

A rubric, in its essence, is a tool containing a limited number of carefully chosen criteria which are used to assess student learning on a given assignment. Rubrics are efficient for communicating performance expectations and giving students feedback on the elements that comprise their grade.

### Process

- Identify measurable criteria that will be evaluated, based on the desired learning outcomes.
- Review the criteria to limit the list to 3-10 items, each of which is clearly defined and focuses on a separate skill or knowledge area.
- Decide how to weigh the criteria (what percentage of the total score or # of points)
- Provide specific, meaningful guidelines for evaluation of each rubric criterion. Levels of success and performance should be clearly communicated in concise language, using action-oriented descriptive language.
- Create a table or grid that lists each criteria and the performance levels.
- Share the rubric with students and explain the criteria and the expectations.

## Table of Specifications

Creating a table linking test questions to the course learning objectives and higher or lower levels of thinking can help in the development of a fair and representative exam that focuses on key areas. Tables of Specifications are like a test “blueprint” and are useful for

- Evaluating the validity of a test
- Guiding the development of test questions, helping instructors to limit the number of test questions.

### Process

- Select the learning objectives the test should cover
- Select different domains or levels of knowledge the test should cover
- Construct a table
- Allocate questions (& points) to to each objective and levels of knowledge. Review, eliminate and create new questions as needed.

TABLE OF SPECIFICATION

Instructional Objectives	% Learning Activity Time / Effort on Objective	% Class time on Objective (Minutes)	# of Test Items	# Lower Cognitive Skills (Knowledge, Recall, Identification, Comprehension)	# Higher Cognitive Skills Levels (Application, Analysis, Evaluation, Synthesis)
Identify the role of supply and demand in a market economy	25%	Lectures 1 & 2 (120 Min)	10/10	7/7	3/3
Identify the necessary conditions for market economies to function well	15%	Lectures 3 & 4 (120 Min)	10/10	5/5	5/5
Understand the economic role of government policy and the Federal Reserve	10%	Lecture 5 (60 Min)	5/10	4/7	1/3
Conduct conceptual evaluation and algebraic analysis of economic problems	25%	Lectures 6, 7, & 8 (180 Min)	10/10	5/5	5/5
Analyze the causes and consequences of unemployment, inflation, and economic growth	25%	Lectures 9 & 10 (120 Min)	10/10	4/4	6/6
<b>Total:</b>	<b>100%</b>	<b>10 Lectures</b>	<b>45/50</b>	<b>25/28</b>	<b>20/22</b>

Student's Final Exam Grade: 90%

Example Table of Specifications

# Analyzing & Feeding Back Classroom Data:

Below is a step by step guide to help you create a classroom assessment plan for your course that allows you to efficiently analyze any data gathered and then close the assessment loop by providing that information where it will most help improve learning.

## Step 1: Creating a Comprehensive Plan

Create a comprehensive plan of assessment in the form of a course matrix that lists the learning objectives and the measures you will use to determine if these objectives have been met. To reiterate, there are two types of assessment. *Formative*- any measurement tool whose goal is to improve learning. It is part of continuous feedback that allows you and your students to determine in a timely manner, progress toward the learning objectives. *Summative*- is any measurement tool whose goal is a judgment of student competency. It is the final assessment of a learning objective that does not allow students to have an opportunity to improve in that course.

For example, one of your learning objectives is that students will be able to evaluate and explain the basic functions, interdependencies, and constraints of integrated systems. You have a preliminary design exercise in which you give students feedback on how well they did the exercise. Whether graded or not, this is formative assessment because students can use that information to improve learning. At the end of the semester you have a critical design exercise in which students present their final project. This is summative because the feedback and grade

you give may help in future learning but does not provide them an opportunity to improve in this class.

Your class matrix would resemble something like this:

<b>Course X</b>		
<b>Knowledge</b>	<b>Formative</b>	<b>Summative</b>
Objective 1	muddy point/concept quiz	mid-term / final exam
Objective 2	cold calling	final exam
<b>Skill</b>		
Objective 3	Peer feedback	Project
<b>Attitude</b>		
Objective 4	self-assessment	

This visual picture of the assessment design for the course will allow you to make informed choices about the type and amount of assessment you wish to do. For example, in the above map, the faculty member may decide that there is too much feedback on Knowledge objective 1 and not enough on Skill objective 1.

