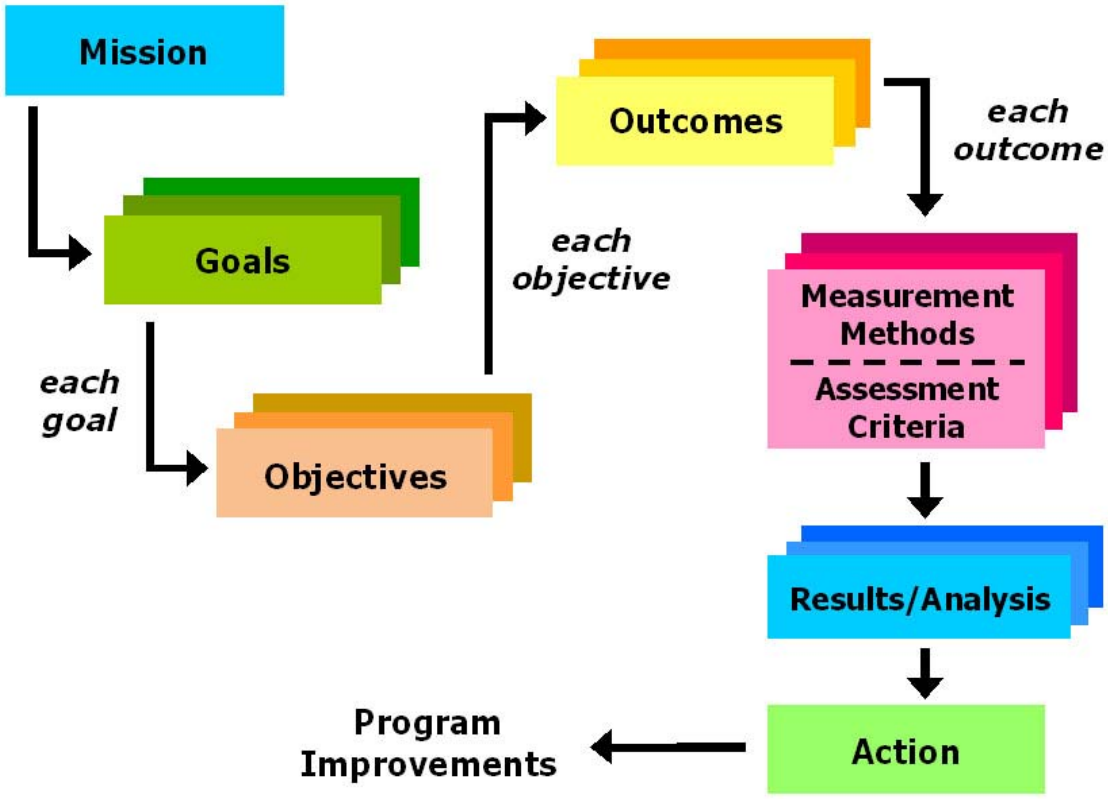
ASSESSMENT NOTES

[A compilation of material from others as indicated]

Eric P. Soulsby
University of Connecticut



Outcomes Assessment Plan

"*If you don't know where you are going, you might wind up someplace else.*" – Yogi Berra

Contents

Why "Assessment"? – *Assessment is needed for Learning*

A significant compilation on the state-of-the-art in terms of what we know about how people learn is given in How People Learn (Bransford, Brown, and Cocking 1999.) Three key findings from the study are

1. Students come to the classroom with preconceptions about how the world works. If their initial understanding is not engaged, they may fail to grasp the new concepts and information that are taught, or they may learn them for purposes of a test but revert to their preconceptions outside the classroom.

2. To develop competence in an area of inquiry, students must:
    a. have a deep foundation of factual knowledge,
    b. understand facts and ideas in the context of a conceptual framework, and
    c. organize knowledge in ways that facilitate retrieval and application.

3. A "metacognitive" approach to instruction can help students learn to take control of their own learning by ***defining learning goals and monitoring their progress in achieving them***.

Bransford et al. describe "transfer" – defined as the ability to extend what has been learned in one context to new contexts – as being a key component of learning. All learning involves transfer from previous experiences. Educators hope that students will transfer learning from one problem to another within a course, from one school year to another, between school and home, and from school to the workplace. Transfer is affected by the degree to which people learn with understanding rather than merely memorize sets of facts or follow a fixed set of procedures.

Time spent learning for understanding has different consequences for transfer than time spent simply memorizing facts or procedures from textbooks or lectures. In order for learners to gain insight into their learning and their understanding, frequent feedback is critical: ***students need to monitor their learning and actively evaluate their strategies and their current levels of understanding***.

Bransford et al. indicate that ***assessment and feedback are crucial for helping people learn***. Assessment should mirror good instruction; happen continuously as part of instruction; and provide information about the levels of understanding that students are reaching. ***Assessments must reflect the learning goals*** that define various learning environments – if the goal is to enhance understanding and applicability of knowledge, it is not sufficient to provide assessments that focus primarily on memory for facts and formulas.

In Knowing What Students Know (Pellegrino, Chudowsky, and Glaser 2001) state laws of skill acquisition:

- *Power law of practice* – acquiring skill takes time, often requiring hundreds or thousands of instances of practice in retrieving a piece of information or executing a procedure.
- *Knowledge of results* – individuals acquire a skill much more rapidly ***if they receive feedback about the correctness of what they have done***.

A dilemma in education is that students often spend time practicing incorrect skills with little or no feedback – the feedback they ultimately receive is often neither timely nor informative; i.e., unguided practice (e.g., homework in mathematics) can be practice in doing tasks incorrectly. **O*ne of the most important roles for assessment is the provision of timely and informative feedback to students during instruction and learning*** so that their practice of a skill and its subsequent acquisition will be effective and efficient

Why "Assessment"? – *Assessment is needed for Effective Teaching*

Major conclusions from What the Best College Teachers Do (Bain 2004):

- What do the best teachers know and understand?
  - Outstanding teachers know their subjects extremely well
  - They have used their knowledge to develop techniques for grasping fundamental principles and organizing concepts that others can use to begin building their own understanding and abilities
  - They have at least an intuitive understanding of human learning
- How do they prepare to teach?
  - They treat their lectures, discussion sections, problem-based sections, and other elements of teaching as serious intellectual endeavors as intellectually demanding and important as their research and scholarship
  - They ***begin with questions about student learning objectives*** rather than about what the teacher will do
- What do they expect of their students?
  - They avoid objectives that are arbitrarily tied to the course and favor those that embody the kind of thinking and acting expected for life
- What do they do when they teach?
  - They try to create what we have come to call a "natural critical learning environment" – one in which people learn by confronting intriguing, beautiful, or important problems, authentic tasks that will challenge them to grapple with ideas, rethink their assumptions, and examine their mental models of reality.
- How do they treat students?
  - They tend to reflect a strong trust in students
  - They often display openness with students
  - They treat students with simple decency
- How do they check their progress and evaluate their efforts?
  - They have some ***systematic program to assess their own efforts and to make appropriate changes***
  - They ***assess their students based on the primary learning objectives*** rather than on arbitrary standards

Once again, as highlighted, *assessment* forms a key ingredient of effective teaching; a natural conclusion given the influence it has on learning.

Summarizing his study, at a 2004 NEEAN/NEASC meeting Ken Bain presented the following:

> "People tend to learn most effectively (in ways that make a sustained, substantial, and positive influence on the way they think, act, or feel) when
> 1. they are trying to solve problems (intellectual, physical, artistic, practical, abstract, etc.) or create something new that they find intriguing, beautiful, and/or important;
> 2. they are able to do so in a challenging yet supportive environment in which they can feel a sense of control over their own education;
> 3. they can work collaboratively with other learners to grapple with the problems;
> 4. they believe that their work will be considered fairly and honestly; and
> 5. they can try, fail, and ***receive feedback from expert learners in advance of and separate from any summative judgment of their efforts***."

This summary of a "learner-friendly" environment is one way of looking at a *learner-centered* approach to educating students.

Why "Assessment"? – *Assessment is part of a quality Learning Environment*

Bransford et al. describe quality learning environments as containing four key ingredients:

"Learner-centered"

- "Learner-centered" environments = environments that pay careful attention to the knowledge, skills, attitudes, and beliefs that learners bring to the educational setting.
- Learner-centered instruction includes a sensitivity to the cultural practices of students and the effect of those practices on classroom learning.

"Knowledge-centered"

- "Knowledge-centered" environments take seriously the need to help students become knowledgeable by learning in ways that lead to understanding and subsequent transfer. Knowledge-centered environments intersect with learner-centered environments when instruction begins with a concern for students' initial preconceptions about the subject matter. Without carefully considering the knowledge that students bring to the learning situation, it is difficult to predict what they will understand about new information that is presented to them.

"***Assessment-centered***"

- *"Assessment-centered" environments provide opportunities for feedback and revision and what is assessed is congruent with the students' learning goals.*
- Formative assessment involves the use of assessments (usually administered in the context of the classroom) as sources of feedback to improve teaching and learning. Examples: comments on work in progress, such as drafts of papers or preparation for presentations. Effective teachers continually attempt to learn about their students' thinking and understanding. They also help students build skills of self-assessment. Feedback is most valuable when students have the opportunity to use it to revise their thinking as they are working on a unit or project.
- Summative assessment measures what students have learned at the end of some set of learning activities. Examples: teacher-made tests given at the end of a unit of study, state and national tests students take at the end of a year.

"Community-centered"

- "Community-centered" environments refer to several aspects of community, including the classroom as community, the school as a community, and the degree to which students, teachers, and administrators feel connected to the larger community of homes, business, states, the nation, and even the world. Activities in homes, community centers, and after-school clubs can have important effects on students' academic achievement.

Learner-centered pedagogy – Assessment drives the *Learning Paradigm College*

In The Learning Paradigm College, (Tagg 2003) discusses the shift away from the "instructional paradigm", one in which

- the mission of colleges and universities is to provide instruction, to offer classes – the successful college is the one that fills classes with students and thus grows in enrollment
- teaching has a focus on
    - what the student *is*: learning is a function of the individual differences between students – a "blame the student" theory of teaching, based on student deficit, where when students don't learn it is due to something the students are lacking
    - what the teacher *does*: learning is a function of teaching – a theory of teaching, based on transmission of concepts and understandings not just information, where the responsibility for effective transmission is placed on the teacher, rather than the student, thereby making it based on teacher deficit

to that of a **"learning paradigm"** in which the college

- ***emphasizes results or outcomes***, rather than formal processes (curriculum, calendar, gpa)
- sees the whole, the whole experience of students, as prior to the parts, the formal instructional processes
- has a ***mission to produce student learning*** using a model of the teaching-learning process that focuses on the learner learning

- has a view of teaching in which the focus is on what the student *does*: getting students to understand at the level required is a matter of getting them to undertake the appropriate learning activities
- ***requires frequent, continual, connected, and authentic student performances***
- ***provides consistent, continual, interactive feedback to students***
- ***aligns all of its activities around the mission of producing student learning***

In Assessing for Learning (Maki 2004) indicates that learning-centered institutions

- View students as active learners, creators of or contributors to knowledge and understanding, while at the same time reflecting on how well they are learning
- Shift away from being providers of instruction to providers of learning
- Have learning environments which expand beyond the classroom to include, for example, face-to-face and online learning, interactive distance education, virtual studio classrooms, simulations accessed over the internet, self-paced learning, and service learning
- Focus on how programs and services outside of the formal curriculum contribute to, support, and complement the curriculum, and thereby, achieve institutional mission and purposes

In Learner-Centered Assessment on College Campuses (Huba and Freed 2000) discuss hallmarks of learner-centered teaching which again show the connection between learning, effective teaching, and *assessment*:

- Learners are actively involved and ***receive feedback***

  "Sending students out on the basketball court to try to shoot baskets or to explore the game doesn't ensure mastery. Students will undoubtedly have fun, and they will surely learn something. But they'll never master the many interrelated skills of the game unless they get feedback about how they are doing. Providing that feedback is what coaching – teaching and assessing – is all about."
- Learners apply knowledge to enduring and emerging issues and problems

  "In leaner-centered teaching, students are asked to do important things worth doing. … They complete assignments designed around real-world problems, and in this way, they experience the compelling challenges typically faced by professionals in their disciplines. … Assessments in which students address ill-defined problems – authentic assessments – are engaging to college students …. Well-defined problems are helpful for developing skills that involve many steps. When students complete them, they repeat the steps over and over so that they eventually become habits that can be used when needed. However, just solving well-defined problems doesn't help students know *when and how* the habits and skills should be *used* – and knowing *when and how* to *use* knowledge is critical to success in adult life."
- Learners integrate discipline-based knowledge and general skills

  "Assessments designed around ill-defined problems typically take the form of projects, papers, performances, portfolios, or exhibitions. Students completing them have to call upon and develop their disciplinary knowledge, as well as their skills in the areas of inquiry, reasoning, problem solving, communication, and perhaps teamwork. … ***Authentic assessments require that students make connections between the abilities and skills they have developed in the general education curriculum and the discipline-based knowledge and skills they have acquired in the major***."
- Learners understand the characteristics of excellent work

  "A key ingredient in learner-centered teaching is ***allowing students to make mistakes and learn from them***. … We must provide students with a clear vision of what excellent work is like and help them use feedback to continually improve their own work and performance. … The opportunity to self-correct and try again is essential to self-improvement and the development of lifelong learning skills."
- Learners become increasingly sophisticated learners and knowers

  "In learner-centered teaching, students reflect upon what they learn and how they learn. Reflection is a powerful activity for helping professors and students understand the present learning environment and think of ways to improve it … Over time, students change not only in terms of *what* they know, but also in terms of *how* they know. … ***In learner-centered environments then, we seek to understand not only what students know, but also how they know it***. … Learner-centered professors use teaching techniques that help students develop into more sophisticated knowers."
- Professors coach and facilitate, intertwining teaching and assessing

  "In a learner-centered environment … ***teaching and assessing are not separate, episodic events, but rather, they are ongoing, interrelated activities focused on providing guidance for improvement***. …

Students … need to practice what they are learning and receive continuous feedback they can use to evaluate and regulate their performance."

- Professors reveal that they are learners, too
  "... When we take a learner-centered approach, we ***design assessments to gather opinions from students on a regular basis about how well they are learning*** and about how the course format helps or hinders their efforts. …[Professors] need to know what students understand and don't understand in order to modify their performance as teachers …."
- Learning is interpersonal, and all learners – students and professors – are respected and valued
  "Instead of emphasizing grades in assessment, ***the focus should be on descriptive feedback for improvement***. Feedback that focuses on self-assessment and self-improvement is a form of intrinsic motivation."

Comparison of Teacher-centered and Learner-centered paradigms (Huba and Freed 2000)

Teacher-Centered Paradigm	Learner-Centered Paradigm
Knowledge is transmitted from professor to students	Students construct knowledge through gathering and synthesizing information and integrating it with the general skills of inquiry, communication, critical thinking, problem solving and so on
Students passively receive information	Students are actively involved
Emphasis is on acquisition of knowledge outside the context in which it will be used	Emphasis is on using and communicating knowledge effectively to address enduring and emerging issues and problems in real-life contexts
Professor's role is to be primary information giver and primary evaluator	Professor's role is to coach and facilitate Professor and students evaluate learning together
Teaching and assessing are separate	**Teaching and assessing are intertwined**
Assessment is used to monitor learning	**Assessment is used to promote and diagnose learning**
Emphasis is on right answers	Emphasis is on generating better questions and learning from errors
Desired learning is assessed indirectly through the use of objectively scored tests	**Desired learning is assessed directly through papers, projects, performances, portfolios, and the like**
Focus is on a single discipline	Approach is compatible with interdisciplinary investigation
Culture is competitive and individualistic	Culture is cooperative, collaborative, and supportive
Only students are viewed as learners	Professor and students learn together

In Assessing Academic Programs in Higher Education (Allen 2004), another comparison of teacher- vs, learner-centered programs is given as shown below:

TEACHING-CENTERED versus LEARNING-CENTERED instruction (Allen 2004)		
Concept	**Teacher-Centered**	**Learner-Centered**
Teaching goals	• Cover the discipline	• Students learn: o How to use the discipline o How to integrate disciplines to solve complex problems o An array of **core learning objectives**, such as communication and information literacy skills
Organization of the curriculum	• Courses in catalog	• Cohesive program with systematically created opportunities to synthesize, practice, and develop increasingly complex ideas, skills, and values
Course structure	• Faculty cover topics	• **Students master learning objectives**
How students learn	• Listening • Reading • Independent learning, often in competition for grades	• Students construct knowledge by integrating new learning into what they already know • Learning is viewed as a cognitive and social act
Pedagogy	• Based on delivery of information	• Based on engagement of students
Course delivery	• Lecture • Assignments and exams for summative purposes	• Active learning • Assignments for formative purposes • Collaborative learning • Community service learning • Cooperative learning • Online, asynchronous, self-directed learning • Problem-based learning
Course grading	• Faculty as gatekeepers • Normal distribution expected	• **Grades indicate mastery of learning objectives**
Faculty role	• Sage on the stage	• Designer of learning environments
Effective teaching	• Teach (present information) well and those who can will learn	• Engage students in their learning • Help all students master learning objectives • **Use classroom assessment to improve courses** • **Use program assessment to improve programs**

The point to be taken here is that learning occurs when effective teaching environments are learner-centered and assessment forms a critical role in such environments. As pointed out in Assessing Student Learning (Suskie 2004), in the teacher-centered model, the major, if not the sole purpose of assessment, is to assign student grades. ***In the learner-centered model, assessment also provides feedback to help faculty understand what is and is not working and how to improve their curricular and teaching/learning strategies to bring about even greater learning***.

Summarizing the benefits of assessment (Suskie 2004):

- Students
  - Helps students understand where they should focus their time and energies
  - Motivates students to do their best
  - Helps students understand their strengths and weaknesses through feedback
  - Gives students documentation of what they have learned which can be used to apply for jobs, awards, programs of advanced study, etc.

- Faculty
  - Brings faculty together to discuss issues such as what they teach, why, and their standards and expectations
  - Helps faculty see how their courses link together to form coherent programs and how the courses they teach contribute to student success in subsequent pursuits
  - Allow faculty to use positive assessment results as compelling evidence of their teaching in the PTR process
- Administrators
  - Allows the documenting of the success of a program or institution which can be used to convince employers, donors, legislators, and other constituents of its quality and worth
  - Helps ensure that institutional resources are being spent in the most effective ways possible; i.e., where they will have the greatest impact on student learning
  - Allows the making of informed decisions about such matters as resource allocations and faculty hires

What is "Assessment"? – Some Definitions and Approaches

Various definitions of assessment and the role it plays in teaching and learning:

- Assessment involves the use of empirical data on student learning to refine programs and improve student learning. (Allen 2004)

- Assessment is the process of gathering and discussing information from multiple and diverse sources in order to develop a deep understanding of what students know, understand, and can do with their knowledge as a result of their educational experiences; the process culminates when assessment results are used to improve subsequent learning. An assessment is an activity, assigned by the professor, that yields comprehensive information for analyzing, discussing, and judging a learner's performance of valued abilities and skills. (Huba and Freed 2000)

- Assessment is the systematic collection of information about student learning, using the time, knowledge, expertise, and resources available, in order to inform decisions about how to improve learning. (in Assessment Clear and Simple Walvoord 2004)

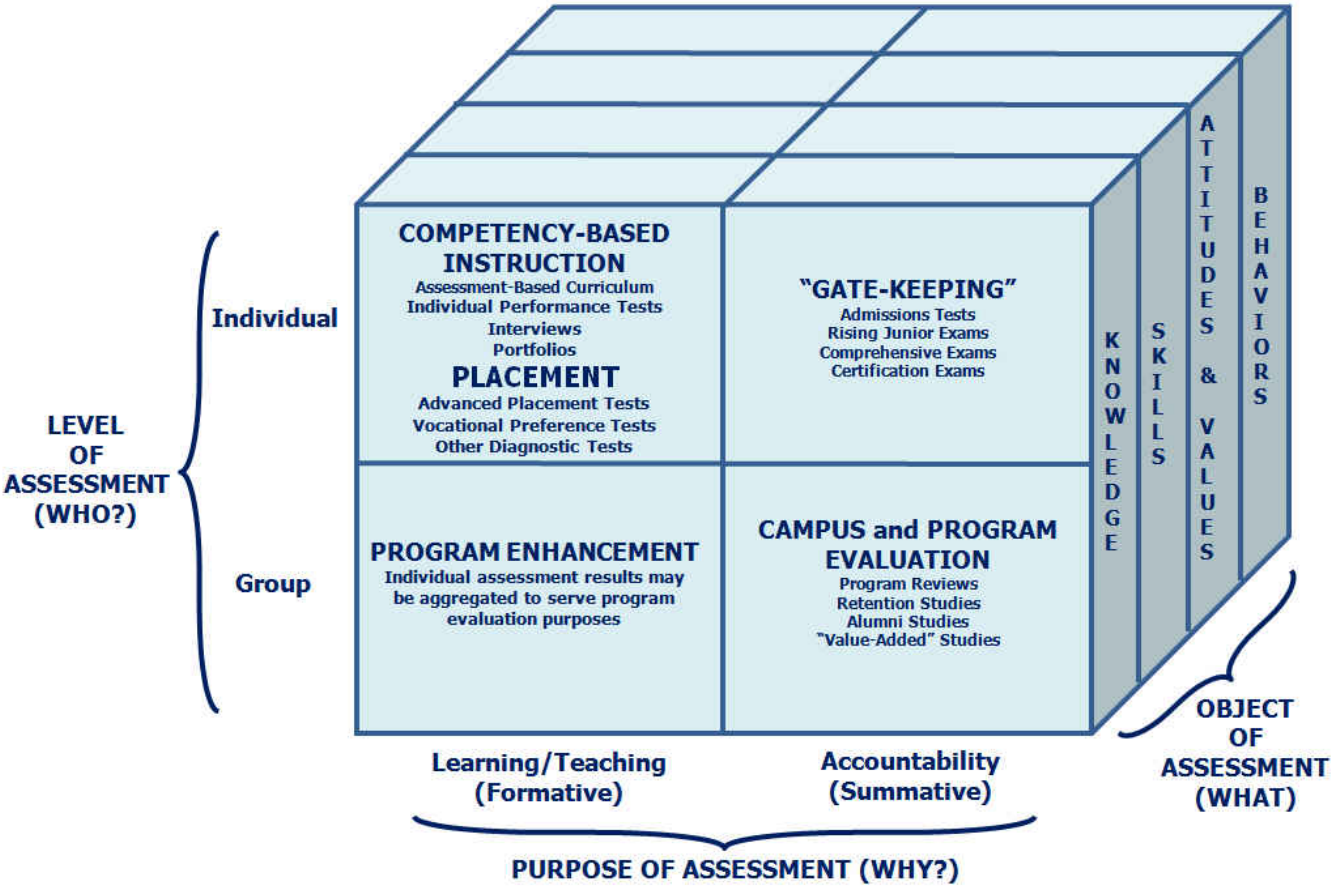
- Assessment is the systematic basis for making inferences about the learning and development of students. It is the process of defining, selecting, designing, collecting, analyzing, interpreting, and using information to increase students' learning and development. (in Assessing Student Learning and Development Erwin 1991)

- Assessment is the systematic collection, review, and use of information about educational programs undertaken for the purpose of improving student learning and development. (in Assessment Essentials Palomba and Banta 1999)

- Assessment is a process of reasoning from evidence. (Pellegrino, Chudowsky, and Glaser 2001)

- Assessment may involve accountability as well as improvement in pedagogy as defined by Peter Ewell (in Building a Scholarship of Assessment Banta and Associates 2002):
  - assessment refers to the processes used to determine an individual's mastery of complex abilities, generally through observed performance
  - assessment is large-scale testing programs whose primary objective is not to examine individual learning but rather to benchmark school performance in the name of accountability
  - assessment is a special kind of program evaluation whose purpose is to gather evidence to improve curricula and pedagogy

A summary of approaches to assessment is given by Terenzini (1989):



A Taxonomy of Approaches to Assessment (Terenzini 1989)

Purposes of assessment (Pellegrino, Chudowsky, and Glaser 2001):

- Assessment to assist learning = *formative* assessment
  Effective teachers use various forms of assessment to inform decisions about next steps for instruction. Classroom assessments, (which include quizzes, classroom projects, feedback from computer-assisted instruction, classroom observation, written work, homework, and conversations with and among students) provide specific information about students' strengths and difficulties with learning. Classroom-based formative assessment can positively affect learning – students learn more when they receive feedback about particular qualities of their work, along with advice on what they can do to improve.
- Assessment of individual achievement = *summative* assessment
  Assessments used to help determine whether a student has attained a certain level of competency after completing a particular phase of education. Examples include those used by teachers (such as end-of-unit tests and letter grades assigned when a course is finished) and those used by external parties (such as large-scale assessments; which provide information about the attainment of individual students as well as comparative information about how one student performs relative to others).
- Assessment to evaluate programs
  These assessments also fall under the category of summative assessments.

Walvoord (2004) provides examples of classroom and program assessment:

- Classroom assessment:

  Example: *"The teacher of the senior capstone course evaluates her students' final projects, assigns grades, and uses the information for her own improvement next semester."*
- Program assessment:

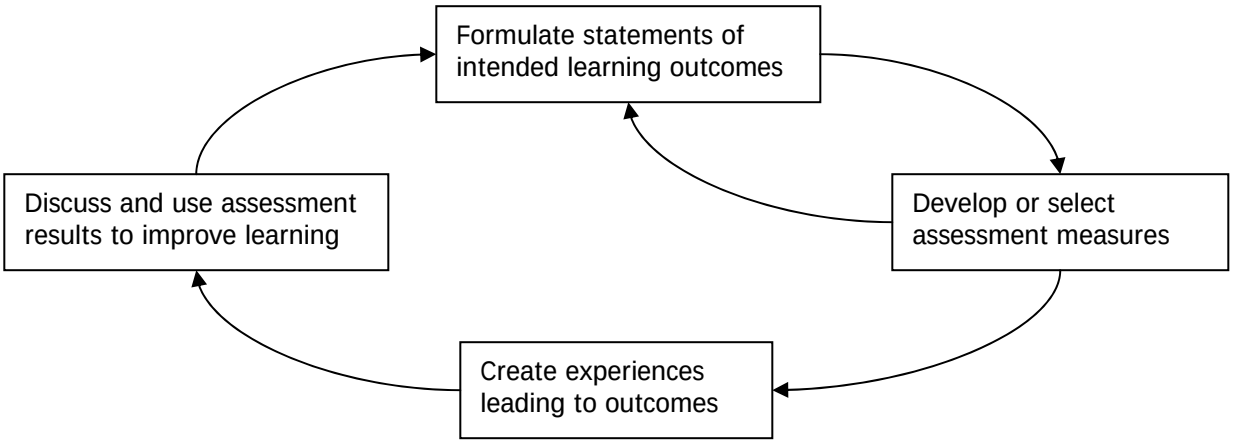
  Example: *"The faculty teaching the senior capstone report annually to the department, outlining the strengths and weaknesses of the students' work in relation to departmental learning goals. The department uses these and other data, such as student and alumni questionnaires, to inform decisions about curriculum, pedagogy, and other factors that affect student learning."*

The meaning of assessment is captured in key questions such as (Palomba and Banta 1999):

- What should college graduates know, be able to do, and value?
- Have the graduates of our institutions acquired this learning?
- What, in fact, are the contributions of the institution and its programs to student growth?
- How can student learning be improved?

Fundamental components of "Assessment"

Four fundamental elements of learner-centered assessment (Huba and Freed 2000):



1. *Formulating Statements of Intended Learning Outcomes* – statements describing intentions about what students should know, understand, and be able to do with their knowledge when they graduate.
2. *Developing or Selecting Assessment Measures* – designing or selecting data gathering measures to assess whether or not our intended learning outcomes have been achieved. Includes

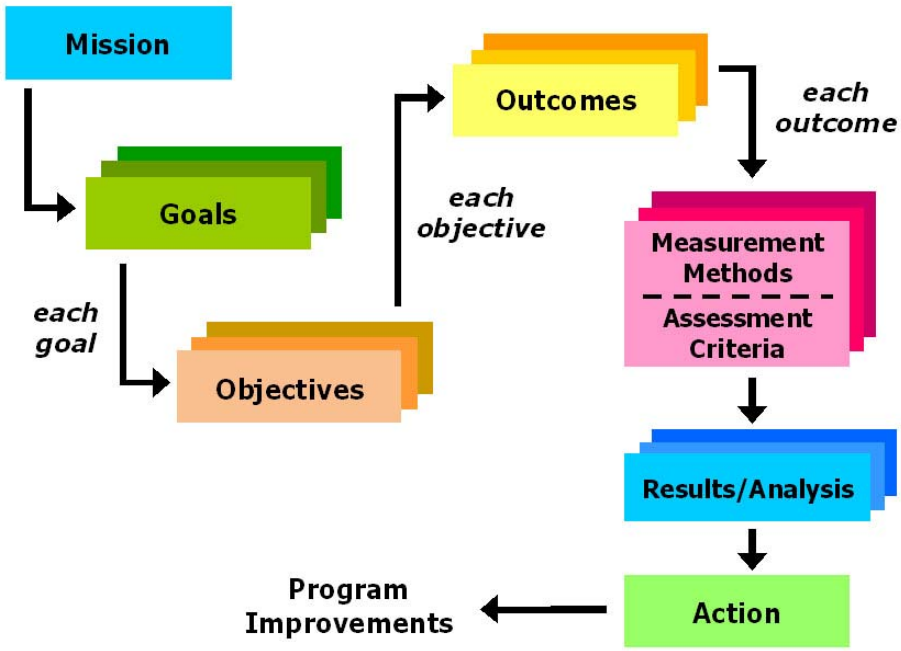
   Direct assessments – projects, products, papers/theses, exhibitions, performances, case studies, clinical evaluations, portfolios, interviews, and oral exams – which ask students to demonstrate what they know or can do with their knowledge.

   Indirect assessments – self-report measures such as surveys – in which respondents share their perceptions about what graduates know or can do with their knowledge.
3. *Creating Experiences Leading to Outcomes* – ensuring that students have experiences both in and outside their courses that help them achieve the intended learning outcomes. The curriculum must be designed as a set of interrelated courses and experiences that will help students achieve the intended learning outcomes. Designing the curriculum by working backwards from learning outcomes helps make the curriculum a coherent 'story of learning'.
4. *Discussing and Using Assessment Results to Improve Teaching and Learning* – the focus is on using the results to improve individual student performance.

Getting started with "Assessment" – Learning objectives and outcomes

"One must know what is to be assessed before one knows how to assess it." (Erwin 1991).

Erwin (1991) indicates most college catalogues present institutional goals, purposes, or mission in the form of broad concepts, such as character, citizenship, or cultural appreciation. Because these goals are global and often vague, it is necessary also to state objectives. *Objectives* are typically expressed in a list or series of statements indicating what the department, program, or office is trying to accomplish with the student. *Outcomes* are the achieved results of the actual consequences of what the students demonstrated or accomplished.



As discussed by Allen 2004, a program's *Mission* = a holistic vision of the values and philosophy of the department. *Program goals* = broad statements concerning knowledge, skills or values that faculty expect graduating students to achieve. *Learning objectives* operationalize program goals – they describe observable behaviors that allow faculty to know if students have mastered the goals.

An example illustrating the difference among the terms "mission", "goal", "objective", and "outcome":

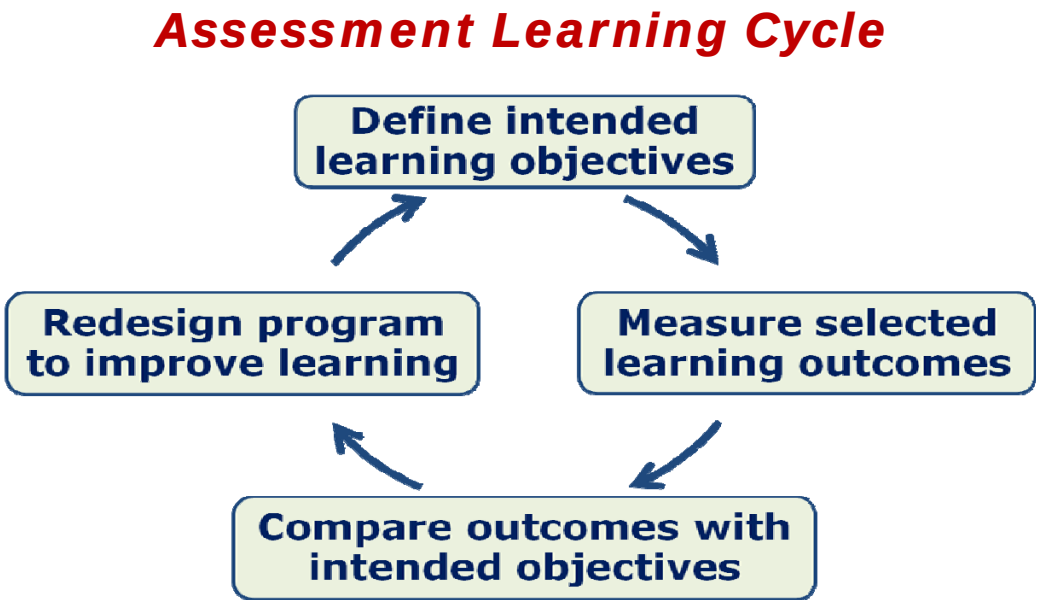
University Mission:	Broad exposure to the liberal arts … for students to develop their powers of written and spoken expression …
Program Goal:	The study of English enables students to improve their writing skills, their articulation …
English Composition Course Objective:	Students will learn to acknowledge and adjust to a variety of writing contexts.
Learning Outcome:	▪ The student will demonstrate through discussion, planning and writing an awareness that audiences differ and that readers' needs/expectations must be taken into account as one writes ▪ The student will write a draft and revise work with a sense of purpose and an awareness of audience.

Robert Diamond (in Designing and Assessing Courses & Curricula, 1998) indicates "as we teach our courses, we tend to lose sight of the fact that each course is but one element in a learning sequence defined as a curriculum." In general, the goals of a curriculum evolve from the total of the instructional outcomes associated with basic core competencies, discipline-specific competencies related to core requirements, and discipline-specific competencies associated with major and minor concentrations.

Successful assessment requires articulating goals and objectives for learning (Palomba and Banta 1999):

- *Goals* for learning – express intended results in general terms. Used to describe broad learning concepts; e.g., clear communication, problem solving, and ethical awareness.
- *Objectives* for learning – express intended results in precise terms. Used to describe specific behaviors students should exhibit; e.g., "*graduates in speech communication should be able to interpret non-verbal behavior and to support arguments with credible evidence*".

Objectives may also be thought of as *intended* outcomes, and the assessment results as the actual outcomes. As captured in the following diagram, assessment is an iterative feedback process for continual program improvement with a focus on student learning. Assessment involves comparing the measured learning outcomes with the intended learning objectives to enable changes to be made to improve student learning.



Goals and *Objectives* are similar in that they describe the intended purposes and expected results of teaching activities and establish the foundation for assessment. *Goals* are statements about general aims or purposes of education that are broad, long-range intended outcomes and concepts; e.g., "clear communication", "problem-solving skills", etc. *Objectives* are brief, clear statements that describe the desired learning outcomes of instruction; i.e., the specific skills, values, and attitudes students should exhibit that reflect the broader goals.

Translating Course Goals Into Measurable Student Outcomes

Assessment can measure the extent to which course goals have been achieved, but only if those goals are measurable. For the most part, course goals are too broad or too abstract to measure directly.

Example: Lack of specificity of Goals
Introductory Astronomy Course *Goal* = *Students understand the seasons*. How does one measure 'understand'? No idea! This *Goal* can be made more *measurable* by identifying specific *Outcomes* one would expect from a student who "understands" the seasons. Course *Outcomes* = The student can *define* seasons The student can *distinguish* the importance of different factors such as tilt and distance.

Thus, once goals have been formalized, the next step is to translate the often abstract language of course goals into a set of concrete ***measurable student outcomes***.

Measurable student outcomes are specific, demonstrable characteristics – knowledge, skills, values, attitudes, interests--that will allow us to evaluate the extent to which course goals have been met.

Example: translating a course goal (in the context of dental health) into measurable student outcomes

Dental Health 101	
Course Goal	Measurable Student Outcomes
The Student: ▪ Understands proper dental hygiene	The Student can: ▪ *Identify* the active ingredient in toothpaste ▪ *Explain* why teeth should be cleaned at least twice per year ▪ *Describe* how poor dental hygiene can lead to poor overall health

Carefully written objectives allow for easier assessment of whether students are achieving what you want them to achieve. Below is an example showing a link between objectives and assessment.

Program Objective: After analyzing and interpreting information from public opinion polls, the graduating Journalism major will communicate the results to at least three different groups in written, oral, and graphic forms	
Verb: Use active verbs that describe behavior	After analyzing and interpreting information from public opinion polls, the graduating Journalism major will communicate the results to at least three different groups in written, oral, and graphic forms
Object: Identify the focus of learning – content, concepts, skills, attitudes	After analyzing and interpreting information from public opinion polls, the graduating Journalism major will communicate the results to at least three different groups in written, oral, and graphic forms
Target group: Specify subgroups when objective applies differentially	After analyzing and interpreting information from public opinion polls, the graduating Journalism major will communicate the results to at least three different groups in written, oral, and graphic forms
Conditions: Describes context when students will demonstrate behavior – how, when, where	After analyzing and interpreting information from public opinion polls, the graduating Journalism major will communicate the results to at least three different groups in written, oral, and graphic forms
Performance criteria: Identifies levels of acceptable performance	After analyzing and interpreting information from public opinion polls, the graduating Journalism major will communicate the results to at least three different groups in written, oral, and graphic forms
Performance stability: Identifies how often the behavior must be observed to be a stable indicator	After analyzing and interpreting information from public opinion polls, the graduating Journalism major will communicate the results to at least three different groups in written, oral, and graphic forms

<table>
<tr><th colspan="2">Example: Refining a Goal into Measurable Objectives</th></tr>
<tr><td colspan="2">Goal: Students will be familiar with the major theories of the discipline.

Does this goal convey any information?
• Would a student know what was expected of his/her work?
• Would a colleague know the focus of your department's teaching?
• Would an employer know what your students could do?</td></tr>
<tr><th>Refining the goal into a measurable objective</th><th>Explanation of the process</th></tr>
<tr><td>Students will be familiar with <u>the major theories of the discipline</u></td><td>Objective = verb (active behaviors)
+
object (products, skills/performances, content/knowledge, attitudes/dispositions)

Objective = (be familiar with) + (<u>major theories of the discipline</u>)

Start with the object aspect of the objective. Suppose five major approaches (theories) to conflict resolution are: withdrawal, smoothing, forcing, compromising, and problem solving.</td></tr>
<tr><td>Students will be familiar with withdrawal, smoothing, forcing, compromising, and problem solving</td><td>Specifying what the department views as the major approaches (theories) is an improvement in the wording of the objective.</td></tr>
<tr><td>Students will <u>be familiar with</u> withdrawal, smoothing, forcing, compromising, and problem solving</td><td>Sharpening the verb will also make it better – what does "be familiar with" imply about a student's knowledge or skills?

Objective = (<u>be familiar with</u>) + (withdrawal, smoothing, forcing, compromising, …)

• Avoid vague phrases:
appreciate, understanding, have an awareness of, etc.
• Use action verbs:
generalize, produce, evaluate, etc.
Action oriented verbs make objectives more concrete

This objective might be revised into two objectives
• Students will summarize …
• Students will choose and defend …</td></tr>
<tr><td colspan="2">Objectives obtained through the revision of the original Goal:
• Students will summarize the five major approaches to conflict resolution: withdrawal, smoothing, forcing, compromising, and problem solving
• Students will choose and defend a conflict resolution approach appropriate for a given situation</td></tr>
</table>

There are three types of learning objectives, which reflect different aspects of student learning:

- Cognitive objectives: "What do you want your graduates to know?"
- Affective objectives: "What do you want your graduates to think or care about?"
- Behavioral Objectives: "What do you want your graduates to be able to do?"

Objectives can also reflect different levels of learning:

- Mastery objectives are typically concerned with the minimum performance essentials – those learning tasks/skills that must be mastered before moving on to the next level of instruction. These objectives tend to be very specific and limited in scope.
- Developmental objectives are concerned with more complex learning outcomes – those learning tasks on which students can be expected to demonstrate varying degrees of progress.

Outcomes are clear learning results that we want students to demonstrate at the end of significant learning experiences. (Spady, 1994) Learning outcomes are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course or program; i.e., what the learner will know and be able to do by the end of a course or program.

The two terms, objectives and outcomes, are often used interchangeably, however, resulting in confusion.

What are the differences between Goals and Objectives? Both goals and objectives use the language of outcomes – the characteristic which distinguishes goals from objectives is the level of specificity. Goals express intended outcomes in general terms and objectives express them in specific terms. Goals are written in broad, global, and sometimes vague, language. Objectives are statements that describe the intended results of instruction in terms of specific student behavior.

What are the differences between Objectives and Outcomes? Objectives are intended results or consequences of instruction, curricula, programs, or activities. *Outcomes* are achieved results or consequences of what was learned; i.e., evidence that learning took place. Objectives are focused on specific types of performances that students are expected to demonstrate at the end of instruction.

Thus, a first step in assessment is the establishment of objectives. *Learning objectives* = cognitively oriented objectives, including subject matter knowledge and skills; e.g., students can learn basic principles and theories of a discipline, or they can learn skills such as writing or computing. *Developmental objectives* = typically include cognitive and affective dimensions, such as critical thinking, ethics, identity, and physical well-being.

Learning goals – view as falling into three categories (Suskie 2004):

(1) Knowledge or understanding goals – including remembering, replicating a simple procedure, and defining, summarizing, or explaining concepts of phenomena
(2) Skills
    a. Thinking skills – including skills in analysis, evaluation, and other thought processes needed to solve problems and make necessary decisions
    b. Performance skills – physical skills such as the ability to manipulate a tool, hit a softball, etc.
    c. Interpersonal skills – the ability to listen, work with people from diverse backgrounds, lead a group, participate as an effective team member, etc.
(3) Attitudes – Attitudinal goals include appreciation; becoming more aware of one's own values, attitudes, and opinions and their evolution and maturation; integrity; character; and enjoying and valuing learning.

Institution- and program-level assessment examines the integration of the three domains of learning identified by Bloom (Maki 2004):

1. The *cognitive domain*, involving the development of intellectual abilities: knowledge, comprehension, application, analysis, synthesis, and evaluation
    a. Example: a medical student's knowledge of anatomy
    b. Example: an undergraduate business student's evaluation of multiple solutions to a problem in a case study
2. The *psychomotor domain*, involving the development of physical movement, coordination, and sets of skills
    a. Example: intricately timed movements of a dancer
    b. Example: precision of a neurosurgeon
3. The *affective domain*, involving the development of values, attitudes, commitments, and ways of responding
    a. Example: valuing others' perspectives
    b. Example: responding to situations that disadvantage a group of people
    c. Example: demonstrating a passion for learning

Instructional objectives and Bloom's taxonomy of the cognitive domain

Beginning in 1948, a group of educators undertook the task of classifying education goals and objectives. The intention was to develop a classification system for three domains: the cognitive, the affective, and the psychomotor. Work on the cognitive domain was completed in 1956 and is commonly referred to as *Bloom's Taxonomy of the Cognitive Domain*, since the editor of the volume was Benjamin S. Bloom, although the full title was *Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain*, 1956 by Longman Inc. with the text having four other authors (Max D. Engelhart, Edward J. Furst, Walker H. Hill, and David R. Krathwohl).

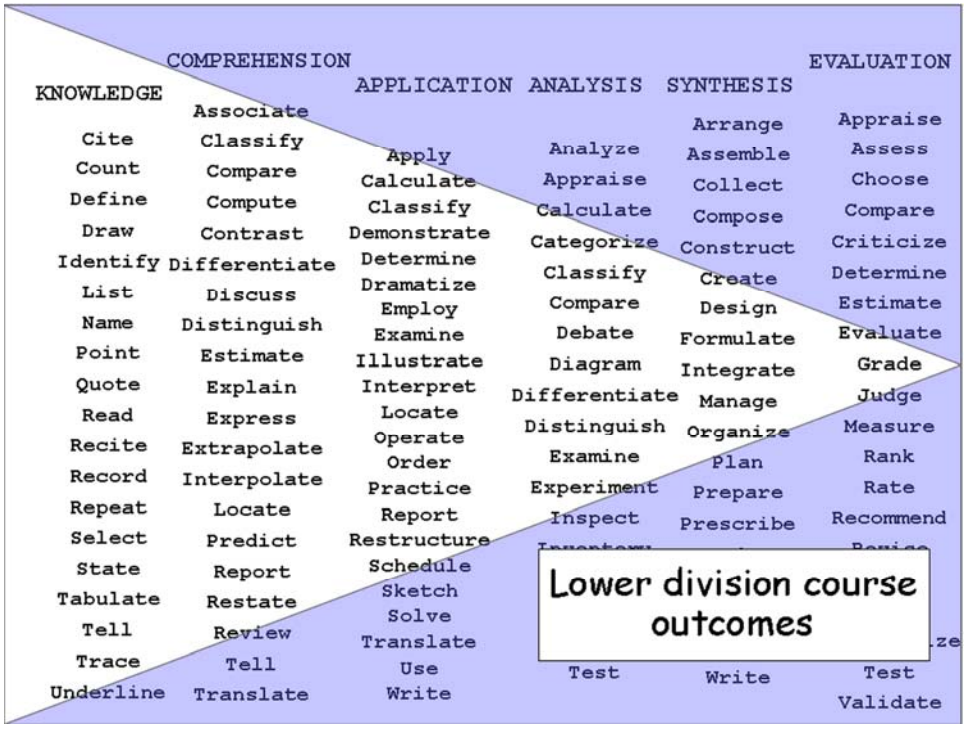
The major idea of the taxonomy is that what educators want students to know (and, therefore, statements of educational objectives) can be arranged in a hierarchy from less to more complex.

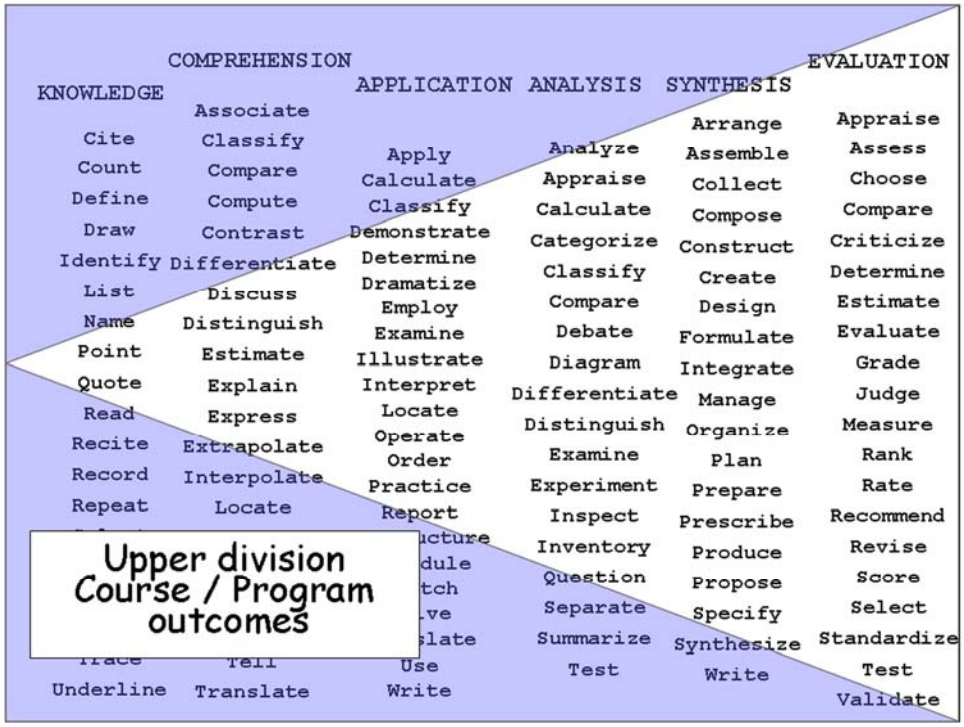
In general, research over the last 40 years has confirmed the taxonomy as a hierarchy; although it is uncertain at this time whether synthesis and evaluation should be reversed (i.e., evaluation is less difficult to accomplish than synthesis) or whether synthesis and evaluation are at the same level of difficulty but use different cognitive processes. In any case it is clear that students can "know" about a topic or subject at different levels. While most teacher-made tests still test at the lower levels of the taxonomy, research has shown that students remember more when they have learned to handle the topic at the higher levels of the taxonomy.