## Step 2: Analyzing data

First: Remember don't do recreational data collecting. After your lecture you're now getting 50-100 muddy point cards. How can you codify this information to help improve student learning? There are many ways to use this data that may be useful to you and your students:

- Start a database of common "unclear concepts"
- Keep count of the number of cards from each class to measure student comprehension of topics by lecture
- Group cards by facts/principles/skills/concepts to help you decide where you need to focus
- Generate a list of "why" questions for yourself. "Why did most students not understand this idea?" or "Why is there such a range of understanding in the class on topic x?"

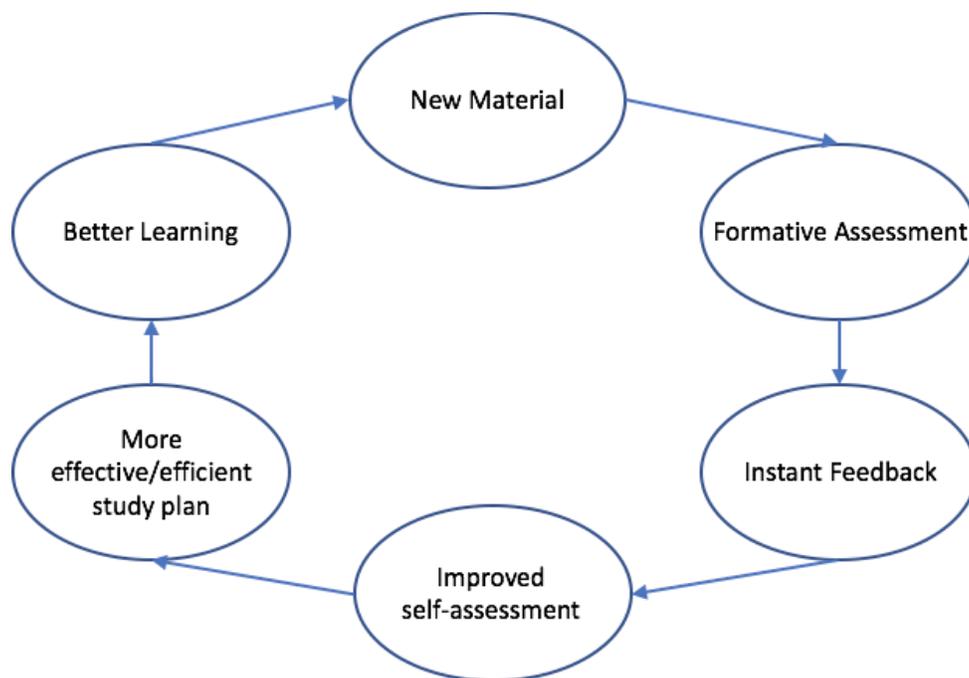
## Step 3: Feeding Back Data

Now that you have this information, what can you do with it? The data from each set of cards can inform your preparation for the next time you give the lecture in a course. You will have a clearer understanding of the areas that students found unclear and that will help you refocus the lecture for maximum learning. But most importantly you can feedback this information to students. This can be done in a number of ways: additional lectures on an unclear topic, reference to pertinent articles, additional sources for the information, handouts of PowerPoint, and so forth.

Whatever class assessment activities you choose are usually easily analyzed and used immediately to improve learning in "real time". BUT there are many other "customers" for this information. Your colleagues might be interested in the areas that students are finding challenging. The next course instructor may find it useful to know what the students actually understand and build on that.

## Conclusion

Using assessment techniques will provide benefits to both students and faculty. Having an on-going emerging picture of how students learn and what they are learning will provide valuable information to inform curriculum decisions. Analysis of student data has shown that while students may be hesitant to try something new, they readily admit that the value of actively engaging in their own learning. Students who have used classroom assessment have defined a cycle that appears below (Qualters, 1999)



If you have questions or would like to discuss active engagement further, please contact the Center for the Enhancement of Learning and Teaching (CELT).

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