Example of Learning Objectives at each of the levels of Bloom's taxonomy
(based on Allen 2004 with examples based on Eder 2004 and Heywood 2000)

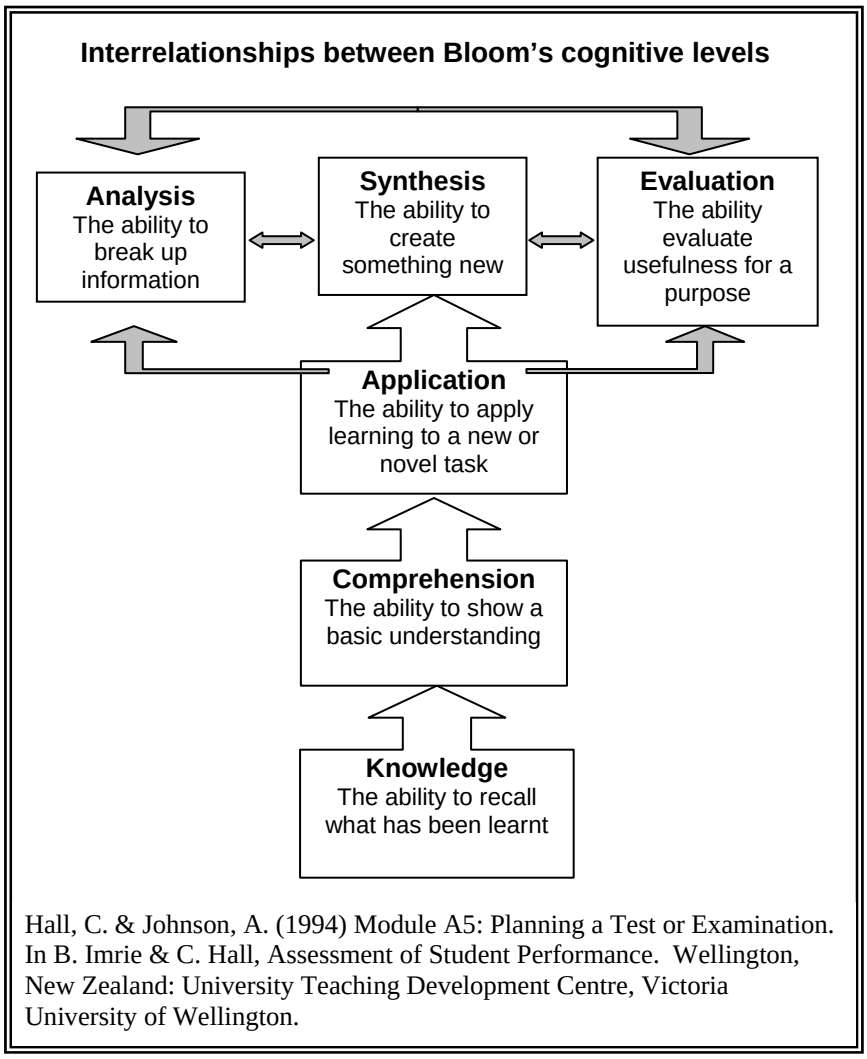
Bloom's level		**Learning goal:** Students will understand the major theoretical approaches within the discipline
Knowledge	To know specific facts, terms, concepts, principles or theories	Students can list the major theoretical approaches of the discipline *Exam question at this level:* Name the muscles of the rotator cuff. *Medical faculty questions at this level*: What was the heart rate? Where is the primary lesion?
Comprehension	To understand, interpret, compare and contrast, explain; Management of Knowledge	Students can describe the key theories, concepts, and issues for each of the major theoretical approaches *Exam question at this level:* How does the rotator cuff help you to raise your arm? *Medical faculty questions at this level*: When would you use that type of hernia repair? Why is the fracture in the same place it was before?
Application	To apply knowledge to new situations, to solve problems; Use of Comprehension or Understanding	Students can apply theoretical principles to solve real-world problems *Exam question at this level:* Why does throwing a curve ball cause rotator cuff injury? *Medical faculty questions at this level*: You are watching the patient and she falls – what would you do? Here is a lady with no vibratory sensation – what problem does this pose?
Analysis	To identify the organizational structure of something; to identify parts, relationships, and organizing principles; Disassembly of Application	Students can analyze the strengths and limitations of each of the major theoretical approaches for understanding specific phenomena *Exam question at this level:* How does the throwing motion stress each component, in turn, of the rotator cuff? *Medical faculty questions at this level*: What are the most significant aspects of this patient's story? That is a curious bit of information – how do you explain it?
Synthesis	To create something, to integrate ideas into a solution, to propose an action plan, to formulate a new classification scheme; Assembly of Application	Students can combine theoretical approaches to explain complex phenomena *Exam question at this level:* Design a physical therapy program to strengthen each component of the rotator. *Medical faculty questions at this level*: How would you summarize this? What are your conclusions?
Evaluation	To judge the quality of something based on its adequacy, value, logic, or use; Appraisal of own or someone else's Analysis or Synthesis	Students can select the theoretical approach that is most applicable to a phenomenon and explain why they have selected that perspective *Exam question at this level:* Evaluate another physical therapist's program to strengthen the rotator cuff. *Medical faculty questions at this level*: Why is that information pertinent? How valid is this patient's story?

The following graphics depict how courses in a curriculum reflect Bloom's levels. Namely, the higher levels of learning are addressed in advanced course work taken by students.





A view on the interrelationship of the different levels is given in Fulks (2004)



Hall, C. & Johnson, A. (1994) Module A5: Planning a Test or Examination. In B. Imrie & C. Hall, Assessment of Student Performance. Wellington, New Zealand: University Teaching Development Centre, Victoria University of Wellington.

As cited in Heywood (2000) which paraphrased Bloom (1956),

> "[Bloom's] *Taxonomy* is designed to be a classification of the student behaviors which represent the ***intended outcomes*** of the educational process. It is assumed that essentially the same classes of behavior may be observed in the usual range of subject-matter content of different levels of education (elementary, high school, college), and in different schools. Thus a single set of classification should be applicable in all these circumstances.
>
> What we are classifying is the intended behaviors of students – the ways in which individuals are to think, act or feel, as a result of participating in some unit of instruction. (Only such of those intended behaviors as are related to mental acts of thinking are included in the part of the *Taxonomy* developed in the handbook for the cognitive domain.)
>
> It is recognized that the ***actual behaviors*** of the students after they have completed the unit of instruction may differ in degree as well as kind from the intended behavior specified by the objectives. That is the effects of instruction may be such that the students do not learn a given skill to any degree.
>
> We initially limited ourselves to those objectives referred to as knowledge, intellectual abilities, and intellectual skills. (This area, which we named the cognitive domain, may also be described as including the behavior; remembering; reasoning, problem solving; concept formation, and to a limited extent creative thinking.)"

In essence, the authors foreshadowed what has come to be known as *outcomes-based assessment* (Heywood, 2000).

Heywood (2000) elaborates on learning objectives by stating that "while much learning is informal, and while students may already have attained the goals we wish them to obtain it is nevertheless the case that learning is enhanced in situations where both the learner and teacher are clear about what they wish to achieve. Thus the understanding of 'learning' which is the central goal of formal education must contribute to the selection of 'objectives' … [T]he process of curriculum, instructional design and assessment are the same. Moreover, it is a complex activity. While it is convenient to begin with aims and objectives, any discussion of these must, at one and the same time, consider the learning experiences (strategies) necessary to bring the students from where they are (entering characteristics) to where they should be (objectives), as well as the most appropriate mode of assessment …"

What is an instructional objective?

> "*An objective is an intent communicated by a statement describing a proposed change in the learner — a statement of what the learner is like when he has successfully completed a learning experience ... When clearly defined goals are lacking, it is impossible to evaluate a course or program efficiently, and there is no sound basis for selecting appropriate materials, content, or instructional methods*" (Mager 1962)

An instructional objective must (in Preparing Instructional Objectives Mager 1962, 1997)

1. Describe what the learner will be doing when demonstrating that he has reached the objective; i.e., *What is the learner to do?*
2. Describe the important conditions under which the learner will demonstrate his competence; i.e., *Under what conditions will he do it?*
3. Indicate how the learner will be evaluated, or what constitutes acceptable performance; i.e., *What will you expect as satisfactory performance?*

Learning objectives focus on knowledge, skills and values (Allen 2004):

- What should students know?
- What should they be able to do?
- What should they value?

Guidelines for writing program learning objectives (Allen 2004):

- Learning objectives should be stated using active verbs that clearly communicate the depth of processing
- Objectives should clarify if faculty expectations are for absolute or value-added attainment
- Objectives may also specify a behavior, a condition, and a criterion

> *Example*: Students can translate a Spanish newspaper into English with no more than 2 errors per sentence
>
> *Behavior* = create a translation
> *Condition* = students are provided a Spanish newspaper
> *Criterion* = no more than 2 errors per sentence

This level of detail is for course learning objectives rather than for program learning objectives.

"*BAD*" words (open to many interpretations)	"*GOOD*" words (open to fewer interpretations)
To KNOW	To WRITE
To UNDERSTAND	To RECITE
To ENJOY	To IDENTIFY
To APPRECIATE	To DIFFERENTIATE
To GRASP THE SIGNIFICANCE OF	To SOLVE
To ENJOY	To CONSTRUCT
To BELIEVE	To LIST
	To COMPARE
	To CONTRAST

The idea is to describe what the learner will be *doing* when demonstrating that he/she "understands" or "appreciates".

Learning objectives are behavioral and can be described by verbs that delineate behaviors.

Relevant Verbs (Allen 2004)					
Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Cite	Arrange	Apply	Analyze	Arrange	Appraise
Define	Classify	Change	Appraise	Assemble	Assess
Describe	Convert	Compute	Break down	Categorize	Choose
Identify	Describe	Construct	Calculate	Collect	Compare
Indicate	Defend	Demonstrate	Categorize	Combine	Conclude
Know	Diagram	Discover	Compare	Compile	Contrast
Label	Discuss	Dramatize	Contrast	Compose	Criticize
List	Distinguish	Employ	Criticize	Construct	Decide
Match	Estimate	Illustrate	Debate	Create	Discriminate
Memorize	Explain	Interpret	Determine	Design	Estimate
Name	Extend	Investigate	Diagram	Devise	Evaluate
Outline	Generalize	Manipulate	Differentiate	Explain	Explain
Recall	Give examples	Modify	Discriminate	Formulate	Grade
Recognize	Infer	Operate	Distinguish	Generate	Interpret
Record	Locate	Organize	Examine	Manage	Judge
Relate	Outline	Practice	Experiment	Modify	Justify
Repeat	Paraphrase	Predict	Identify	Organize	Measure
Reproduce	Predict	Prepare	Illustrate	Perform	Rate
Select	Report	Produce	Infer	Plan	Relate
State	Restate	Schedule	Inspect	Prepare	Revise
Underline	Review	Shop	Inventory	Produce	Score
	Suggest	Sketch	Outline	Propose	Select
	Summarize	Solve	Question	Rearrange	Summarize
	Translate	Translate	Relate	Reconstruct	Support
		Use	Select	Relate	Value
			Solve	Reorganize	
			Test	Revise	

Examples of learning objectives given in Designing and Assessing Courses & Curricula (Robert Diamond, 1998):

> *Music*: On hearing musical selections, you will be able to identify those that are examples of chamber music and be able to identify the form, texture, and makeup of the ensemble.
> *Psychology*: When given a case study, you will be able to identify whether it describes a case of schizophrenia and, if it does, which of the following schizophrenic reactions are involved: hebephrenic, catatonic, or paranoid.
> *Economics*: Demonstrate graphically and explain how a change in expectations will affect the *loanable funds market*. (Begin with an appropriately labeled graph that represents the initial equilibrium.)
> *Management*: Identify (based on readings, case studies, and/or personal experiences) those activities that are most likely to distinguish effective, well-managed technology development programs from ineffective programs.
> *Government*: When given a major decision made by a governmental leader, you will be able to identify the major factors that the leader had to consider and discuss why the action was taken and what apparent trade-offs were made.

Program learning objectives focus on the learner. Unlike the teacher-centered approach, a learner-centered approach should be used to determine learning objectives. In other words, rather than list what a course/program may cover, a learner-centered approach examines courses and curricula from the other direction: *what is expected of students upon completion of the course/program*.

Characteristics of Institution- and Program-level Learning Outcome Statements (Maki 2004):

- Describes what students should be able to demonstrate, represent, or produce based on their learning histories
- Relies on active verbs that identify what students should be able to demonstrate, represent, or produce

over time – verbs such as create, apply, construct, translate, identify, formulate, and hypothesize

- Aligns with collective program- and institution-level educational intentions for student learning translated into the curriculum and co-curriculum
- Maps to the curriculum, co-curriculum, and educational practices that offer multiple and varied opportunities for students to learn
- Is collaboratively authored and collectively accepted
- Incorporates or adapts professional organizations' outcome statements when they exist
- Can be quantitatively and/or qualitatively assessed during students' undergraduate or graduate studies

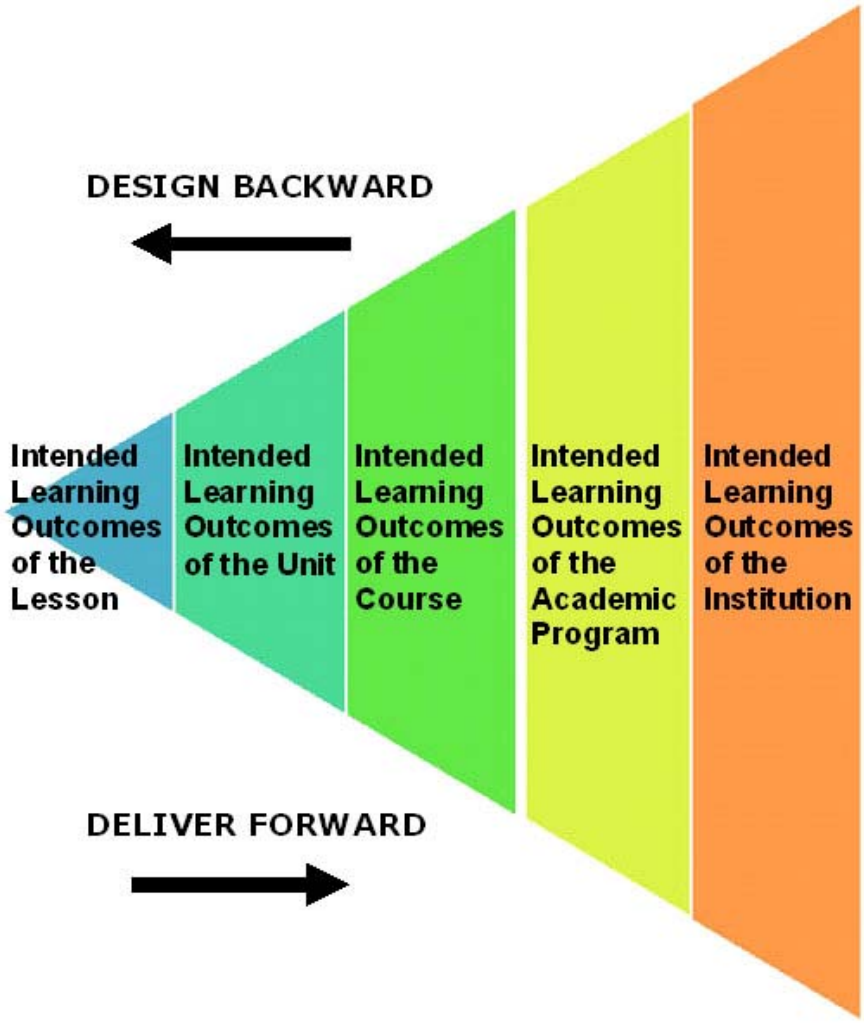
Plan for designing and delivering learning outcomes (Huba and Freed 2000):

In designing course outcomes

- Start first with the broad outcomes expected of all students
- Then work *backward* to design academic program outcomes
- Finally design course outcomes that will lead to the achievement of both program and institutional outcomes

When the program is delivered, students experience the system in reverse

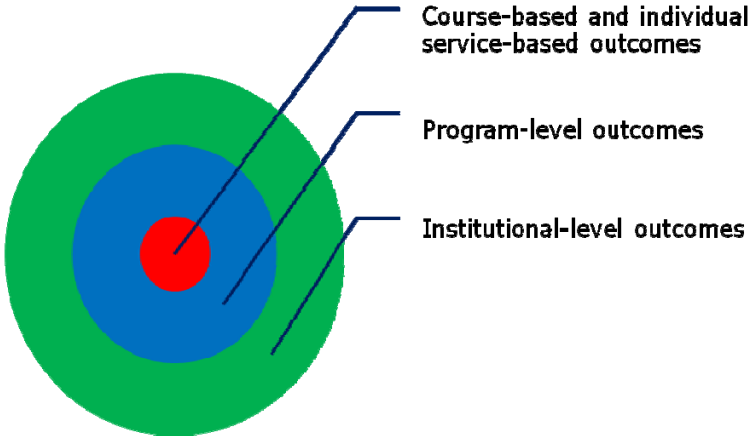
- Students first participate in experiences that address lesson outcomes
- The learning that results from these experiences accumulates as students proceed through the courses and other experiences in the program
- The curriculum is designed so that it provides a coherent set of experiences leading to the development of desired knowledge and skills – students show increasing levels of sophistication and integration of skills as they progress through the program



Curriculum Mapping – Linking objectives/outcomes to the curriculum

As indicated by Maki 2004, program or institutional objectives identify content or learning parameters – what students should *learn*, *understand*, or *appreciate* as a result of their studies. Learning outcome statements identify what students should be able *to demonstrate* or *represent* or *produce* as a result of what and how they have learned at the institution or in a program. These outcome statements translate learning into actions, behaviors, and other texts from which observers can draw inferences about the depth and breadth of student learning.

There is an underlying coherence among the levels of learning outcome statements (Maki 2004):



At the *Institution level*, outcome statements are more general statements reflecting students' entire educational experiences. At the *Program level* outcome statements become more specific.

Curriculum mapping makes it possible to identify where within the curriculum learning objectives are addressed. In other words, it provides a means to determine whether your objectives are *aligned* with the curriculum.

Alignment – the curricula must be systematically aligned with the program objectives (Allen 2004). Alignment involves clarifying the relationship between what students do in their courses and what faculty expect them to learn. Analyzing the alignment of the curricula with program objectives allows for the identification of gaps which can then lead to curricular changes to improve student learning opportunities.

Approach to determining the alignment of courses with the program objectives – *create a matrix*:

Curriculum Alignment Matrix (Allen 2004)			
Course	**Program Objective 1**	**Program Objective 2**	***Etc.***
100	I		
101		P	
102	D	P	
103	I	D	
Etc.			
I = introduced, **P** = practiced, **D** = demonstrated			

Aligning course objectives to program objectives may be accomplished by a *curriculum alignment matrix* which maps each onto the other; a checkmark indicating coverage or an indication of the level of coverage can be used.

Similarly, a *course alignment matrix* may be used to indicate where course objectives support the overall objectives of the program.

Course Alignment Matrix (Allen 2004)				
Course Objectives	**Program Objective 1**	**Program Objective 2**	**Program Objective 3**	***Etc.***
Course Objective 1	B			
Course Objective 2	B	B		
Course Objective 3		B		
Course Objective 4			I	
Etc.			A	
B = basic, **I** = intermediate, **A** = advanced expectation for this objective				

Mapping of *outcomes* to educational experiences may also be done (Maki 2004):

Program- or Institution-level Map (Maki 2004)			
Learning Outcomes	**Course or Educational Experience #1**	**Course or Educational Experience #2**	**Etc.**
Outcome #1	I		
Outcome #2	E	R	
Outcome #3		R	
Outcome #4	I	E	
Etc.			
I = introduced, **R** = reinforced, **E** = emphasized			

An example, based on Pagano (2005), outlines the connections between program objectives and courses:

Example of curriculum mapping Martha Stewart College Degree: Bachelor of Arts Major: Party Planning	
Program Objectives:	All students with a major in Party Planning will be able to: ▪ Develop and execute parties for a variety of situations and for diverse clientele. ▪ Create complete menus for a variety of events. ▪ Demonstrate an understanding of the biochemical properties of foods and liquids. ▪ Plan, price, and budget a variety of parties. ▪ Develop successful marketing strategies for a party planner. ▪ Anticipate and respond to emergencies in parties they are running. ▪ Train and manage staff.
Party Planning Core Courses:	PP 110 Introduction to Party Planning PP 200 Party Budgeting and Purchasing PP 201 Fundamentals of Catering PP 240 Home Decorations PP 260 Crisis Management PP 290 Capstone Course/Internship
Details on one of the courses:	PP 201: Fundamentals of Catering By the end of the semester, students should be able to 1. Create and develop a food and beverage menu for a variety of parties 2. Budget and price menus for a variety of parties 3. Develop realistic timelines for delivering and preparing food and ancillary party accoutrements. 4. Demonstrate an understanding of food varieties and appropriateness for different occasions. 5. Make appropriate decisions regarding staffing at a variety of parties.

	(Example Continued) Martha Stewart College Degree: Bachelor of Arts Major: Party Planning **Program Objectives**						
	#1 Develop and execute parties for a variety of situations and for diverse clientele.	*#2* Create complete menus for a variety of events.	*#3* Demonstrate an understanding of the biochemical properties of foods and liquids.	*#4* Plan, price, and budget a variety of parties.	*#5* Develop successful marketing strategies for a party planner.	*#6* Anticipate and respond to emergencies in parties they are running.	*#7* Train and manage staff.
PP 110 Introduction to Party Planning	I				I		I
PP 200 Party Budgeting and Purchasing				I	P		
PP 201 Fundamentals of Catering	D		I				
PP 240 Home Decorations				P	D		
PP 260 Crisis Management				I		D	D
PP 290 Capstone Course	D	P			P	D	D
	I = introduced, **P** = practiced, **D** = demonstrated						

	(Example Continued – Mapping of the objectives of a single course) Martha Stewart College Degree: Bachelor of Arts Major: Party Planning **Program Objectives**						
	#1 Develop and execute parties for a variety of situations and for diverse clientele.	*#2* Create complete menus for a variety of events.	*#3* Demonstrate an understanding of the biochemical properties of foods and liquids.	*#4* Plan, price, and budget a variety of parties.	*#5* Develop successful marketing strategies for a party planner.	*#6* Anticipate and respond to emergencies in parties they are running.	*#7* Train and manage staff.
PP 201 Objective #1	B	B		I			
PP 201 Objective #2	B	A		A			
PP 201 Objective #3	B		B				A
PP 201 Objective #4		I	B				
PP 201 Objective #5						B	A
	B = basic, **I** = intermediate, **A** = advanced expectation for this objective						

A sample Curriculum Mapping for a Business program follows:

Business Administration Map	**Econ 207**	**Econ 208**	**CS 214**	**Eng 200**	**Math 1165**	**Busi 201**	**Busi 203**	**Busi 211**	**Busi 231**	**Busi 241**	**Busi 251**	**Busi 252**	**Busi 281**	**Busi 371**	**Busi 411**
	Macro-Economics	Micro-Economics	Microcomp App for Bus	Writing for Bus	Pre-Calc (Bus)	Intro to Bus	Bus Statistics	Prin Mgmt	Prin Mktg	International Bus	Prin Acctg I	Prin Acctg II	Bus Law I	Mgl Finance	Bus Policy
Writing Competencies															
Identify a subject and formulate a thesis statement						I			R						E
Organize ideas to support a position				I		R			R				R		E
Write in a unified and coherent manner appropriate to the subject matter				I		R			R				R		E
Use appropriate sentence structure and vocabulary				I		R			R				R		E
Document references and citations according to an accepted style manual						I			R				R		E
Critical Thinking Competencies															
Identify business problems and apply creative solutions								I	R	R	R	R		R	E
Identify and apply leadership techniques								I						R	E
Translate concepts into current business environments								I	R	R	R	R		R	E
Analyze complex problems by identifying and evaluating the components of the problem								I			R	R	R	E	E
Quantitative Reasoning Competencies															
Apply quantitative methods to solving real-world problems					I		R				R	R		E	
Perform necessary arithmetic computations to solve quantitative problems					I		R				R	R		E	
Evaluate information presented in tabular, numerical and graphical form					I		R				R	R		E	E
Recognize the reasonableness of numeric answers					I		R				R	R		E	E
Oral Communications Competencies															
Organize an oral argument in logical sequence that will understood by the audience						I		R	R	R					E
Use visual aids effectively to support an						I		R	R	R					E

Business Administration Map	Econ 207	Econ 208	CS 214	Eng 200	Math 1165	Busi 201	Busi 203	Busi 211	Busi 231	Busi 241	Busi 251	Busi 252	Busi 281	Busi 371	Busi 411
oral presentation															
Demonstrate professional demeanor, speak clearly in well-modulated tone, and engage the audience						I		R	R	R					E
Exhibit good listening skills when others are speaking						I		R	R	R					E
Technology and Information Literacy															
Identify problem/topic						I		R						R	
Demonstrate familiarity with information resources and technologies						I		R						R	
Conduct search query						I		R						R	
Evaluation sources of information						I		R						R	
Computer Literacy															
Demonstrate computer literacy in preparation of reports and presentations			I						R					E	E
Demonstrate ability to use software application to solve business problems							I				R	R		E	
Conduct search queries through the use of the Internet						I		R	R					E	
Values Awareness															
Recognize ethical issues						I		R	R	R			E		E
Identify ethical issues						I		R	R	R			E		E
Identify theoretical frameworks that apply to corporate social responsibility						I		R	R	R			R	R	E
Translate ethical concepts into responsible behavior in a business environment						I		R	R	R				R	E
Develop values awareness						I		R	R	R					E
CONTENT-SPECIFIC COMPETENCIES															
Global Business Competencies															
Demonstrate knowledge of contemporary social, economic, and political forces; their interrelationship; and their impact on the global business environment	I	I				I		R	R	RE				R	R
Identify the integration of global markets from both financial and product/service perspectives.						I			R	RE				R	R
Incorporate diverse cultural perspectives into business decisions						I		R	R	RE					R
Accounting Competencies															

Business Administration Map	Econ 207	Econ 208	CS 214	Eng 200	Math 1165	Busi 201	Busi 203	Busi 211	Busi 231	Busi 241	Busi 251	Busi 252	Busi 281	Busi 371	Busi 411
Understand the role of the accounting information system within an organization's overall information system											I	R		R	
Demonstrate knowledge of the accounting cycle and the ability to perform necessary procedures at each step of the cycle for both corporate and non-corporate entities											I	R			
Describe, prepare and interpret comparative financial statements using analytical techniques such as ratios and common-size statements											I	R		E	
Understand the differences between financial and managerial accounting															
Understand the role of managerial accounting analysis, control and planning of costs within the corporation											I	R			
Finance Competencies															
Integrate knowledge of economics, accounting, and quantitative analysis in the process of making financial decisions	I	I												IRE	
Access and interpret financial market data using both Internet and print sources						I		R	R	R				RE	
Apply basic computational techniques and/or spreadsheet software to solve financial problems							I				R	R		E	
Compute return and risk measures for basic financial assets (stocks and bonds)														I	
Analyze corporate financial statements to pinpoint strengths and weaknesses.											I	R		E	R
Identify the impact of investment, financing and dividend policy decisions on the value of an enterprise														I	
Use financial tools for life decisions about items such as housing, credit, retirments, and investments														I	
Management Competencies															
Define basic terms used in management						I		E							R
Develop a basic strategic planning process for an organizational unit						I		E							R

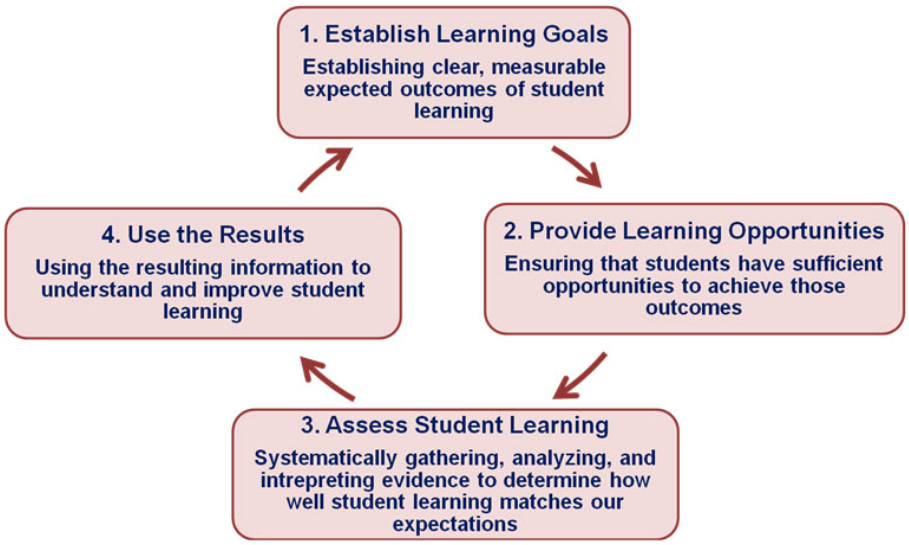
Business Administration Map	**Econ 207**	**Econ 208**	**CS 214**	**Eng 200**	**Math 1165**	**Busi 201**	**Busi 203**	**Busi 211**	**Busi 231**	**Busi 241**	**Busi 251**	**Busi 252**	**Busi 281**	**Busi 371**	**Busi 411**
Derive policies and practices that meet the cultural and global challenges of a changing work force						I		E							R
Translate productivity, quality and efficiency concepts to current business environments						I		E							R
Marketing Competencies															
Identify, evaluate and translate basic marketing problems into powerful business solutions									IRE						
Analyze buyer behavior									IRE						
Utilize a marketing information system to achieve a competitive advantage									IRE						
Improve ability to develop new products and evaluate pricing, promotional and distribution strategies									IRE						
I=Introduce; R=Reinforce; E=Emphasize															
Developed by Business Administration faculty at New Jersey City University															

How to do "Assessment" – Ways of Gathering Evidence

Again, assessment to improve learning focuses on how well students are learning what we intend them to learn. By establishing learning objectives, assessment methods are used to measure selected learning outcomes to see whether or not the objectives have been met for the course or program.

Assessment is the ongoing process of (Suskie 2004):

- Establishing clear, measurable expected outcomes of student learning.
- Ensuring that students have sufficient opportunities to achieve those outcomes.
- Systematically gathering, analyzing, and interpreting evidence to determine how well student learning matches our expectations.
- Using the resulting information to understand and improve student learning.



Steps of Assessment (Walvoord 2004):

1. Articulate your goals for student learning
   "When they complete our program, students will be able to _____"
2. Gather evidence about how well students are meeting the goals.
   Direct measures directly evaluate student work. Examples: exams, papers, projects, computer programs, interaction with a client, or musical performances
   Indirect measures include asking students or alumni how well they thought they learned, tracking their graduate school or job placement rates, and so on. Evidence includes qualitative as well as quantitative information.
3. Use the information for improvement.

Ways of gathering evidence (Suskie 2004) and Maki (2004):

- *Formative* – those undertaken while student learning is taking place; the purpose or which is to improve teaching and learning; designed to capture students' progress toward institution- or program-level outcomes based on criteria and standards of judgment
- *Summative* – those obtained at the end of a course or program; the purpose of which is to document student learning for transcripts and for employers, donors, legislators, and other external audiences; designed to capture students' achievement at the end of their program of study and their undergraduate or graduate education based on criteria and standards of judgment
- *Direct* – evidence of student learning which is tangible, visible, self-explanatory; prompt students to represent or demonstrate their learning or produce work so that observers can assess how well students' texts or responses fit institution- or program-level expectations
  - Example: performances, creations, results of research or exploration, interactions within group problem solving, or responses to questions or prompts
- *Indirect* – evidence which provides signs that students are probably learning, but the evidence of exactly what they are learning is less clear and less convincing; capture students' perceptions of their learning and

the educational environment that supports that learning, such as access to and the quality of services, programs, or educational offerings that support their learning
    - Example: student satisfaction, alumni, and employer surveys
- *Objective* – one that needs no professional judgment to score correctly (although interpretation of the scores requires professional judgment); examples: multiple-choice, true-false exams
- *Subjective* – yield many possible answers of varying quality and require professional judgment to score
- *Traditional* – the kinds of tests that have been around for decades; e.g., objective tests, 'blue book' essay questions, and oral examinations
- *Performance* – ask students to demonstrate their skills rather than relate what they have learned through traditional tests; e.g., field experiences, laboratory and studio assignments, projects. Also called authentic assessments when asking students to do a real-life task. Have two components: (i) the assignment or prompt that tells students what is expected of them and (ii) a scoring guide or rubric used to evaluate completed work.
- *Embedded* – program assessments which are embedded into course work
- *Add-on* – assessments which are in addition to course requirements; e.g., assemble a portfolio, take a standardized test, participate in a survey
- *Local* – created by faculty and/or staff
- *Published* – those published by an organization external to the institution and used by a number of institutions
- *Quantitative* – use structured, predetermined response options that can be summarized into meaningful numbers and analyzed statistically; place interpretative value on numbers; e.g., the number of right versus wrong answers
- *Qualitative* – use flexible, naturalistic methods and are usually analyzed by looking for recurring patterns and themes; e.g., reflective writing, notes from interviews and focus groups; place interpretative value on the observer; e.g., observations of group interaction or an individual's performance in a simulation

DIRECT ASSESSMENT TECHNIQUES (Allen 2004)		
Technique	**Potential Strength**	**Potential Limitations**
Published tests	• Can provide direct evidence of student mastery of learning objectives • Generally, are carefully developed, highly reliable, professionally scored, and nationally normed • Frequently provide a number of norm groups, such as norms for community colleges, liberal arts colleges, and comprehensive universities • Online versions of tests are increasingly available, and some provide immediate scoring • Some publishers allow faculty to supplement tests with their own items, so tests can be adapted to better serve local needs	• If the test does not reflect the learning objectives that faculty value and the curricula that students experience, results are likely to be discounted and inconsequential • Most published tests rely heavily on multiple-choice items that often focus on specific facts, but program learning objectives more often emphasize higher-level skills • Test scores may reflect criteria that are too broad for meaningful assessment • Students may not take the test seriously if test results have no impact on their lives • Tests can be expensive • The marginal gain from annual testing may be low • Faculty may object to standardized exam scores on general principles, leading them to ignore results
Locally developed tests	• Can provide direct evidence of student mastery of learning objectives • Appropriate mixes of items allow faculty to address various types of learning objectives • Can provide for authentic assessment of higher-level learning • Students generally are motivated to display the extent of their learning • If well constructed, they are likely to have good validity • Because local faculty write the exam, they are likely to be interested in results and willing to use them • Can be integrated into routine faculty workloads • Campuses with similar missions could decide to develop their own norms, and they could assess student work together or provide independent assessment of each other's student work • Discussion of results focuses faculty on student learning and program support for it	• These exams are likely to be less reliable than published exams • Reliability and validity generally are unknown • Creating effective exams requires time and skill • Score exams takes time • Traditional testing methods may not provide authentic measurement • Norms generally are not available

DIRECT ASSESSMENT TECHNIQUES (Allen 2004)		
Technique	**Potential Strength**	**Potential Limitations**
Embedded assignments and course activities	• Can provide direct evidence of student mastery of learning objectives • Out-of-class assignments are not restricted to time constraints typical for exams • Students are generally motivated to demonstrate the extent of their learning • Can provide authentic assessment of learning objectives • Can involve ratings by fieldwork supervisors • Can provide a context for assessing communication and teamwork skills, as well as other types of learning objectives • Can be used for grading as well as assessment • Faculty who develop the procedures are likely to be interested in results and willing to use them • Discussion of results focuses faculty on student learning and program support for it • Data collection is unobtrusive to students	• Requires time to develop and coordinate • Requires faculty trust that the program will be assessed, not individual teachers • Reliability and validity generally are unknown • Norms generally are not available
Competence interviews	• Can provide direct evidence of student mastery of learning objectives • The interview format allows faculty to probe for the breadth and extent of student learning • Can be combined with other techniques that more effectively assess knowledge of facts and terms • Can involve authentic assessment, such as simulated interactions with clients • Can provide for direct assessment of some student skills, such as oral communication, critical thinking, and problem-solving skills	• Requires time to develop, coordinate, schedule, and implement • Interview protocols must be carefully developed • Subjective judgments must be guided by agreed-upon criteria • Interviewer training takes time • Interviewing using unstructured interviews requires expertise • Not an efficient way to assess knowledge of specific facts and terms • Some students may be intimidated by the process, reducing their ability to demonstrate their learning
Portfolios	• Can provide direct evidence of student mastery of learning objectives • Students are encouraged to take responsibility for and pride in their learning • Students may become more aware of their own academic growth • Can be used for developmental assessment and can be integrated into the advising process to individualize student planning • Can help faculty identify curriculum gaps • Students can use portfolios and the portfolio process to prepare for graduate school or career applications • Discussion of results focuses faculty on student learning and program support for it • Webfolios or CD-ROMs can be easily viewed, duplicated, and stored	• Requires faculty time to prepare the portfolio assignment and to assist students in preparing portfolios • Requires faculty analysis and, if graded, faculty time to assign grades • May be difficult to motivate students to take the task seriously • May be more difficult for transfer students to assemble the portfolio if they haven't saved relevant materials • Students may refrain from criticizing the program if their portfolio is graded or if their names will be associate with portfolios during the review • It may be difficult to protect student confidentiality and privacy
Collective portfolios	• Can provide direct evidence of student mastery of learning objectives • Students generally are motivated to display the extent of their learning • Workload demands generally are more manageable than traditional portfolios • Students are not required to do extra work • Discussion of results focuses faculty on student learning and program support for it • Data collection is unobtrusive to students	• If assignments are not aligned with the objectives being examined, evidence may be problematic • If sampling is not done well, results may not generalize to the entire program • Reviewing the materials takes time and planning

INDIRECT ASSESSMENT TECHNIQUES (Allen 2004)		
Technique	**Potential Strength**	**Potential Limitations**
Surveys	• Are flexible in format and can include questions about many issues • Can be administered to large groups of respondents • Can easily assess the views of various stakeholders • Usually have face validity – the questions generally have a clear relationship to the objectives being assessed • Tend to be inexpensive to administer • Can be conducted relatively quickly • Responses to closed-ended questions are easy to tabulate and to report in tables or graphs • Open-ended questions allow faculty to uncover unanticipated results • Can be used to track opinions across time to explore trends • Are amenable to different formats, such as paper-and-pencil or online formats • Can be used to collect opinions from respondents at distant sites	• Provide indirect evidence about student learning • Their validity depends on the quality of the questions and response options • Conclusions can be inaccurate if biased samples are obtained • Results might not include the full array of opinions if the sample is small • What people say they do or know may be inconsistent with what they actually do or know • Open-ended responses can be difficult and time-consuming to analyze
Interviews	• Are flexible in format and can include questions about many issues • Can assess the views of various stakeholders • Usually have face validity – the questions generally have a clear relationship to the objectives being assessed • Can provide insights into the reasons for the participants' beliefs, attitudes, and experiences • Interviewers can prompt respondents to provide more detailed responses • Interviewers can respond to questions and clarify misunderstandings • Telephone interviews can be used to reach distant respondents • Can provide a sense of immediacy and personal attention for respondents • Open-ended questions allow faculty to uncover unanticipated results	• Generally provide indirect evidence about student learning • Their validity depends on the quality of the questions • Poor interviewer skills can generate limited or useless information • Can be difficult to obtain a representative sample of respondents • What people say they do or know may be inconsistent with what they actually do or know • Can be relatively time-consuming and expensive to conduct, especially if interviewers and interviewees are paid or if the no-show rate for scheduled interviews is high • The process can intimidate some respondents, especially if asked about sensitive information and their identity is known to the interviewer • Results can be difficult and time-consuming to analyze • Transcriptions of interviews can be time-consuming and costly
Focus groups	• Are flexible in format and can include questions about many issues • Can provide in-depth exploration of issues • Usually have face validity – the questions generally have a clear relationship to the objectives being assessed • Can be combined with other techniques, such as surveys • The process allows faculty to uncover unanticipated results • Can provide insights into the reasons for the participants' beliefs, attitudes, and experiences • Can be conducted within courses • Participants have the opportunity to react to each other's ideas, providing an opportunity to uncover the degree of consensus on ideas that emerge during the discussion	• Generally provide indirect evidence about student learning • Require a skilled, unbiased facilitator • Their validity depends on the quality of the questions • Results might not include the full array of opinions if only one focus group is conducted • What people say they do or know may be inconsistent with what they actually do or know • Recruiting and scheduling the groups can be difficult • Time-consuming to collect and analyze data
Reflective essays	• Are flexible in format and can include questions about many issues • Can be administered to large groups of respondents • Usually have face validity – the writing assignment generally has a clear relationship to the objectives being assessed • Can be conducted relatively quickly • Allow faculty to uncover unanticipated results • Can provide insights into the reasons for the participants' beliefs, attitudes, and experiences • Can provide direct assessment of some learning objectives	• Generally provide indirect evidence about student learning • Their validity depends on the quality of the questions • Conclusions can be inaccurate if biased samples are obtained • Results might not include the full array of opinions if the sample is small • What people say they do or know may be inconsistent with what they actually do or know • Responses can be difficult and time-consuming to analyze

Types of rating scales (Erwin 1991):

- Behaviorally anchored – each area or concept to be rated contains a series of possible behaviors, ranging from descriptions of a poor performance or product to those of a superior performance or product; in between are several levels of behavioral descriptors or anchors, with each level representing a progressively higher degree of performance
- Semantic differential – also contain a series of items, but each concept is bounded by bipolar adjectives representing contrasting views of the performance or product
- Likert – list a stimulus statement or content item to which the respondent marks "strongly agree", "slightly agree", "slightly disagree", or "strongly disagree". Numerical values or weights are assigned to each response alternative and then summed across all items for a total score.

COMMON SURVEY FORMATS (Allen 2004)	
Type of Item	**Example**
Checklist	Please indicate which of the activities you feel competent to perform: ___ Develop an investment plan ___ Interpret a financial report ___ Provide feedback about an employee's performance ___ Write a case study
Classification	Organization of the paper: ___ Confusing, unclear ___ Generally clear, minor points of confusion ___ Clear, logical, easy to follow
Frequency	In a typical term, I used the department's computer lab: Never Seldom Sometimes Often
Importance	How important is it for the department to provide career counseling? Unimportant Slightly Important Moderately Important Very Important Extremely Important
Likelihood	How likely are you to apply to a graduate program in the next five years? Very Unlikely Slightly Unlikely Uncertain Slightly Likely Likely
Linear rating scale	Ability to compose paragraphs in standard written English: Unsatisfactory ___ | ___ | ___ | ___ | ___ | ___ | ___ | ___ | ___ Excellent
Likert scale	I am able to write a research paper using MLA standards Strongly Disagree Disagree Neutral Agree Strongly Agree
Open-ended	Please describe the most important concepts you learned in the program
Partially closed-ended	Please check the most important factor that led you to major in engineering ___ Experience in a specific class ___ Experience with a specific instructor ___ Work experience in this or a related field ___ Advice from a career planning office or consultant ___ Advice from family or friends ___ Other: please explain
Quality	Please indicate the quality of instruction in the general education program Very Poor Poor Good Very Good
Quantitative judgment	Compared to other interns I have supervised, this student's knowledge of the theory and principles of clinical practice is 1 2 3 4 5 6 7 8 9 10 Below average Average Above Average
Ranking	Please indicate your ranking of the importance of the following student learning objectives by assigning ranks from "1" to "4", where "1" is most important and "4" is least important ___ Computing ___ Critical thinking ___ Speaking ___ Writing

How much evidence is enough? (Suskie 2004)

- Error margins of various sample sizes:

Error Margin	1%	2%	3%	4%	5%	6%	7%
Sample Size	9604	2401	1067	600	384	264	196

- Sample sizes needed from small groups for 5% error margins

# of students you are sampling from	1000	500	350	200	100	50
Sample Size	278	217	184	132	80	44

Selection criterion matrix for determining which methods to use (Palomba and Banta 1999):

Selection criteria	***Measures* – potential methods (Palomba and Banta 1999)**				
	Objective Tests	Performances	Portfolios	Surveys	Classroom Assignments
Match to curriculum					
Technical quality					
Preparation time					
Value to students					
Programmatic information					

Objectives by measure matrix (Palomba and Banta 1999):

Objectives for the program	***Measures* – potential methods (Palomba and Banta 1999)**		
	Term paper	Questionnaire	Speech
Write at a scholarly level	√		
Adapt verbal messages to a specific audience			√
Value lifelong learning		√	

Ways of comparing the scores or ratings from any assessment method (Erwin 1991):

- *Norm-referenced* – report students scores *relative* to those of other students
  - Example: comparing students' scores with students' scores from other institutions
  - Proprietary tests are norm referenced, with percentile ranks ranging from 1 to 99 typically used. Percentile rank = percentage of persons in a reference group who obtained lower scores
- *Criterion-referenced* – report scores according to an *absolute* standard of achievement
  - Example: comparing students' scores with a designated level of competency or cutoff standard; above which is passing, below which is failing
  - Alternative terms = domain-based or content-based
- *Self-referenced* – compare different scores or ratings from the same student

Reliability and Validity of Methods Used to Gather Evidence

Reliability and *Validity* narrow down the pool of possible summative and formative methods (Maki 2004):

- *Reliability* – refers to the extent to which trial tests of a method with representative student populations fairly and consistently assess the expected traits or dimensions of student learning within the construct of that method.
- *Validity* – refers to the extent to which a method prompts students to represent the dimensions of learning desired. A valid method enables direct and accurate assessment of the learning described in outcome statements.

Reliable measures can be counted on to produce consistent responses over time (Palomba and Banta 1999):

- Reliable data – variance in scores is attributable to actual differences in what is being measured, such as knowledge, performance or attitudes
- Unreliable data – score variance is due to measurement error; which can include such things as the individuals responding to the instrument, the administration and scoring of the instrument, and the instrument itself

Sources of error in regard to *reliability* (Erwin 1991):

(i) from the student
- lack of motivation to take assessment seriously
- prior experience with being evaluated
- test anxiety, coaching, and physiological variables

(ii) from the assessment instrument
- test items ambiguously worded
- rating scale is confusing or vague
- representativeness of test items; e.g., if two test forms differ in their emphasis on program content, inconsistent scores may result

(iii) from the conditions of assessment administration
- varying the style of test administration procedures produces varying scores

The greater the error in any assessment information, the less reliable it is, and the less likely it is to be useful.

Types of *reliability* (Erwin 1991):

(i) Stability – usually described in a test manual as test-retest reliability; if the same test is readministered to the same students within a short period of time, their scores should be highly similar, or stable

(ii) Equivalence – the degree of similarity of results among alternate forms of the same test; tests should have high levels of equivalence if different forms are offered

(iii) Homogeneity or internal consistency – the interrelatedness of the test items used to measure a given dimension of learning and development

(iv) Interrater reliability – the consistency with which raters evaluate a single performance of a given group of students

Barriers to establishing *reliability* (Shermis and Daniels in Banta and Associates 2002) include rater bias – the tendency to rate individuals or objects in an idiosyncratic way:

- central tendency – error in which an individual rates people or objects by using the *middle* of the scale
- leniency – error in which an individual rates people or objects by using the *positive end* of the scale
- severity – error in which an individual rates people or objects by using the *negative end* of the scale
- halo error – when a rater's evaluation on one dimension of a scale (such as work quality) is influenced by his or her perceptions from another dimension (such as punctuality)

Major Types of Reliability (Allen 2004)	
Test-retest reliability	A reliability estimate based on assessing a group of people twice and correlating the two scores. This coefficient measures score stability.
Parallel forms reliability (or alternate forms reliability)	A reliability estimate based on correlating scores collected using two versions of the procedure. This coefficient indicates score consistency across the alternative versions.
Inter-rater reliability	How well two or more raters agree when decisions are based on subjective judgments.
Internal consistency reliability	A reliability estimate based on how highly parts of a test correlate with each other.
Coefficient alpha	An internal consistency reliability estimate based on correlations among all items on a test.
Split-half reliability	An internal consistency reliability estimate based on correlating two scores, each calculated on half of a test.

Valid measures on ones in which the instrument measures what we want it to measure (Palomba and Banta 1999):

- Construct-related validity – refers to the congruence between the meaning of the underlying construct and the items on the test or survey; i.e., do results correlate with other instruments examining the same construct?
- Criterion-related validity – includes predictive validity: how dependable is the relationship between the scores or answers on an instrument and a particular future outcome?
- Content-related validity – refers to the match between the content of the instrument and the content of the curriculum or other domain of interest

Validity must be judged according to the application of each use of the method. The validity of an assessment method is never proved absolutely; it can only be supported by an accumulation of evidence from several categories. For any assessment methods to be used in decision making, the following categories should be considered (Erwin 1991):

- Content relevance and representativeness
  - The selected test should be a representative sample from those educational objectives which the test is supposed to measure
  - The test should cover what the program covered and should place emphasis in proportion to the program's emphases
  - Tests may be reliable but not valid for a particular program
- Internal test structure
  - Typically demonstrated through intercorrelations among items covering the same content domain
- External test structure
  - Necessary when the educator wishes to compare test scores or ratings with other measures or related variables
- Process of probing responses
  - Typically sought at two points during any test or scale construction: initially in the test construction to determine whether the students' interpretations are consistent with the intent of the test designer; and at the point of probing the process to see if a pattern might be discovered on those students who scored very high or very low
- Test's similarities and differences over time and across groups and settings
  - In studying validity evidence over time, some outcome measures should increase over time
- Value implications and social consequences
  - If a test or rating scale discriminates against certain groups of people, that test or scale should be considered suspect.

Validity (Shermis and Daniels in Banta and Associates 2002):

- involves establishing that an assessment measures what it is supposed to measure
- can be thought of as the extent of the relationship between an assessment and the construct the assessment is supposed to predict

Major Types of Validity (Allen 2004)	
Construct validity	Construct validity is examined by testing predictions based on the theory (or construct) underlying the procedure. For example, faculty might predict that scores on a test that assesses knowledge of anthropological terms will increase as anthropology students progress in their major. We have more confidence in the test's construct validity if predictions are empirically supported.
Criterion-related validity	Criterion-related validity indicates how well results predict a phenomenon of interest, and it is based on correlating assessment results with this criterion. For example, scores on an admissions test can be correlated with college GPA to demonstrate criterion-related validity.
Face validity	Face validity is assessed by subjective evaluation of the measurement procedure. This evaluation may be made by test takers or by experts in what is being assessed.
Formative validity	Formative validity is how well an assessment procedure provides information that is useful for improving what is being assessed.
Sampling validity	Sampling validity is how well the procedure's components, such as test items, reflect the full range of what is being assessed. For example, a valid test of content mastery should assess information across the entire content area, not just isolated segments.

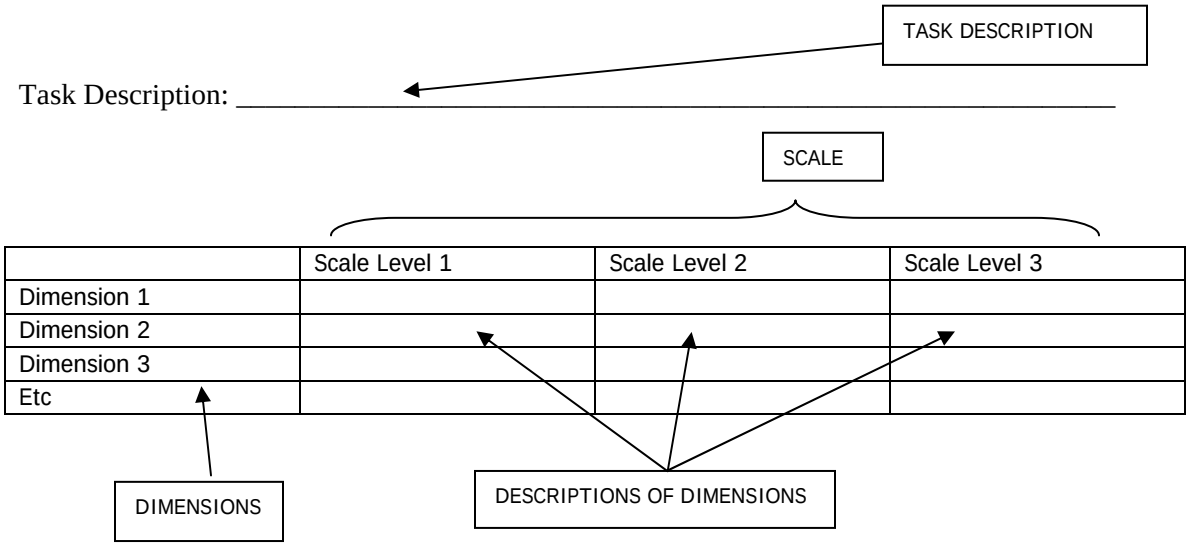
Using Rubrics for Direct Assessment of Student Work

What is a *rubric*?

A *rubric* is a scoring tool that lays out the specific expectations for an assignment. Rubrics divide an assignment into its component parts and provide a detailed description of what constitutes acceptable or unacceptable levels of performance for each of those parts. (from Introduction to Rubrics by Stevens and Levi 2005)

What are the parts of a rubric? Rubrics are composed of four basic parts (Stevens and Levi 2005):

- A task description (the assignment)
- A scale of some sort (levels of achievement, possibly in the form of grades). Scales typically range from 3 to 5 levels.
- The dimensions of the assignment (a breakdown of the skills/knowledge involved in the assignment)
- Descriptions of what constitutes each level of performance (specific feedback)



Rubrics (Allen 2004):

- Can be used to classify virtually any product or behavior, such as essays, research reports, portfolios, works of art, recitals, oral presentations, performances, and group activities
- Can be used to provide formative feedback to students, to grade students, and to assess programs
- Can be used for program assessment in a number of ways:
  - Faculty can use rubrics in classes and aggregate the data across sections
  - Faculty can independently assess student products and then aggregate results
  - Faculty can participate in group readings in which they review student products together and discuss what they have found

Scoring rubrics are explicit schemes for classifying products or behaviors into categories that are steps along a continuum – these steps usually range from "unacceptable" to "exemplary", and the number of intermediate categories varies with the need to discriminate among other performance levels (Allen 2004).

Scoring Rubrics (Maki 2004):

- Translate outcome statements into criteria
- Raters assess student work based on these criteria to derive inferences about students' learning
- Consist of two kinds of descriptors
  - Criteria descriptors – descriptions of the criteria or traits manifested in a project, performance, or text students produce in response to an assessment method
  - Performance descriptors – descriptions of how well students execute each criterion or trait along an achievement continuum – score levels

Rubrics can be classified into four formats (Suskie 2004):

- *Checklists* – simple list indicating the presence of 'things you are looking for'

A checklist rubric for evaluating a web site (Suskie 2004)	
√	Titles are meaningful
	Each page loads quickly
√	The text is easy to read

- *Rating scales* – a checklist with a rating scale added to show the degree to which the 'things you are looking for' are present

A rating scale rubric for an information literacy assignment (Suskie 2004)						
Please indicate the student's skill in each of the following respects, as evidenced by this assignment, by checking the appropriate box. If this assignment is not intended to elicit a particular skill, please check the N/A box.						
	Outstanding (A)	Very Good (B)	Acceptable (C)	Marginally acceptable (D)	Inadequate (F)	N/A
Identify, locate, and access sources of information						
Critically evaluate information, including its legitimacy, validity, and appropriateness						
Organize information to present a sound central idea supported by relevant material in a logical order						
Use information to answer questions and/or solve problems						
Clearly articulate information and ideas						
Use information technologies to communicate, manage, and process information						
Use information technologies to solve problems						
Use the work of others accurately and ethically						
What grade are you awarding this assignment?						
If you had to assign a final course grade for this student today, what would it be?						

A rating scale for an oral presentation (Suskie 2004)				
The presenter …				
	Strongly agree	Agree	Disagree	Strongly disagree
Clearly stated the purpose of the presentation	√			
Was well organized		√		
Answered questions authoritatively				√
Appeared confident			√	

It should be noted that rating scales can be vague in nature leading to problems (Suskie 2004):

- When several faculty are doing the rating, they may be inconsistent in how they rate performance
- Students don't receive thorough feedback; i.e., a scored rubric may not explain why something was less than superior

- *Holistic rating scales*
  - Do not have a list of the 'things you're looking for'
  - Have short narrative descriptions of the characteristics of outstanding work, acceptable work, unacceptable work, and so on

HOLISTIC rubric for assessing student essays (Allen 2004)	
Inadequate	The essay has at least one serious weakness. It may be unfocused, underdeveloped, or rambling. Problems with the use of language seriously interfere with the reader's ability to understand what is being communicated.
Developing competence	The essay may be somewhat unfocused, underdeveloped, or rambling, but it does have some coherence. Problems with the use of language occasionally interfere with the reader's ability to understand what is being communicated.
Acceptable	The essay is generally focused and contains some development of ideas, but the discussion may be simplistic or repetitive. The language lacks syntactic complexity and may contain occasional grammatical errors, but the reader is able to understand what is being communicated.
Sophisticated	The essay is focused and clearly organized, and it shows depth of development. The language is precise and shows syntactic variety, and ideas are clearly communicated to the reader.

- *Descriptive rubrics*
  - Replace the checkboxes of rating scale rubrics with brief descriptions of the performance that merits each possible rating
  - Descriptions of each performance level make faculty expectations explicit and student performance convincingly documented. But, coming up with succinct but explicit descriptions of every performance level for every 'thing you are looking for' can be time-consuming.
  - Are a good choice when several faculty are collectively assessing student work, it is important to give students detailed feedback, or outside audiences will be examining the rubric scores.

A descriptive rubric for a slide presentation on findings from research sources (Suskie 2004)				
	Well done (5)	Satisfactory (4-3)	Needs improvement (2-1)	Incomplete (0)
Organization	Clearly, concisely written. Logical, intuitive progression of ideas and supporting information. Clear and direct cues to all information.	Logical progression of ideas and supporting information. Most cues to information are clear and direct.	Vague in conveying viewpoint and purpose. Some logical progression of ideas and supporting information but cues are confusing or flawed.	Lacks a clear point of view and logical sequence of information. Cues to information are not evident.
Introduction	Presents overall topic. Draws in audience with compelling questions or by relating audience's interests or goals.	Clear, coherent, and related to topic.	Some structure but does not create a sense of what follows. May be overly detailed or incomplete. Somewhat appealing.	Does not orient audience to what will follow.
Etc.				

ANALYTIC rubric for peer assessment of team project members (Allen 2004)			
	Below expectation	**Good**	**Exceptional**
Project contributions	Made few substantive contributions to the team's final product	Contributed a "fair share" of substance to the team's final product	Contributed considerable substance to the team's final product
Leadership	Rarely or never exercised leadership	Accepted a "fair share" of leadership responsibilities	Routinely provided excellent leadership
Collaboration	Undermined group discussions or often failed to participate	Respected others' opinions and contributed to the group's discussion	Respected others' opinions and made major contributions to the group's discussion

ANALYTIC rubric for grading oral presentations (Allen 2004)				
	Below expectation	**Satisfactory**	**Exemplary**	**Score**
Organization	No apparent organization. Evidence is not used to support assertions. (0 – 2)	The presentation has a focus and provides some evidence that supports conclusions. (3 – 5)	The presentation is carefully organized and provides convincing evidence to support conclusions (6 – 8)	
Content	The content is inaccurate or overly general. Listeners are unlikely to learn anything or may be misled. (0 – 2)	The content is generally accurate, but incomplete. Listeners may learn some isolated facts, but they are unlikely to gain new insights about the topic (5 – 7)	The content is accurate and complete. Listeners are likely to gain new insights about the topic. (10 – 13)	
Style	The speaker appears anxious and uncomfortable, and reads notes, rather than speaks. Listeners are largely ignored. (0 – 2)	The speaker is generally relaxed and comfortable, but too often relies on notes. Listeners are sometimes ignored or misunderstood. (3 – 6)	The speaker is relaxed and comfortable, speaks without undue reliance on notes, and interacts effectively with listeners. (7 – 9)	
			Total Score	

Generic rubric for assessing portfolios (Allen 2004)				
	Unacceptable: Evidence that the student has mastered this objective is not provided, unconvincing, or very incomplete	**Marginal**: Evidence that the student has mastered this objective is provided, but it is weak or incomplete	**Acceptable**: Evidence shows that the student has generally attained this objective	**Exceptional**: Evidence demonstrates that the student has mastered this objective at a high level
Learning objective 1				
Learning objective 2				
Etc.				

Why use Rubrics? (Stevens and Levi 2005)

- Rubrics provide timely feedback – grading can be done more quickly
  Since students often make similar mistakes on assignments, incorporating predictable notes into the "descriptions of dimensions" portion of a rubric can simplify grading into circling or checking off all comments that apply to each specific student.
- Rubrics prepare students to use detailed feedback
  In the rubric, the highest level descriptions of the dimensions are the highest level of achievement possible, whereas the remaining levels, circled or checked off, are typed versions of the notes/comments an instructor regularly writes on student work explaining how and where the student failed to meet that highest level. Thus, in using a rubric the student obtains details on how and where the assignment did or

did not achieve its goal, and even suggestions (in the form of the higher level descriptions) as to how it might have been done better.

- Rubrics encourage critical thinking
  Because of the rubric format, students may notice for themselves the patterns of recurring problems or ongoing improvement in their work.
- Rubrics facilitate communication with others
  TAs, counselors/tutors, colleagues, etc. can benefit from the information contained in the rubric; i.e., it provides information to help all involved in a student's learning process.
- Rubrics help faculty refine their teaching skills
  Rubrics showing a student's continuing improvement or weaknesses over time, or rubrics showing student development over time, can provide a clearer view of teaching blind spots, omissions, and strengths.
- Rubrics help level the playing field
  To aid first-generation or non-native speakers of English, rubrics can act as a translation device to help students understand what teachers are talking about.

Thoughts for using rubrics (Allen 2004):

- Evaluators should be "normed" or "calibrated" before using the rubric
- Faculty readers may require training
  - It is not essential to use all rubric levels
  - They should not be concerned about how often each category is used – some learning objectives are easier to achieve than others or are better aligned with the curriculum, so it is possible to find extensive use of higher categories for some objectives and lower categories for other objectives
  - Readers need to be careful to rate each category in analytic rubrics separately, avoiding a halo effect

How can Rubrics be used to assess ***program*** learning goals? (Suskie 2004)

- Embedded course assignments – program assessments which are embedded into course assignments can be scored using a rubric
- Capstone experiences – theses, oral defenses, exhibitions, presentations, etc. – can be scored using a rubric to provide evidence of the overall effectiveness of a program
- Field experiences – internships, practicum, etc.—supervisor's ratings of the student's performance can be evidence of the overall success of a program
- Employer feedback – feedback from the employers of alumni can provide information on how well a program is achieving its learning goals
- Student self-assessments – indirect measures of student learning
- Peer evaluations – while having the potential for being inaccurate and biased – they can motivate students to participate fully
- Portfolios – rubrics can be a useful way to evaluate portfolios

Rubric scores are subjective and thus prone to unintentional scoring errors and biases (Suskie 2004):

- Leniency errors – when faculty judge student work better than most of their colleagues would judge it
- Generosity errors – when faculty tend to use only the high end of the rating scale
- Severity errors – when faculty tend to use only the low end of the rating scale
- Central tendency errors – when faculty tend to use only the middle of the rating scale
- Halo effect bias – when faculty let their general impression of a student influence their scores
- Contamination effect bias – when faculty let irrelevant student characteristics (e.g., handwriting or ethnic background) influence their scores
- Similar-to-me effect bias – when faculty give higher scores to those students whom they see as similar to themselves
- First-impression effect bias – when faculty's early opinions distort their overall judgment
- Contrast effect bias – when faculty compare a student against other students instead of established standards
- Rater drift – when faculty unintentionally redefine scoring criteria over time

Example of a Rubric and its use for improvement

Walvoord (1998) presents the following example rubric and the analysis of using it over a two year period.

Example Rubric for Scientific Experiment in Biology Capstone Course by Virginia Johnson Anderson, Towson University
(From Walvoord and Anderson, *Effective Grading: A Tool for Learning and Assessment*, 1998, pp. 197-201)

Task Assignment: Semester-long assignment to design an original experiment, carry it out, and write it up in scientific report format. Students are to determine which of two brands of a commercial product (e.g. two brands of popcorn) are "best." They must base their judgment on at least four experimental factors (e.g. "% of kernels popped" is an experimental factor. Price is not, because it is written on the package).

	5	4	3	2	1
Title	Is appropriate in tone and structure to science journal; contains necessary descriptors, brand names, and allows reader to anticipate design.	Is appropriate in tone and structure to science journal; most descriptors present; identifies function of experimentation, suggests design, but lacks brand names.	Identifies function, brand name, but does not allow reader to anticipate design.	Identifies function or brand name, but not both; lacks design information or is misleading	Is patterned after another discipline or missing.
Introduction	Clearly identifies the purpose of the research; identifies interested audiences(s); adopts an appropriate tone.	Clearly identifies the purpose of the research; identifies interested audience(s).	Clearly identifies the purpose of the research.	Purpose present in Introduction, but must be identified by reader.	Fails to identify the purpose of the research.
Scientific Format Demands	All material placed in the correct sections; organized logically within each section; runs parallel among different sections.	All material placed in correct sections; organized logically within sections, but may lack parallelism among sections.	Material place is right sections but not well organized within the sections; disregards parallelism.	Some materials are placed in the wrong sections or are not adequately organized wherever they are placed.	Material placed in wrong sections or not sectioned; poorly organized wherever placed.
Materials and Methods Section	Contains effective, quantifiable, concisely-organized information that allows the experiment to be replicated; is written so that all information inherent to the document can be related back to this section; identifies sources of all data to be collected; identifies sequential information in an appropriate chronology; does not contain unnecessary, wordy descriptions of procedures.	As 5, but contains unnecessary information, and/or wordy descriptions within the section.	Presents an experiment that is definitely replicable; all information in document may be related to this section; however, fails to identify some sources of data and/or presents sequential information in a disorganized, difficult pattern.	Presents an experiment that is marginally replicable; parts of the basic design must be inferred by the reader; procedures not quantitatively described; some information in Results or Conclusions cannot be anticipated by reading the Methods and Materials section.	Describes the experiment so poorly or in such a nonscientific way that is cannot be replicated.
Non-experimental Information	Student researches and includes price and other nonexperimental information that would be expected to be significant to the audience in determining the better product, or specifically states non-experimental factors excluded by design; interjects these at appropriate positions in text and/or develops a weighted rating scale; integrates nonexperimental information in the Conclusions.	Student acts as above, but is somewhat less effective in developing the significance of the non-experimental information.	Student introduces price and other non-experimental information, but does not integrate them into Conclusions.	Student researches and includes price effectively; does not include or specifically exclude other non-experimental information.	Student considers price and/or other non-experimental variables as research variables; fails to identify the significance of these factors to the research.
Designing an Experiment	Student selects experimental factors that are appropriate to the research purpose and audience; measures adequate aspects of these selected factors; establishes discrete subgroups for which data significance may vary; student demonstrates an ability to eliminate bias from the design and bias-ridden statements from the research; student selects appropriate sample size, equivalent groups, and statistics; student designs a superior experiment.	As 5, but student designs an adequate experiment.	Student selects experimental factors that are appropriate to the research purpose and audience; measures adequate aspects of these selected factors; establishes discrete subgroups for which data significance may vary; research is weakened by bias OR by sample size of less than 10.	As 3, but research is weakened by bias AND inappropriate sample size	Student designs a poor experiment.

Defining Operationally	Student constructs a stated comprehensive operational definition and well-developed specific operational definitions.	Student constructs an implied comprehensive operational definition and well-developed specific operational definitions.	Student constructs an implied comprehensive operational definition (possible less clear) and some specific operational definitions.	Student constructs specific operational definitions, but fails to construct a comprehensive definition.	Student lacks understanding of operation definition.
Controlling Variables	Student demonstrates, by written statement, the ability to control variables by experimental control and by randomization; student makes reference to, or implies, factors to be disregarded by reference to pilot or experience; superior overall control of variables.	As 5, but student demonstrates an adequate control of variables.	Student demonstrates the ability to control important variables experimentally; Methods and Materials section does not indicate knowledge of randomization and/or selected disregard of variables.	Student demonstrates the ability to control some, but not all, of the important variables experimentally.	Student demonstrates a lack of understanding about controlling variables.
Collecting Data and Communicating Results	Student selects quantifiable experimental factors and/or defines and establishes quantitative units of comparison; measures the quantifiable factors and/or units in appropriate quantities or intervals; student selects appropriate statistical information to be utilized in the results; when effective, student displays results in graphs with correctly labeled axes; data are presented to the reader in text as well as graphic forms; tables or graphs have self-contained headings.	As 5, but the student did not prepare self-contained headings for tables or graphs.	As 4, but data reported in graphs or tables contain materials that are irrelevant. and/or not statistically appropriate.	Student selects quantifiable experimental factors and/or defines and establishes quantitative units of comparison; fails to select appropriate quantities or intervals and/or fails to display information graphically when appropriate.	Student does not select, collect, and/or communicate quantifiable results.
Interpreting Data: Drawing Conclusions/Implications	Student summarizes the purpose and findings of the research; student draws inferences that are consistent with the data and scientific reasoning and relates these to interested audiences; student explains expected results and offers explanations and/or suggestions for further research for unexpected results; student presents data honestly, distinguishes between fact and implication, and avoids overgeneralizing; student organizes non-experimental information to support conclusion; student accepts or rejects the hypothesis.	As 5, but student does not accept or reject the hypothesis.	As 4, but the student overgeneralizes and/or fails to organize non-experimental information to support conclusions.	Student summarizes the purpose and findings of the research; student explains expected results, but ignores unexpected results.	Student may or may not summarize the results, but fails to interpret their significance to interested audiences.

Applying this rubric to student capstone course work resulted in scores showed a need for improvement in the *Design of Experiments* and in *Defining Operationally*.

Student Scores for Science Reports Before and After Anderson Made Pedagogical Changes
(From Walvoord and Anderson, *Effective Grading: A Tool for Learning and Assessment*, 1998, p. 147)

Trait	**Before**	**After**
Title	2.95	3.22
Introduction	3.18	3.64
Scientific Format	3.09	3.32
Methods and Materials	3.00	3.55
Non-Experimental Info	3.18	3.50
Designing the Experiment	**2.68**	**3.32**
Defining Operationally	**2.68**	**3.50**
Controlling Variables	2.73	3.18
Collecting Data	2.86	3.36
Interpreting Data	2.90	3.59
Overall	*2.93*	*3.42*

After improving the course material an improvement was seen in the following year application of the rubric.

Assessment Planning

Questions which assessment helps address (Walvoord 2004):

- We are spending time and resources trying to achieve student learning – is it working?
- When we claim to be graduating students with qualities like "critical thinking" or "scientific literacy", do we have evidence of our claims?
- We have the impression that our students are weak in areas X – would more systematic research back up this impression and help us understand the weaknesses more thoroughly?
- When we identify a weakness in our students' learning, how can we best address the problem?
- How can we improve learning most effectively in a time of tight resources?

Steps which underlie the assessment of student learning (Allen 2004):

1. Develop learning objectives
2. Check for alignment between the curriculum and the objectives
3. *Develop an assessment plan*
4. Collect assessment data
5. Use results to improve the program
6. Routinely examine the assessment process and correct, as needed

Key to success: *don't skip one of these steps.* Information related to Step #3 is presented in the material below.

Components of an Assessment Plan (Allen 2004)

Learning Objectives	***How is this objective aligned with the curriculum?***	***How will this objective be assessed?***	***Who will be involved in the assessment?***	***A summary of what was learned about each objective and the impact of these findings could go in this column to provide a written record of the assessment activities***
Objective #1	*Entries in this column identify courses and other aspects of the curriculum that help students master each objective*			
Objective #2				
Etc.				

A good assessment program does the following (Palomba and Banta 1999):

- Asks important questions
- Reflects institutional mission
- Reflects programmatic goals and objectives for learning
- Contains a thoughtful approach to assessment planning
- Is linked to decision making about curriculum
- Is linked to processes such as planning and budgeting
- Encourages involvement of individuals from on and off campus
- Contains relevant assessment techniques
- Includes direct evidence of learning
- Reflects what is known about how students learn
- Shares information with multiple audiences
- Leads to reflection and action by faculty, staff, and students
- Allows for continuity, flexibility, and improvement in assessment

Successful assessment requires (Palomba and Banta 1999):

- Guidelines to clarify the purposes and intended uses of assessment:
  - The purpose of assessment is improvement of educational programs
  - Assessment of student learning is a collaborative process involving faculty, staff, and students
  - Assessment results will not be used for faculty or staff evaluation
  - The assessment process will itself be evaluated
- Making choices about how to organize for assessment
  - Key players, committees, and structures must be identified before assessment can begin
  - Assessment committees can help
  - Departmental assessment coordinators can help
  - Central assessment offices provide continuity and support – typically acting as facilitators and consultants rather than as monitors of assessment
- Articulating *goals* and *objectives* for learning – statements about the intended results of educational activities provide the basis for assessment. A consensus is needed in regard to the statements of intended *outcomes*:
  - Accrediting bodies may establish such standards
  - Course syllabi may contain elements used to prepare program outcomes
  - Learning objectives 'matrix' can be useful
- Developing meaningful assessment plans
  - Planning may occur at the institutional, division, and department levels
  - Institutional planning may be involved with general education assessment, campus-wide assessment activities, and establishing requirements for unit plans
  - Elements of an assessment plan – should include such things as purpose for assessment, methods that will be used, the timeline for administration, the framework for using the assessment information, and provisions for administering the plan. Assessment plan <u>outline</u>:
    - *Departmental Goals* – describe what the department intends to accomplish, how the department's goals relate to campus mission, and purposes for assessment
    - *Learning Objectives* – describe what students must know, do, and value
    - *Techniques and Target Groups* – indicate how you will determine whether learning objectives have been met, including methods, target groups, and any impact on students
    - *Time Line* – indicate when data will be collected and analyzed, when reports will be available, and when recommendations will be made
    - *Provisions for Administration* – indicate who has responsibility for seeing the plan is carried out, who will conduct and analyze data, and who will summarize/report results
    - *Use of Information* – describe provisions for sharing information with internal and external audiences, and for making recommendations and decisions
    - *Assessment Evaluation* – indicate how the assessment program itself will be evaluated

Program or Course Assessment Planning Matrix* (Allen 2004)

Objectives	Performance Criteria	Implementation Strategy	Assessment Methods	Timeline	Feedback
What should your students know and be able to do?	How will you know the objective has been met? What level of performance meets each objective?	What learning activities will help students meet each objective?	What assessment methods will you use to collect data? How will you interpret and evaluate the data?	When will you collect data?	Who needs to know the results? How can you improve your program/course and your assessment process?
Objective 1					
Objective 2					
Etc.					

*Modified from Olds, Barbara & Miller, Ron (1998). "An Assessment Matrix for Evaluating Engineering programs", *Journal of Engineering Education*, April p. 175-178.

The Three Basic Steps of Assessment (Walvoord 2004)

1. Articulate learning goals/objectives
   "When students complete this [course, major, gen-ed program] we want them to be able to…."
2. Gather information about how well students are achieving the goals/objectives and why
3. Use the information for improvement

<u>The Basic, No-Frills Departmental Assessment Plan</u> (Walvoord 2004)

1. Learning goals/objectives
2. Two measures:
   a. One direct measure
      i. Review of senior work by faculty teaching seniors
      ii. If students take a licensure or certification exam, this will be added as a second direct measure
   b. One indirect measure
      i. Senior student surveys and/or focus groups asking three questions:
         1. *How well did you achieve each of the following departmental learning goals?* (use scale such as "extremely well, very well, adequately well, not very well, not at all")
            [List each department goal/objective, with scoring scale for each]
         2. *What aspects of your education in this department helped you with your learning, and why were they helpful?*
         3. *What might the department do differently that would help you learn more effectively, and why would these actions help?*
      ii. Second choice: Alumni surveys
      iii. In some fields, job placement rates will be important
3. Annual meeting to discuss data and identify action items

Assessment plan template addresses the following (Suskie 2004):

- Key learning outcome: *What should students be able to do <u>after</u> completing the program?*
- For this outcome, *through what courses/assignments will you ensure that all students have the opportunity to learn this?*
- In these courses/assignments, *how will you assess how well your students are learning this?*
- For this assessment technique, *when do you expect to begin collecting the assessment information?*
- For the information collected, *how often will you collect this assessment information?*
- Summarize the results of your assessments: *What have you learned about how well you are achieving this goal?*
- *How have you used this information to help students?*

Questions to consider when establishing or evaluating an assessment program (Huba and Freed 2000):

- *Does assessment lead to improvement so that the faculty can fulfill their responsibilities to students and to the public?* Two purposes for assessment: the need to assess for accountability and the need to assess for improvement – they lead to two fundamentally different approaches to assessment.
- *Is assessment part of a larger set of conditions that promote change at the institution?* Does it provide feedback to students and the institution? Assessment should become integrated into existing processes like planning and resource allocation, catalog revision, and program review.
- *Does assessment focus on using data to address questions that people in the program and at the institution really care about?* Focusing on questions such as
  What do we want to know about our students' learning?
  What do we think we already know?
  How can we verify what we think we know?
  How will we use the information to get to make changes?
  allows use of the data for improved learning in our programs.
- *Does assessment flow from the institution's mission and reflect the faculty's educational values?* The mission and educational values of the institution should drive the teaching function of the institution.
- *Does the educational program have clear, explicitly stated purposes that can guide assessment in the program?* The foundation for any assessment program is the faculty's statement of student learning

outcomes describing what graduates are expected to know, understand, and be able to do at the end of the academic program – *When we are clear about what we intend students to learn, we know what we must assess.*

- *Is assessment based on a conceptual framework that explains relationships among teaching, curriculum, learning, and assessment at the institution?* The assessment process works best when faculty have a shared sense of how learning takes place and when their view of learning reflects the learner-centered perspective.
- *Do the faculty feel a sense of ownership and responsibility for assessment?* Faculty must decide upon the intended learning outcomes of the curriculum and the measures that are used to assess them – this assessment data must then be used to make changes that are needed to strengthen and improve the curriculum. Assessment may be viewed as the beginning of conversations about learning.
- *Do the faculty focus on experiences leading to outcomes as well as on the outcomes themselves?* In the learner-centered paradigm, the curriculum is viewed as the vehicle for helping students reach our intended learning outcomes – assessment results at the program level provide information on whether or not the curriculum has been effective.
- *Is assessment ongoing rather than episodic?* Assessment must become part of standard practices and procedures at the institution and in each program.
- *Is assessment cost-effective and based on data gathered from multiple measures?* No one assessment measure can provide a complete picture of what and how students are learning – both direct and indirect measures should be used.
- *Does assessment support diversity efforts rather than restrict them?* Assessment data help us understand what students are learning, where they are having difficulty, and how we can modify instruction and the curriculum to help them learn better – the process helps populations of non-traditional students.
- *Is the assessment program itself regularly evaluated?* Ongoing evaluation of assessment efforts helps maximize the cost-effectiveness of assessment in that faculty and student efforts are used productively.
- *Does assessment have institution-wide support? Are representatives from across the educational community involved?* Administrators should play two key roles – that of providing administrative leadership and that of providing educational leadership.

Matrix for Assessment Planning, Monitoring, or Reporting (Huba and Freed 2000)

Intended Outcome = intended learning outcomes of the program	**Relevant Experiences** = courses, practica, internships, labs, etc. that the faculty provide to help students reach the learning goal	**Meaures** = measure(s) faculty have identified or developed to assess each learning goal	**Results** = summary of results obtained from administering the measures	**Changes Based on Results** = list of changes that have been made based on the results	**Stakeholders Informed** = stakeholders who have been informed about the process
Architecture students should be aware of the values, behaviors, and traditions of diverse cultures and individuals	*Courses 221, 223 Study Abroad semester*	*External examiners* *Senior diploma project review*	*" … exceptional strength … a model program in this regard"* *Favorable review*	*None*	*Students, alumni*
Etc.					

Perspectives for assessment – what questions will the assessment aim to answer? (Suskie 2004)

- *Standards-based*: Are your students meeting your standards? Standards-based (= competency-based = criterion-based) compares a student's score against an established standard.
  Approach:
    - Design your assessment to collect information at a suitable point in the course or program
    - Determine the standard: what level of performance is 'good enough'
    - Compare your findings against that standard
- *Benchmarking*: How do your students compare to peers? Benchmarking (= peer-referenced = norm-referenced) compares a student's score against the scores of his peers.
  Approach:
    - Design your assessment to collect information at an appropriate point in the course or program
    - Identify appropriate peers
    - Collect comparable information from those peers
    - Compare your findings against those of your peers
- *Best –practice*: How do your students compare to the best of their peers? Best-practice (= best-in-class) compares your results against the best of your peers.
- *Value-added*: Are your students improving? Value-added (= growth = change = improvement = pre-post) compares the student's performance against his/her performance when he entered. This is important if desiring to document that a course or program yields significant gains in student learning.
- *Longitudinal*: Is your program improving? Longitudinal compares current students against peers in prior classes; differs from value-added in that it looks at changes in successive groups of students rather than change within one group or one student.
  Approach:
    - Design your assessment so that the same assessment is given to successive groups of students
    - Determine the change in successive groups of students
- *Capability*: Are your students doing as well as they can? Capability (= potential) compares assessment results against what your students are capable of doing. Helpful for understanding 'outliers' – those students whose capabilities are significantly above or below those of typical students.

Institution-wide planning suggestions (Walvoord 2004):

- Embed Assessment into high-energy and high-stakes processes
    - Require assessment as part of cyclical review of departments and programs
    - Begin strategic planning with assessment
    - Embed assessment of learning into a new institutional initiative such as retention, technology, distance learning, or learning communities
    - Embed assessment of student learning into evaluation of teaching
    - Embed assessment into general education curriculum reform
    - Require assessment as part of departmental requests for new money or new faculty
- Appoint a coordinator and a committee
    - The coordinator may be an associate or assistant provost, a faculty member with released time, or a recent retiree who still knows the institution well. The coordinator should possess:
        - Thorough knowledge of the institution
        - The respect of faculty and administrators
        - Excellent organization, communication, and leadership skills
    - The coordinator's tasks:
        - Become thoroughly knowledgeable about assessment and use that knowledge to inform others
        - Take the lead in planning and implementing actions
        - Chair the assessment committee
    - The committee's tasks:
        - Understand what is being asked by external audiences
        - Conduct a campus audit to discover what assessment is already taking place
        - Recommend actions to enhance assessment and student learning
        - Recommend the ongoing bodies that will be needed to implement those actions

        - Continue to monitor the quality of the assessment of learning that is embedded in campus structures and processes
        - Membership should include:
            - Someone who is good at "big picture" thinking and planning
            - A good ethnographer or social science researcher who understands how to gather information about cultures
            - Someone from Institutional Research who is familiar with the instruments, data, and methods of analysis being used
            - Representatives from Student Affairs as well as the academic side
            - A representative sample of powerful, well-respected, knowledgeable faculty who know the campus culture well and who represent major colleges or schools
            - Someone who has been involved in professional accreditation such as nursing, engineering, or business
            - Representative graduate and undergraduate students who have been active in gathering the data and evidence that supported student requests for change
- Analyze Task, Audience, and Purposes
    - Understanding your task: The committee's first task is to understand exactly what you are being asked to do and what you are not being asked to do.
        - Report and recommend strategies to improve assessment mechanisms;
        - Vs. Analyze assessment data and recommend ways to improve student learning
    - Analyzing audiences and purposes: Determine all potential audiences for the assessment information you gather; i.e., "Who needs to know what, for what?".
- Articulate University-wide learning goals
    - After analyzing task, audiences, and purposes, the committee should begin analyzing how the campus implements the three steps of assessment:
        - Articulating learning goals
        - Using appropriate measures to gather data
        - Using data for improvement
    - Begin by analyzing written institutional mission and goal statements and making any needed adjustments to allow them to serve as the basis for assessment
        - *"When students graduate from out institution, we want them to be able to _____"*
        - These may be reframed as learning goals *"Students will …"*
    - Choose workable goals for assessment rather than rewrite the institution's mission; i.e.,
        - *"Upon graduation, students will demonstrate effective writing skills."*
        - *"Upon graduation, students will demonstrate effective quantitative reasoning skills."*
        - *"Upon graduation, students will demonstrate that they can think critically about issues and arguments presented in the humanities."*
- Conduct an Assessment Audit
    - Find out what assessment is already occurring, or being planned and desired, in the institution
    - List all the places where you think assessment may be happening. Examples:
        - Departments as they review data and make decisions about curriculum, staffing, equipment
        - Professional accreditation in disciplines such as engineering
        - Program review of departments every seven years
        - Current university-wide strategic planning process
        - Student Affairs office
        - Writing Program
        - Office of Institutional Research
        - Centers for women, multicultural, international, and other groups
        - Career placement
        - Graduate school
        - Student government
        - Teaching/Learning Center
        - Administrators of learning communities or similar programs
        - Service learning center

        - International studies
        - First-year student support services
        - Etc.
    - Gather and analyze data about assessment to determine what kind of assessment is occurring, how it is being used, how it might be used, and what kinds of assessment people want in each of these places.
- Recommend actions to strengthen assessment
    - The audit process helps you examine all the ongoing institutional processes with an eye to the role of assessment within them and to take steps to strengthen assessment as part of these vital processes.
    - *"What questions about students' learning are most important to the institution and to your constituencies, and what institution-wide data should we be gathering to address those questions?"* Examples:
        - Retention and graduation statistics
        - Placement in jobs or further schooling
        - Student perceptions of their own learning
        - Student scores on standardized tests of critical thinking or some other quality
        - Measures of behavior that research has been shown to be linked to learning; e.g., NSSE
        - Data on campus-wide teaching practices or attitudes that research has shown may be linked to greater student learning: practices such as active learning, the amount of writing that teachers assign and comment on, or the percentage of students involved in faculty research.
        - Portfolios of student work evaluated by faculty
        - Random samples of student work
        - Faculty surveys asking them to reflect their observations of students' strengths and weaknesses

A Sample Assessment Plan for a Single Learning Outcome

Based on material from Colorado State University, a sample assessment plan for a single learning outcome is presented below:

PROGRAM IMPROVEMENT RESEARCH PLAN

College: **Liberal Arts**
Department/Unit: **Journalism & Tech. Communication**
Program: ***BA Technical Journalism***
Contact Person: **JOHN SMITH**
Contact Phone: **860-555-1212**

General Plan Information	
Institutional Mission Linkages:	This program supports in particular the land-grant mission of ANYU by promoting excellence in student learning, in research and scholarship, and in service and outreach to the community, the state, and beyond. The program creates, integrates, and disseminates knowledge contributing to productive lifelong roles for students and ultimately the betterment of the human condition.
Institutional Strategic Planning Linkages:	This program contributes to Key Strategy One, the undergraduate experience, notably through its commitment to enhancement of intellectual and professional development of communication knowledge of (1) its majors seeking media-related careers; and (2)to the ANYU undergraduate population through core courses addressing communication arts, sciences and practice. Key Strategy Two is addressed through the program's emphasis on information technology throughout its own curriculum, its interdisciplinary work across campus in IT, and its faculty research emphases on IT (also Key Strategy Eight).
College Planning Goals or Mission Statement Linkages:	This program links strongly with College of Liberal Arts objectives in "providing an understanding of people, their cultures . . . media, and arts," and "skills of critical thinking and communication." The program also works to strengthen "undergraduate and graduate teaching" and "foster and encourage significant research, scholarship, and creativity" and service to "the University, the academic disciplines of the liberal arts, and the community."

Program Purpose:	The program is concerned with communication principles and their application and effects in mass and specialized media. To fulfill this role, the program engages in: (1) Teaching, to examine with students the knowledge, skills, and values that may be useful in professional communication responsibilities; (2) Research and other forms of inquiry to help understand the nature, process, effects, and problems of communication, the media, and journalism education, and to test ideas that may help us achieve the goals we seek; (3) Interdisciplinary teaching and research and ANYU (especially related to science and technology communication), and (4) Service to the University, the professional media, academic organizations, and outreach to the public and media/communication constituencies.
Program Improvement Research Administration:	Program improvement research will be administered by the departmental chair with departmental committee oversight as appropriate under the Departmental Code.

Outcome 1
Student Learning/Development

Description & Methodology

Outcome

Outcome One: Students will demonstrate appropriate knowledge and use of communication theory and research principles to guide the selection of communication audiences, message content and format, and media channels to enhance communication impact. Program components aimed at this outcome include: (1) Knowledge of the role of communication and information dissemination in society, including First Amendment and related legal and ethical issues, and the rights and responsibilities of professional communicators; (2) Understanding of the appropriate applications of communication and related social science theory and research principles to professional communication activity; and (3) Ability to identify communication strategies for messages that inform, educate, and/or persuade audiences as appropriate.

Strategy

The program curriculum is structured to achieve this outcome by requiring (1) a freshman-level course focusing on the role of media in American democracy, impact of media on individuals and social institutions, comparative communications, and communication and diversity; (2) A Communication Law course emphasizing political speech, libel, privacy, copyright, information ownership and access, commercial speech, obscenity, and related issues; (3) a third required substantive course drawn from such areas as ethics, media effects, multiculturalism and communication, international communication and related areas. In addition, certain concentrations require parallel coursework, e.g. news-editorial students must take 6 to 9 credits of political science; technical-specialized concentration students must essentially minor in a science-technical specialization. Moreover, communication theory and research are interwoven into the more applied communication skills courses to demonstrate

Assessment Method(s)

The program currently has an integrated assessment approach for the required capstone course in each of the four concentrations (broadcast news and video, news-editorial, public relations, and technical-specialized communication. In each capstone, each student must present a portfolio of work appropriate to that concentration. The portfolio is evaluated in writing by at least two persons apart from the course instructor, typically another faculty member and a member of the professional media community. Each student also presents the portfolio orally to the evaluation team. A Likert-scale rating form with items particular to the concentration, in addition to more general and open-ended items, is used, with the same form used each semester across all capstone sections in a concentration. These forms are being reviewed to add more items on communication principles and theory; the review sessions will also add a more interactive exit form and interview for use by the student. A census survey of all majors at an earlier point in their coursework is also being designed, as is an alumni survey with the assistance of our Alumni Advisory Board. The overall method measures multiple learning components, enabling the faculty committee to determine patterns and identify low and high performing areas for added analysis and interpretation. Faculty drawn from each of the four concentrations will review analyses pertinent to their areas, arrive at conclusions, and present those conclusions to the faculty curriculum committee for policy recommendations.

Expected Performance Level

General faculty expectations for student performance have been developed within each concentration, but not across all. These will be developed more clearly in early spring 2003 within and across concentrations, with end-of-Spring 2003 assessments providing baseline data. Approximately 80 students complete capstone courses each semester.

Results & Planning

Data Summary & Evaluation

Data Summary & Evaluation

Departmental data were gathered on student portfolios during the last two weeks of spring semester 2004 on students in capstone courses: JT450 for public relations (n = 36 students), JT440 for television news and video communication (n = 22), JT420 for news-editorial (n = 24), and JT465 for specialized/technical communication (n = 12). In each of the capstones reviewed, a media professional paired with a departmental faculty member other than the course instructor for the review session, which typically lasted 30 to 40 minutes per student. Students orally described their portfolio products as reviewers examined them, asked appropriate questions, and independently filled out rating sheets including open-ended comments and advice. These rating sheets were given to the instructor and taken into account in course grading. They were then given to the evaluator. In addition, in all four capstone courses offered, the College of Liberal Arts Graduation Surveys were distributed and completed by each course just prior to the end of the semester. An additional list of questions pertaining to Outcomes One and Two were added to this survey. Individual surveys and summary data were reviewed by the evaluator.

All data gathered presented an arguably positive view of student accomplishment and program effectiveness, with quite few (less than 10%) instances of shortcomings in either. Mean scores across indicators in the two capstones reviewed were in the upper quintile of possible scores, e.g. above 4.0 on a 5-point scale, the same as in the previous assessment cycle. For JT440, the a new instructor used an extensive open-ended questionnaire format, not allowing comparable scoring. This will be rectified in the future. However, it was clear from the open-ended comments that the perceptions of the reviewers were uniformly high. As previously, scores on some individual attributes do assist capstone instructors to vary content emphases or techniques, but those are individual decisions based upon specific courses rather than programmatic issues at this point. Indeed, the differences in mean scores on individual course attributes was inconsequential from Spring 2003 to Fall 2003 to Spring 2004, nowhere approaching significance.

On the other hand, the baseline data called for by the objectives specified for Outcome 1 should provide more useful programmatic benchmark indicators. Items are indicated below with mean scores as called for.

Responses were uniformly positive, with fewer than 10% “disagree” and no “strongly disagree” on any one item. Specifically, the items in brief and mean scores (“Strongly Agree” = 5, “Strongly Disagree” =1) reflecting Outcome One objectives were:

1. I have adequate knowledge of role of communication and information dissemination in society, including First Amendment and related legal and ethical issues, and the rights and responsibilities of professional communicators. Mean = 4.1 (vs. 3.9 in Fall 2003)
2. I understand understanding the applications of communication principles and theories to professional communication skills and activities: Mean = 4.2 (vs. 4.1 in Fall 2003)
3. Ability to identify communication strategies for messages that inform, educate and/or persuade audiences as appropriate: Mean = 4.5 (vs. 4.1 in Fall 2004).

We would like to say that the comparisons with Fall 2004 suggest at the least positive consistency, with some slight but not statistically significant improvements. However, an important caveat enters in here: Due to a printing error, an inappropriate response scale was entered for the questions asked in Fall 2004, i.e. the questions were posed under the rubric “How good a job do you think the courses that you took in your major:” , but the response categories were identified as being from “Strongly Agree” to “Strongly Disagree” on a five-point index. The gaffe was not confusing enough so that all students did not respond, but obviously on the next round the metric will be changed to “Excellent, very well...” etc., which will not allow direct comparisons with this semester’s data.

The baseline census survey began with a pre-test across all students in a required sophomore course (JT210 Newswriting). That instrument is under supplemental materials, appears to have worked well based upon preliminary analyses of results and inquiries made of students, and will be repeated to the larger population in fall 2004.

Program Improvements

The evaluation data are still such that after a year we are hesitant to pursue meaningful longitudinal interpretations of the. However, the positive consistency is highly encouraging. The development of the items above, and open-ended responses by students to the CLA and sophomore course questionnaires, has opened discussion of directions to emphasize in our program, and possible shortcomings in curricular structure. Two immediate outcomes have been formal discussions initiated by the chair among members of the faculty with public relations interests as to how to better manage a smoother flow among those courses, with less duplication. Similar discussions were held among instructors of courses emphasizing media technology over the same basic issues. Those will continue. How to more effectively integrate the concentrations without losing the distinctive elements of each has been discussed as well. We obviously await further data beyond what are still early efforts, however. In addition, the department this year is undergoing its six-year accreditation review by the Accrediting Council on Education in Journalism and Mass Communication. These assessments are being included in that review, and we await further comments from the accrediting body as to interpretation of them for accreditation purposes.

Supplemental Materials

JT440 Video Concentration *Portfolio Evaluations*
JT450 PR Concentration *Portfolio Evaluations*
JT450 PR Concentration p2 *Student Overall Evaluation*
JT465 Tec Concentration p1 *Portfolio Evaluations*
JT465 Tech Concentration P2 *Student Overall Evaluation*
JT465 Tech Concentration P3 *Student Overall Evaluation*
JTC Student Survey *Student Survey*

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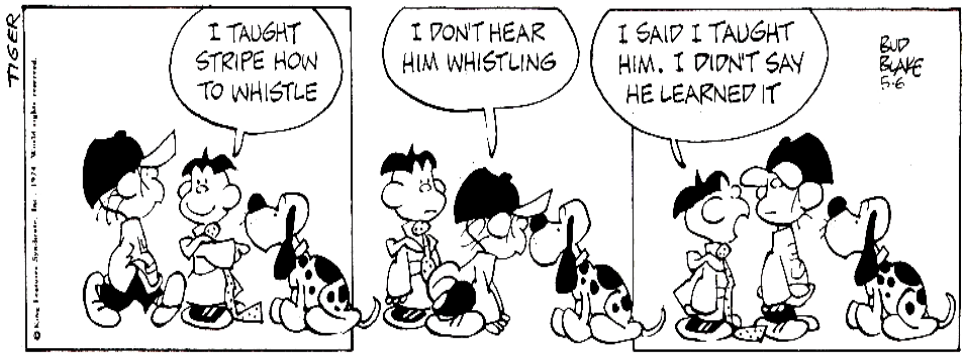


APPENDIX – American Association for Higher Education (AAHE) Principles of Good Practice for Assessing Student Learning

[The AAHE Principles and *comments* on each, as presented in Banta, Lund, Black, and Oblander, 1996, are given below.]

9 Principles of Good Practice for Assessing Student Learning

Authors: Alexander W. Astin; Trudy W. Banta; K. Patricia Cross; Elaine El-Khawas; Peter T. Ewell; Pat Hutchings; Theodore J. Marchese; Kay M. McClenney; Marcia Mentkowski; Margaret A. Miller; E. Thomas Moran; Barbara D. Wright

a. **The assessment of student learning begins with educational values.** Assessment is not an end in itself but a vehicle for educational improvement. Its effective practice, then, begins with and enacts a vision of the kinds of learning we most value for students and strive to help them achieve. Educational values should drive not only what we choose to assess but also how we do so. Where questions about educational mission and values are skipped over, assessment threatens to be an exercise in measuring what's easy, rather than a process of improving what we really care about.

   - *The college mission must be understood not just by the school's faculty and staff but also by its students and the community it serves. Assessment must be based on that which is truly important.*

b. **Assessment is most effective when it reflects an understanding of learning as multidimensional, integrated, and revealed in performance over time.** Learning is a complex process. It entails not only what students know but what they can do with what they know; it involves not only knowledge and abilities but values, attitudes, and habits of mind that affect both academic success and performance beyond the classroom. Assessment should reflect these understandings by employing a diverse array of methods, including those that call for actual performance, using them over time so as to reveal change, growth, and increasing degrees of integration. Such an approach aims for a more complete and accurate picture of learning, and therefore firmer bases for improving our students' educational experience.

   - *Successful assessment techniques embody creativity, adaptability, reliability, and validity. Through the use of multiple methods, triangulation, and the measurement of knowledge and performance over time, effective assessment techniques can begin to capture and reflect the complex nature of learning.*

c. **Assessment works best when the programs it seeks to improve have clear, explicitly stated purposes.** Assessment is a goal-oriented process. It entails comparing educational performance with educational purposes and expectations -- those derived from the institution's mission, from faculty intentions in program and course design, and from knowledge of students' own goals. Where program purposes lack specificity or agreement, assessment as a process pushes a campus toward clarity about where to aim and what standards to apply; assessment also prompts attention to where and how program goals will be taught and learned. Clear, shared, implementable goals are the cornerstone for assessment that is focused and useful.

   - *Assessment is most effective when it is based on clear and focused goals and objectives. It is from these goals that educators fashion the coherent frameworks around which they can carry out inquiry. When such frameworks are not constructed, assessment outcomes fall short of providing the direction necessary to improve programs.*

d. **Assessment requires attention to outcomes but also and equally to the experiences that lead to those outcomes.** Information about outcomes is of high importance; where students "end up" matters greatly. But to improve outcomes, we need to know about student experience along the way -- about the curricula, teaching, and kind of student effort that lead to particular outcomes. Assessment can help us understand which students learn best under what conditions; with such knowledge comes the capacity to improve the whole of their learning.

   - *Effective assessment strategies pay attention to process. Educational processes are essential to the attainment of an outcome. Successful assessment practitioners understand that how students get there matters.*

e. **Assessment works best when it is ongoing not episodic.** Assessment is a process whose power is cumulative. Though isolated, "one-shot" assessment can be better than none, improvement is best fostered when assessment entails a linked series of activities undertaken over time. This may mean tracking the process of individual students, or of cohorts of students; it may mean collecting the same examples of student performance or using the same instrument semester after semester. The point is to monitor progress toward intended goals in a spirit of continuous improvement. Along the way, the assessment process itself should be evaluated and refined in light of emerging insights.

- *Assessment strategies must be continually nurtured, evaluated, and refined in order to ensure success.*

f. **Assessment fosters wider improvement when representatives from across the educational community are involved.** Student learning is a campus-wide responsibility, and assessment is a way of enacting that responsibility. Thus, while assessment efforts may start small, the aim over time is to involve people from across the educational community. Faculty play an especially important role, but assessment's questions can't be fully addressed without participation by student-affairs educators, librarians, administrators, and students. Assessment may also involve individuals from beyond the campus (alumni/ae, trustees, employers) whose experience can enrich the sense of appropriate aims and standards for learning. Thus understood, assessment is not a task for small groups of experts but a collaborative activity; its aim is wider, better-informed attention to student learning by all parties with a stake in its improvement.

- *Successful assessment is dependent upon the involvement of many individuals – each person contributes his or her knowledge, expertise, and perspectives, thereby enhancing the overall assessment program. Assessment therefore works best when it is conceptualized as a group effort.*

g. **Assessment makes a difference when it begins with issues of use and illuminates questions that people really care about.** Assessment recognizes the value of information in the process of improvement. But to be useful, information must be connected to issues or questions that people really care about. This implies assessment approaches that produce evidence that relevant parties will find credible, suggestive, and applicable to decisions that need to be made. It means thinking in advance about how the information will be used, and by whom. The point of assessment is not to gather data and return "results"; it is a process that starts with the questions of decision-makers, that involves them in the gathering and interpreting of data, and that informs and helps guide continuous improvement.

- *Successful assessment programs know how to use data. Assessment makes a difference when meaningful data are collected, connected, and applied creatively to illuminate questions and provide a basis for decision making. Only then can data guide continuous improvement.*

h. **Assessment is most likely to lead to improvement when it is part of a larger set of conditions that promote change**. Assessment alone changes little. Its greatest contribution comes on campuses where the quality of teaching and learning is visibly valued and worked at. On such campuses, the push to improve educational performance is a visible and primary goal of leadership; improving the quality of undergraduate education is central to the institution's planning, budgeting, and personnel decisions. On such campuses, information about learning outcomes is seen as an integral part of decision making, and avidly sought.

- *Successful assessment is directed toward improvements. Those improvements may occur in teaching, student learning, academic and support programs, or institutional effectiveness. The bottom line is that assessment information must be applied systematically toward improvements if it is to have a lasting impact on the institution.*

i. **Through assessment, educators meet responsibilities to students and to the public**. There is a compelling public stake in education. As educators, we have a responsibility to the publics that support or depend on us to provide information about the ways in which our students meet goals and expectations. But that responsibility goes beyond the reporting of such information; our deeper obligation -- to ourselves, our students, and society -- is to improve. Those to whom educators are accountable have a corresponding obligation to support such attempts at improvement.

- *Effective assessment programs measure outcomes and then inform their many publics of the ways in which campus programs and services positively affect students, the community, and society. Assessment, then, is an important component in demonstrating institutional accountability.*

Additional principle put forward by Banta, Lund, Black, and Oblander, 1996:

j. ***Assessment is most effective when undertaken in an environment that is receptive, supportive, and enabling.*** More specifically, successful assessment requires an environment characterized by effective leadership, administrative commitment, adequate resources, faculty and staff development opportunities, and time.

- *Without a supportive environment, most assessment efforts will fail to take root and grow.*

APPENDIX – Academic Audit Questions for Faculty Discussion

Based on:

- "Academic Audits: Program Reviews of the Future, Minus Audit Trails", by Cynthia Burnley, William Kirkwood, William Massy, and Janice VanDyke, 2005 IUPUI Assessment Institute

The following questions are designed to help faculty examine the processes by which you are pursuing your goals for student learning in a program of study. Although most of these questions seem to call for "Yes" or "No" answers, they are meant to prompt wider discussions.

If you answer "Yes" to a question, your self-study should briefly describe the "Who, What, When, Where, and How" of that answer. If you answer "No," the self-study should discuss whether you wish to improve in this regard and how you plan to do so.

Learning Objectives

- Have we explicitly defined what we want students who complete our program to know and be able to do? (e.g., as employees, as graduate students, as citizens)
- Do we work collaboratively to define program learning objectives, or is the task delegated to one or a few individuals?
- Do we consult sources beyond our own faculty when defining program learning objectives? (e.g., employers, students or graduates, comparable programs in other institutions, professional associations)
- Do we communicate program learning objectives to students, employers or other stakeholders?
- Do we periodically review program learning objectives to see how they might be improved?
- (See also questions in the remaining focal areas on how we use program learning objectives.)

Curriculum and Co-curriculum

- Do we consciously design the curriculum and co-curriculum to achieve program learning objectives?
- Do we work collaboratively to design the curriculum and co-curriculum, or do they reflect our individual preferences or decisions?
- Do we consider out-of-classroom activities that could complement or be integrated into the curriculum?
- Do we consult sources beyond our own faculty when designing the curriculum and co-curriculum? (e.g., employers, students or graduates, comparable programs in other institutions, professional associations)
- Do we clearly communicate curricular and co-curricular requirements and the reasoning behind these requirements to students?
- Do we periodically review the curriculum and co-curriculum to see how they might be improved?

Teaching and Learning Methods

- Do we consciously consider program and course learning objectives when deciding which teaching methods we will use in our courses?
- Do we discuss our teaching practices with each other and work collaboratively to improve teaching and learning, or is teaching primarily an individual responsibility?
- Do we consult sources beyond our own faculty when selecting our teaching practices? (e.g., employers, students or graduates, comparable programs in other institutions, professional associations)
- Do we identify best practices in teaching and use this information to improve our teaching?
- Do we periodically review our teaching methods to see how they might be improved?

Student Learning Assessment

- Are we measuring the degree to which our students are achieving program learning objectives?
- Do we work collaboratively to develop and implement assessments of program learning objectives, or are these tasks delegated to one or a few individuals?
- Do we consult sources beyond our own faculty when designing assessments of program learning objectives? (e.g., employers, students or graduates, comparable programs in other institutions, professional associations)
- Do we discuss assessment data and use our findings to improve our curriculum, co-curriculum and teaching practices?
- Do we identify best practices in assessment of program learning objectives and use this information to improve our assessments?
- Do we periodically review our assessment methods to see how they might be improved?

Quality Assurance

- How do we assure ourselves that each course in the curriculum addresses agreed upon content, that sound teaching practices are carried out appropriately and consistently, that assessments are conducted as planned, and that agreed upon plans to improve courses or the program as a whole are implemented by those responsible?
- How do we assure ourselves that other faculty activities affecting students, such as academic advisement, are being performed appropriately and consistently?
- Do we provide meaningful, timely feedback and recognition to faculty regarding how they are performing work related to the curriculum, teaching and learning, assessment, and other practices affecting students?
- Do we identify best practices in quality assurance and use this information to improve how we assure that the work of the program is performed appropriately and consistently?
- Do we periodically review our quality assurance practices to see how they might be improved?

APPENDIX – The Outcomes Pyramid and Definitions of Terminology

Based on work by Charlie Yokomoto and David Bostwick at IUPUI
(see http://www.engr.iupui.edu/assessment/Outcomespyramid.htm)

With additional material from:

- Personal conversation with Charlie Yokomoto
- Material by Shirley Lesch at George Brown College
- Material by Mark Battersby at Capilano College
- Material at the University of Tasmania
- Fulks, Janet, "Assessing Student Learning in Community Colleges", Bakersfield College, 2004

The assessment literature is full of terminology such as "mission", "goals", "objectives", "outcomes", etc. but lacking in a consensus on a precise meaning of each of these terms. Part of the difficulty stems from changes in approaches to education – shifts from *objective*-based, to *competency*-based, to *outcomes*-based, etc. education have taken place over the years with various champions of each espousing the benefits of using a different point of view. As a result, some of the terminology associated with student learning outcomes may appear to an "assessment newcomer" as confusing, and, at times, contradictory.

Regardless of which frame of reference is at the foundation of the approach to education involving student learning outcome assessment, the notion of a 'pyramid' whereby more general statements about the mission/goals of a program for student learning are supported by more detailed or specific statements of program/course student learning objectives/outcomes is a good building block to use in trying to come to grips with assessment terminology.

The Outcomes Pyramid shown below presents a pictorial clarification of the ***hierarchical*** relationships among several different kinds of goals, objectives, and outcomes that appear in assessment literature.

The 'pyramid' image is chosen to convey the fact that increasing complexity and level of specificity are encountered as one moves downward. The pyramid structure also reinforces the notion that learning flows from the mission of the institution down to the units of instruction. As we will see, this pyramid is not intended as the definitive description of these terms, as some organizations have defined terms to meet their specific needs. It does, however, provide a general interpretation of common assessment terminology as will be elaborated upon below.

Outcomes Pyramid Definitions

Mission Statements of the University and School/College

A *Mission Statement* is a general, concise statement outlining the purpose guiding the practices of an institution or school/college. Accrediting bodies expect that student learning outcomes flow from the mission statements of the institution and school/college; i.e., the school/college mission should be in harmony with the mission statement of the institution.

Goals of the Program (or Department)

Goals are broad, general statements of what the program, course, or activity intends to accomplish. Goals describe broad learning outcomes and concepts (what you want students to learn) expressed in general terms (e.g., clear communication, problem-solving skills, etc.)

Goals should provide a framework for determining the more specific educational objectives of a program, and should be consistent with the mission of the program and the mission of the institution. A single goal may have many specific subordinate learning objectives.

Note: A single Department within a School may offer several Programs. Hence, at times a Department may have an overarching set of Goals which encompass all of the Program-specific goals. In dealing with student learning outcomes associated with a *program of study*, it is perhaps best not to confuse the 'organizational' side of the university (Department) with the 'academic' side (Program). Thus, in the Outcomes Pyramid the items below the Mission statements are meant to pertain to Programs and Courses. The Program is assumed to be one which is consistent with the mission of the organization within which it resides.

Objectives

Instructional *Objectives* describe in detail the behaviors that students will be able to perform at the conclusion of a unit of instruction such as a class, and the conditions and criteria which determine the acceptable level of performance.

Goals and *Objectives* are similar in that they describe the intended purposes and expected results of teaching activities and establish the foundation for assessment. *Goals* are statements about general aims or purposes of education that are broad, long-range intended outcomes and concepts; e.g., "clear communication", "problem-solving skills", etc. *Objectives* are brief, clear statements that describe the desired learning outcomes of instruction; i.e., the specific skills, values, and attitudes students should exhibit that reflect the broader goals.

There are three types of learning objectives, which reflect different aspects of student learning:

- Cognitive objectives: "*What do you want your graduates to know?*"
- Affective objectives: "*What do you want your graduates to think or care about?*"
- Behavioral Objectives: "*What do you want your graduates to be able to do?*"

Objectives can also reflect different levels of learning:

- Mastery objectives are typically concerned with the minimum performance essentials – those learning tasks/skills that must be mastered before moving on to the next level of instruction. These objectives tend to be very specific and limited in scope.
- Developmental objectives are concerned with more complex learning outcomes – those learning tasks on which students can be expected to demonstrate varying degrees of progress.

What are the differences between Goals and Objectives? Both goals and objectives use the language of outcomes – the characteristic which distinguishes goals from objectives is the level of specificity. Goals express intended outcomes in general terms and objectives express them in *specific* terms. Goals are written in broad, global, and sometimes vague, language. Objectives are statements that describe the intended results of instruction in terms of

specific student behavior. The two terms, objectives and outcomes, are often used interchangeably, however, resulting in confusion.

Outcomes

Learning Outcomes are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course or program. Learning Outcomes identify what the learner will know and be able to do by the end of a course or program – the essential and enduring knowledge, abilities (skills) and attitudes (values, dispositions) that constitute the integrated learning needed by a graduate of a course or program. Learning outcomes normally include an indication of the evidence required to show that the learning has been achieved and how that evidence is to be obtained.

The learning outcomes approach to education means basing program and curriculum design, content, delivery, and assessment on an analysis of the integrated knowledge, skills and values needed by both students and society. In this outcomes-based approach to education, the ability to demonstrate learning is the key point. This demonstration of learning involves a performance of some kind in order to show significant learning or learning that matters – knowledge of content must be manifested through a demonstration process of some kind.

This approach differs from more *traditional academic approaches* that emphasize coverage by its emphasis on:

- basing curriculum on what students need to know and be able to do as determined by student and societal needs not disciplinary tradition,
- focusing on what *students should be able to do* rather than merely what *knowledge they should possess* as a result of a course or program,
- making explicit the development and assessment of generic abilities.

It differs from *competency-based approaches* in its emphasis on integration and the development of more general abilities that are often overlooked in a competency approach. For example, competencies such as being able to punctuate correctly or know appropriate vocabulary must be recognized as subordinate to the learning outcome of writing and communicating effectively.

What are the differences between Objectives and Outcomes? Objectives are intended results or consequences of instruction, curricula, programs, or activities. *Outcomes* are achieved results or consequences of what was learned; i.e., evidence that learning took place. Objectives are focused on specific types of performances that students are expected to demonstrate at the end of instruction. Objectives are often written more in terms of teaching intentions and typically indicate the subject content that the teacher(s) intends to cover. Learning outcomes, on the other hand, are more student-centered and describe what it is that the learner should learn.

Objectives statements can vary in form and nature – they can range from general 'curriculum' objectives, to more specific 'learning' objectives, to even more specific 'behavioral' objectives. They may be expressed as intentions on the part of the lecturer (e.g., 'The objectives of this unit are to …'), or as desired outcomes ('By the end of this unit you should be able to….'). It is the latter form – the outcome statement – that has the most power in informing teaching and learning, whether it be called a 'learning outcome', 'learning objective', or some other name. An outcome statement clarifies intention. It is squarely focused on the learner and is performance-oriented, beginning with an action verb (e.g. 'demonstrate', apply' etc.) and signaling the desired level of performance. A learning outcome is thus an unambiguous statement of what the learner is expected to achieve and how he/she is expected to demonstrate that achievement.

The most common way of expressing educational aims in academic courses is in terms of the "course objectives". "Course objectives" and "learning outcomes" are often contrasted. Because there is no fixed meaning to the notion of course objectives, objectives commonly include statements about what the instructor intends to do ("provide a basic introduction to…", "expose the student to…") and statements about what both the instructor and student will do ("there will be daily class discussions") and often, outcome type statements about what the student should know or be able to do at the end of the course. A mixture of "instructional intentions", "inputs" and "learning outcomes" often results.

To some, objectives are teacher-focused; i.e., what the instructor hopes to accomplish. For example: This course is intended to

- Foster understanding of the nature of American democracy
- Demonstrate use of computer-aided drafting skills
- Develop an understanding of the importance of effective work-place communication

Here learning outcomes are viewed as student-focused; i.e., what a student is expected to know, or be able to do as a result of a course. For example: Upon successful completion of this course, the student should be able to

- Summarize in writing the five major causes of the French Revolution
- Make common social introductions using the Spanish language
- Identify the major organs of a laboratory frog
- Meet entry-level standards for employment as registered nurses

Learning outcomes are an essential part of any unit outline. A learning outcome is a clear statement of what a learner is expected to be able to do, know about and/or value at the completion of a unit of study, and how well they should be expected to achieve those outcomes. It states both the substance of learning and how its attainment is to be demonstrated.

Key to the learning outcomes approach to assessment is the use of "authentic assessment." The idea of authentic assessments is to create assignments and assessments that simulate as much as possible the situations in which students would make integrated use of the knowledge, skills and values developed in a course. By focusing assessment in this way, instructors emphasize their intention that students should be able to make use of their learning outside of class. Instructors need to ask themselves what kind of student performance would give them confidence that the student had understood and could apply the material learned.

An effective set of learning outcomes statements informs and guides both the instructor and the students:
For teaching staff: It informs:

- the content of teaching
- the teaching strategies you will use
- the sorts of learning activities/tasks you set for your students
- appropriate assessment tasks
- course evaluation.

For students: The set of learning outcomes provides them with:

- a solid framework to guide their studies and assist them to prepare for their assessment
- a point of articulation with graduate attributes at course and/or university (i.e. generic) level.

Effective learning outcomes statements should:

- identify important learning requirements (the 'content' of learning – the range and type of knowledge, skills and values required);
- state clear expectations - learners know what they have to do to demonstrate that they have achieved the learning outcomes;
- link to the generic and/or course graduate attributes;
- focus on results of the learning experiences;
- be achievable and assessable;
- relate to explicit statements of achievement (e.g., level of understanding required);
- reflect the desired end of the learning experience, not the means or the process;
- answer the question, "Why should a student take this course anyway?"

Learning Outcome statements may be broken down into three main components:

- an *action* word that identifies the performance to be demonstrated;
- a *learning statement* that specifies what learning will be demonstrated in the performance;
- a broad statement of the *criterion* or standard for acceptable performance.

For example:

ACTION WORD	LEARNING STATEMENT	CRITERION

(performance)	*(the learning)*	*(the conditions of the performance demonstration)*
Produces	documents	using word processing equipment
Analyzes	global and environmental factors	in terms of their effects on people

Examples of Goals, Objectives, and Outcomes

Goal	**Objective**	How this objective might be reformulated as a **Learning Outcome**
(Geology) To develop knowledge, understanding and skills related to the recognition and interpretation of igneous and metamorphic rocks.	To explain the different magma geochemistries derived from partial melting of the mantle in different tectonic regime.	Students should be able to demonstrate how magma geochemistry relates to partial melting of the mantle by contrasting the outcomes of this process in different tectonic regimes through the critical analysis of specific case studies.
(Biochemistry) To explain the biochemical basis of drug design and development.	To demonstrate the application of molecular graphics to drug design.	Students should be able to apply the principles underpinning the use of molecular graphics in the design of drugs to illustrate general and specific cases through a computer-based presentation.
(English) To introduce students to modes of satiric writing in the eighteenth century.	To familiarize students with a number of substantive eighteenth century texts. Students will be trained in the close reading of language and its relation to literary form.	Students should be able to analyze the relationship between the language of satire to literary form by the close examination of a selected number of eighteenth-century texts in a written essay.
(Engineering) This course introduces senior engineering students to design of concrete components of structure and foundation and the integration of them into overall design structures.	The student is able to function in teams.	Functioning as a member of a team, the student will design and present a concrete structure which complies with engineering standards.
(Geology) Become acquainted with topographic maps and their usage.	Use topographic maps and employ these maps to interpret the physiography and history of an area.	Students should be able to o Locate and identify features on topographic maps by latitude and longitude and township and range. o Contour a topographic map and construct a topographic profile. o Identify major landform features on topographic maps and relate them to basic geologic processes of stream, groundwater, glacial or marine erosion and deposition. o Interpret geologic maps and geologic cross-sections.
(Business) Introduce students to business communication	{Course level} The objective of this course is to expose [by instructor] students to the complex nature of business communications, consolidations of financial statements, international accounting issues, and accounting for partnerships	{Course level} At the end of this course, students will be able to • Identify and describe the most common forms of business communication • Consolidate financial statements as of the date of acquisition • Consolidate financial statements subsequent to the date of acquisition • Describe the formation and operations of partnerships

As shown in the Outcomes Pyramid above, there is very often an interconnection between Objectives and Outcomes at the program, course, and instructional unit levels. Teachers will modify objectives and outcomes based on the success of the delivery of the subject matter.

Below is an example based on material from Eastern Kentucky University Social Work program:

	instruction, service, and scholarship.
Program Mission/Goals	•
Program Objectives	1. Apply critical thinking skills within the context of professional social work practice. 2. Practice within the values and ethics of the social work profession and with an understanding of and respect for the positive value of diversity. 3. Demonstrate the professional use of self. 4. Understand the forms and mechanisms of oppression and discrimination and the strategies for change that advance social and economic justice. 5. Understand the history of the social work profession and its current structures and issues. 6. Apply the knowledge and skills of generalist social work practice with systems of all sizes. 7. Apply knowledge of bio-psycho-social, cultural, and spiritual variables that affect individual development and behavior, and use theoretical frameworks to understand the interactions among individuals and between individuals and social systems (i.e., families, groups, organizations, and communities). 8. Analyze the impact of social policies on client systems, workers, and agencies. 9. Evaluate research studies and apply findings to practice, and, under supervision, to evaluate their own practice interventions and those of other relevant systems. 10. Use communication skills differentially with a variety of client populations, colleagues, and members of the community. 11. Use supervision appropriate to generalist practice. 12. Function within the structure of organizations and service delivery systems, and under supervision, seek necessary organizational change. 13. Analyze the impact of violence on the psychological, social, cultural, and spiritual functioning of individuals, groups, organizations, communities, and society. 14. Apply understanding of the dynamics of violence when assessing and intervening with private trouble and public issues.Analyze the role of institutional and cultural violence in the creation and maintenance of social oppression and economic injustice.
SWK 358 (Child Abuse and Neglect) Course Objectives	• Students will learn the causes and effects of violence on the micro and macro levels. (Program Objectives 1, 4, 6, 7, 8, 13, 14, and 15) • Students will learn indicators and family dynamics of child neglect, physical abuse, sexual abuse, and emotional maltreatment. (Program Objectives 1, 7, 13, 14, and 15) • Students will be able to identify and describe the interaction between individual developmental stages and family developmental stages. (Program Objectives: 1 and 7) • Students will utilize the principles of empowerment and strength perspective as well as systems framework to understand how individuals in families communicate and develop. (Program Objectives: 2 and 7) • Students will learn the indicators and relationship dynamics of domestic violence as it relates to child abuse and neglect. (Program Objectives: 1, 6, 7, 13, 14, and 15) • Students will know reporting requirements for child abuse/neglect and spouse abuse/partner abuse and how to make such abuse/neglect reports. (Program Objectives 1, 6, 13, 14, and 15) • Students will learn the roles of primary professionals involved in domestic violence cases and summarize the effectiveness of the multidisciplinary approach. (Program Objectives: 1, 6, 7, 13, 14, and 15) • Students will be able to diagram the present structure of Public Child Welfare System and its relationship with other community partners. (Program Objectives: 5 and 8) • Students will gain knowledge of society's response to child/spouse maltreatment including current legislation. (Program Objectives: 1, 4, 8, 13, 14, and 15) • Students will learn systems issues contributing to violence and barriers impeding protection of victims. (Program Objectives: 1, 4, 5, 8, 13, 14, and 15) • Students will understand the social worker's intervention roles and responsibilities in abuse/neglect situations. (Program Objectives: 1 and 5) • Students will be able to explain the most effective treatment modalities for intervening in CPS abuse and neglect and domestic violence situations. (Program Objectives: 1, 2 and 7) • Students learn to identify the principles of advocacy for children and families. (Program Objectives: 1, 2, 4, 6, 8, 10 and 12) • Students will be able to restate the roles and functions of the multi-partners needed in the collaborative process necessary for the continuum of care provided to families. (Program Objectives: 1, 5, 10 and 12)Students will learn about the potential impact of cultural and ethnic background as it apples to family function and system response. (Program Objectives: 2, 4, 5, and 10)
SWK 358 (Child Abuse and Neglect) Course Outcomes	• Students should be able to list at least five indicators of child abuse/neglect, and five indicators of domestic violence. • Students should learn when and how to make a child or adult maltreatment report. • Students will know and be able to restate current legal responsibilities of the social worker in domestic violence and child maltreatment cases. • Students should be able to describe at least five resources and community partners available to assist child and adult victims in Kentucky. • Students will know and be able to relate at least three advocacy groups established to assist children and abused women. • Students will be able to identify at least three deleterious effects of maltreatment of children and women. • Students will be able to identify at least five treatment modalities. • Students will be able to plan case and class advocacy strategies on behalf of maltreated

	children and women. • Students will be able to identify strengths and weakness of Kentucky's child welfare system. • Students will be able to differentiate between at least three cultural practices and child maltreatmentStudents will be able to view family dynamics, strengths, and needs with cultural sensitivity.

Another example, based on material from California State University, Sacramento:

University Mission	*(Excerpt)* California State University, Sacramento • is an integral part of the community, committed to access, excellence and diversity. • is dedicated to the life-altering potential of learning that balances a liberal arts education with depth of knowledge in a discipline. • is committed to providing an excellent education to all eligible applicants who aspire to expand their knowledge and prepare themselves for meaningful lives, careers, and service to their community. • is committed to fostering in all its members a sense of inclusiveness, respect for human differences, and concern for others. In doing so, we strive to create a pluralistic community in which members participate collaboratively in all aspects of university life. • is committed to teaching and learning as its primary responsibility. • is dedicated to advancing the many social, economic, political, and scientific issues affecting the region and the state.
Program Mission	The Gerontology Program's mission is to prepare graduates to assume roles in diverse settings serving the older adult community throughout the region, state and nation, and to develop a clearly humanistic, ethical, responsible, and professional approach to the conduct of those roles.
Gerontology Program Goals	• provide an integrated interdisciplinary program of courses and field experiences that lead to a Bachelor of Science Degree with a major with a Major, Minor or Certificate in Gerontology. • prepare individuals for careers in varied gerontological practice areas based upon demographic projections of need for personnel in planning, administering, coordinating and delivering older adult services. • prepare gerontological practitioners who are aware of the effects of social policy on aging individuals and families. • facilitate students' progression from community colleges to the University when acquiring a B.S. degree in gerontology. • offer individuals currently working in the community opportunities to learn advanced skills and acquire professional training in gerontology. • enhance and strengthen the relationships between the Gerontology Program and Sacramento area agencies and institutions planning or delivering services for older person. • enhance the interest and commitment of faculty and the University and provide a vehicle for interdisciplinary study and research in the field of gerontology. • provide academic preparation for graduate study in Gerontology or other related fields.
Program Outcomes	• Demonstrate knowledge of the discipline of gerontology and its role in society. • Apply current theory and research in gerontology. • Use knowledge of reciprocal relationships among older adults, their families and society. • Use knowledge of the diversity of older adults in the American society. • Demonstrate socially-conscious behavior regarding the older population. • Acquire knowledge necessary for competent interdisciplinary gerontological practice. • Demonstrate critical thinking as a foundation for decision making. • Exhibit effective written, oral and interpersonal communication skills with individuals, caregivers, families, and staff. • Exhibit effective use of various sources of information needed for functioning in a global, information society.
GERO 101 Services for the Aging Course Goals	• Raise student awareness about the range of resources for older adults. • Provide students the opportunity to become familiar with community resources programs and services. • Demonstrate the multidisciplinary characteristics of a gerontological knowledge base. • Explore existing and potential careers in the field of aging and the aging continuum of services. • Contribute to the support of an older adult within the infra-structure of an agency in a service learning capacity.
GERO 101 Services for the Aging Course Objectives	Students will be able to: • Define the key factors involved in assessing the needs of older adults and the resources available to meet those needs. • Describe the structure and organization of senior services in the country through the Older Americans Act and in the Sacramento area. • Differentiate and discuss the realities of aging services and factors that deter utilization of services. • Describe the range of services available to meet the needs and challenges of the aged. • Identify social policy issues that affect the elderly. • Utilizing the service learning experience, students will explore own beliefs and feelings about health and illness with aging. • Explore responses to readings and class activities through journal writing.
GERO 101 Services for the Aging Class #1 Objectives	• Discuss and recognize the changing demographic patterns of the aging population. • Explore the unique demographic characteristics of the baby boom cohort versus other cohorts. • Explore the continuum of care services, in relation to the Older Americans Act and services provided through the aging network.
Etc.	

For some organizations, the definition of objectives and outcomes may be slightly different. But, the 'pyramid' approach still holds. For example, Engineering accreditation standards put forward by ABET, Inc indicate that an Engineering Program must have

- *Program Educational Objectives* – defined as "broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve" – which are "consistent with the mission of the institution,"
- "a process … in which the objectives are … periodically evaluated,"
- "an educational program … that prepares students to attain program outcomes … that are consistent with these objectives," and
- "a process of ongoing evaluation of the extent to which these objectives are attained, the result of which shall be used to develop and improve the program outcomes so that graduates are better prepared to attain the objectives."

The Engineering *Program Outcomes* are defined as "statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that student[s] acquire in their matriculation through the program. … Each program must formulate program outcomes that foster attainment of the program objectives …" In addition, an Engineering program must have "an assessment process … that demonstrates that these program outcomes are being measured and indicates the degree to which the outcomes are achieved."

ABET, Inc accreditation criteria mandate that "Engineering programs must demonstrate that their students attain:

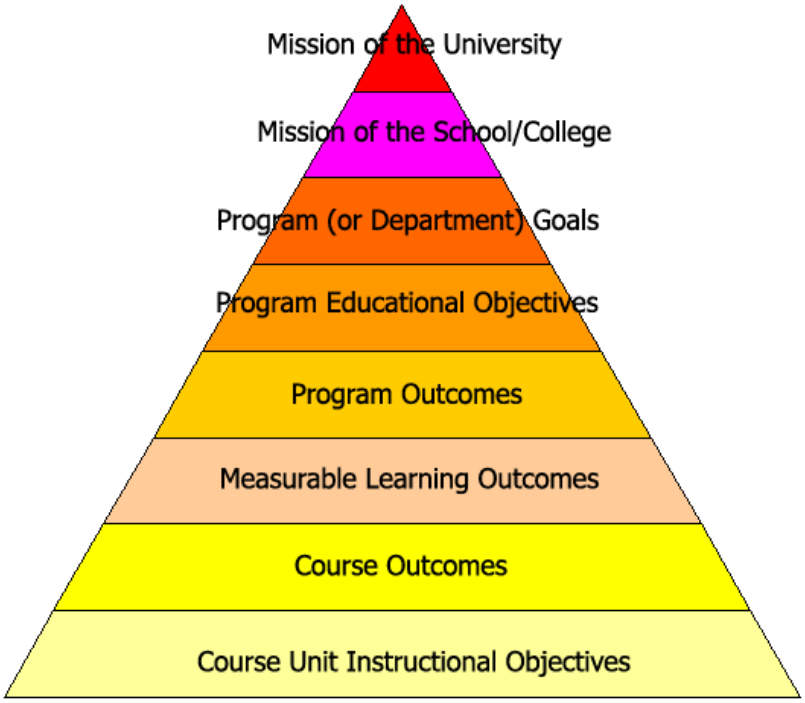
a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multi-disciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. a recognition of the need for, and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice."

These, therefore, make up Program Outcomes which may be augmented by any "additional outcomes articulated by the program to foster achievement of its education objectives." As an example, for Mechanical Engineering, "the program must demonstrate that graduates have:

- knowledge of chemistry and calculus-based physics …
- the ability to apply advanced mathematics …
- familiarity with statistics and linear algebra
- the ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems."

The key here is that this is an outcomes-based approach whereby the outcomes are mandated rather than developed from objectives. But, it is clear that some of these mandated attributes for a student graduating from an Engineering program are worded in such a manner that a determination of "knowledge" or "familiarity" or … is not at all clear. Thus, many programs developed *Measurable Learning Outcomes* based on these Program Outcomes.

Hence, a variation on the Outcomes Pyramid more suitable for this Engineering scenario is as follows (as originally given in the material by Yokomoto and Bostwick):



Here the pyramid components are defined in a similar manner to the discussion above.

Program Educational Objectives

Program Educational Objectives are statements that describe what we expect graduates to be able to do a few years after graduation. They describe the knowledge, skills, abilities, capacities, attitudes or dispositions you expect students to acquire in your program. Program Educational Objectives are statements describing how a program will satisfy constituency needs and fulfill its mission – the audience for objective statements are external constituents such as prospective students, employers, student sponsors, etc.

Program Educational Objectives are more specific than the broad Goals of the program, and they are more general than the Program Outcomes, which reside one level lower in the pyramid. Each of the Program Educational Objectives should be linked to the Program Goals.

Program Outcomes

Program Outcomes describe the essential knowledge, skills and attitudes graduates are expected to have after completing the program. They are statements that describe what the graduates of the curriculum will be able to do; i.e., what students actually develop through their college experience. Each of your Program Outcomes should be linked to one or more of your Program Objectives.

Assessment experts will tell you that these are often too broad to be assessed and should be broken down into more measurable units. This can be done in several ways, one of which is through the development of Measurable Learning Outcomes.

Measurable Learning Outcomes

In an ideal assessment process, you should have a set of Measurable Learning Outcomes associated with each of your Program Outcomes to help define what each Program Outcome means in terms of the terminology specific to your program. They are more specific than your Program Outcomes, and they are more general than your Course Outcomes, which reside at the next lower level in the pyramid. You may use them to articulate your Program Outcomes or you may use them in your assessment of student learning, or both.

Measurable Learning Outcomes can be written using either a top-down method, where a set of Measurable Learning Outcomes are written for each Program Outcome. Measurable Learning Outcomes can also be written using a bottom-up method, where currently used criteria for evaluating student learning are mapped into the Program Outcomes.

It may even be possible to let your Course Outcomes, which reside at the next lower level in the pyramid, to serve as your Measurable Learning Outcomes.

Course Outcomes

Course Outcomes are statements that describe the broad knowledge that students will obtain from a course. They are detailed, specific, measurable or identifiable, and personally meaningful statements that are derived from the course goals and articulate what the end result of the course is to achieve. They refer to the specific knowledge, skills, or developmental attributes that a student actually develops through their course experience.

They should be written with active language that describes what students should be able to demonstrate to show that they have accomplished the learning expected of them, and they should be reduced in number by combining statements with common themes into a single statement. Active verbs such as "solve," "compute," "draw," "explain," and "design," etc., should be used, and passive terms such as "understand" and "know" should be avoided.

The easiest way is to write Course Outcomes is to start with your course outline, the table of contents of your textbook, or the Course Instructional Objectives that reside at the next lower level in the pyramid and reduce them to a set of broader outcomes. Course Outcomes should be put in your syllabus and in any publication that communicates with your constituents.

Unit Instructional Objectives

Unit Instructional Objectives describe in detail the behaviors that students will be able to perform at the conclusion of a unit of instruction such as a class, and the conditions and criteria which determine the acceptable level of performance. Unit Instructional Objectives have three components:

- A description of what the student will be able to do
- The conditions under which the student will perform the task
- The criteria for evaluating student performance

They are statements that define the circumstances by which it will be known if the desired change has occurred. They are the *intended* student outcomes; i.e., the specific skills, values, and attitudes students should exhibit that reflect the broader course objectives (e.g., for students in a freshman writing course, this might be "students are able to develop a cogent argument to support a position").

Experts in good practices in education tell us that student learning is enhanced when each student is provided with a list of detailed Unit Instructional Objectives that tell them what they will be held responsible for within each unit of instruction. These statements help students prepare for exams. Just as in the writing of Measurable Learning Outcomes and Program Outcomes, instructional objectives should be written using active verbs.

An example from IUPUI Mechanical Engineering which takes the step of defining Measurable Outcomes:

University Mission	The mission of IUPUI is to provide for its constituents, excellence in: • Teaching and Learning • Research, Scholarship, and Creative Activity • Civic Engagement, Locally, Nationally, and Globally with each of these core activities characterized by: o Collaboration within and across disciplines and with the community, o A commitment to ensuring diversity, and o Pursuit of best practices.
School Mission	The mission of the IUPUI School of Engineering and Technology is to provide quality education, develop technical leaders, and conduct basic and applied research. The School strives to enhance the local community through civic responsibility and by promoting economic development.

Program Mission	Consistent with the mission of IUPUI and the School of Engineering and Technology, the mission of the Department of Mechanical Engineering is to: • Provide high quality education in mechanical engineering for both undergraduate and graduate students • Provide support for faculty to conduct high quality research and ensure high quality education • Increase the program's national and international reputation • Enhance the community through civic responsibility and the promotion of economic development • Provide technical expertise and training to industry on advanced technologies
Program Educational Objectives	The Program Educational Objectives of the Department of Mechanical Engineering are to educate undergraduate students who – during the first few years following the graduation – will: • Demonstrate excellent technical capabilities in mechanical engineering and related fields • Be responsible citizens • Continue their professional advancement through life-long learning • Apply sound design methodology in multidisciplinary fields of mechanical engineering • Competently use mathematical methods, engineering analysis and computations, and measurement and instrumentation techniques • Practice effective oral and written communication skills • Understand the environmental, ethical, diversity, cultural, and contemporary aspects of their work • Work collaboratively and effectively in engineering or manufacturing industries
Program Educational Outcomes	The Program Outcomes of the Department of Mechanical Engineering are to educate graduates who – by the time of graduation – will be able to: a. Demonstrate and apply knowledge of mathematics, science, and engineering with: a1. Knowledge in chemistry and calculus-based physics in depth a2. Mathematics through multivariate calculus, differential equations, and linear algebra a3. Probability and statistics a4. Mechanical engineering sciences: solid mechanics, fluid-thermal sciences, materials science b. Conduct experiments methodically, analyze data, and interpret results c. Design a system, component, or process to meet desired needs with applications to: c1. Mechanical systems c2. Thermal systems d. Function in teams to carry out multidisciplinary projects e. Identify, formulate, and solve engineering problems f. Understand professional and ethical responsibilities g. Communicate effectively in writing and orally h. Understand the impact of engineering solutions in a global and societal context through broad education i. Recognize the need to engage in lifelong learning j. Demonstrate knowledge of contemporary issues k. Use the techniques, skills, and modern tools of engineering effectively and correctly in engineering practice with: k1. Mechanical engineering analysis tools (e.g., ANSYS, ProMechanica, etc.) k2. Engineering design and manufacturing tools (e.g., AutoCAD, ProE, etc.) k3. Internet and library information resources k4. Mathematical computing and analysis tools (e.g., Matlab, Excel, LabView, etc.)
Measurable Outcome a1	Ability to work with forces, moments, statics and dynamics of rigid bodies, electricity, material chemistry, electrical circuits, basic digital electronics, basic fluid statics and dynamics, and basic heat energy an thermodynamics.
Measurable Outcome a2	Ability to use multivariate calculus, differential equations, and linear algebra in solving problems in fluid mechanics, heat and mass transfer, system modeling of dynamic systems, dynamic and control systems.
Measurable Outcome a3	Ability to use statistics and probability in experiments and measurements. Use regression analysis to determine relationships between measured dependent and independent variables.
Measurable Outcome a4	Ability to apply the knowledge mathematics and science in solving problems in engineering sciences.
Measurable Outcome b	Ability to conduct experiments methodically, analyze data and interpret results. Use regression analysis to determine relationships between measured dependent and independent variables.
Measurable Outcome c1	Ability to design mechanical systems that meet desired needs, work in teams, communicate the design process and results in the form of written reports, posters, and/or oral presentations. Generate creative and multiple design ideas based on functional specifications and evaluate them based on customer requirements.
Measurable Outcome c2	Ability to design thermal-fluid systems that meet desired needs, work in teams, communicate the design process and results in the form of written reports, posters, and/or oral presentations. Generate creative and multiple design ideas based on functional specifications and evaluate them based on customer requirements.
Measurable Outcome d	Ability to work in teams for solving multidisciplinary projects, such as in electromechanical, dynamic systems and control system. Also, work on projects involving solid, thermal and fluid systems.
Measurable Outcome e	Ability to identify an engineering problem, formulate it mathematically and find a solution for it. Present the solution in the form of a software or hardware product, device or process that meets a need in upper level design courses.
Measurable Outcome f	Ability to: a) describe how an ethics course can help a practicing engineer, b) describe how codes of ethics help an engineer work ethically, c) analyze a behavior using models of right and wrong, d) analyze ethics codes using models of right and wrong, e) describe how group discussions can help

	with critical thinking, f) discuss ethical issues in the work-place, and g) describe how knowledge of cultures is needed for ethical behavior.
Measurable Outcome g	Ability to effectively write engineering reports and present reports orally. Depict organization, well prepared introduction, good grammar, correct spelling, good conclusions, effective graphical and visual aids.
Measurable Outcome h	a) Awareness of environmental and societal impact of engineering solutions, safety aspect of designs and b) understanding of societal issues, including environment, cultures and ethics.
Measurable Outcome i	Realizing the importance of: a) continuing education to keep-up with ever changing technology after graduation, b) advanced degrees for professional growth, and c) early planning to pursue advanced degrees. Graduates reporting on continued education involvement and obtaining advanced degrees.
Measurable Outcome j	Ability to: a) describe current issues in public forum and b) identify and interpret current ethical issues. Graduates reporting satisfaction in their knowledge of contemporary issues.
Measurable Outcome k1	Ability to use engineering and analysis modeling software, such as finite element method for design and analysis.
Measurable Outcome k2	Ability to use solid modeling and CAD/CAM software, such as ProEngineer for creating solid models of complex engineering products and devices.
Measurable Outcome k3	Ability to conduct library and Internet research to gather information regarding engineering applications, including literature surveys, vendor data collection, and patent checks.
Measurable Outcome k4	Ability to use mathematical computing and analysis tools effectively for engineering design and analysis.
Example of a Course Objective ME 270 Basic Mechanics I	After completion of this course students should be able to: • Draw free body diagrams of particles [a1] • Analyze vectors (vector algebra) [a1] • Express forces in 3-D space [a4] • Apply equilibrium conditions to particles [a1, a4] • Draw free body diagrams of rigid bodies [a1] • Apply vector algebra to rigid bodies [a1] • Analyze rigid bodies for moments, couples, etc. [e, a4] • Apply equilibrium conditions to rigid bodies [a1, a4] • Determine centroids of lines, areas, and volumes [a4] • Analyze structures-trusses, frames and machines [e, a4] • Calculate friction forces [a4] • Calculate moments and product of inertia [a4] Note: The letters within the brackets indicate the program outcomes.

Comments: The terms "outcome," "objective," and "goal" have been commonly used in education circles, and different people have different understandings of them. It would be wise to use phrases instead of single terms when using these words, such as Program Outcomes instead of "outcomes" and Program Objectives or Unit Instructional Objectives instead of simply using "objectives."

Finally, below is a checklist to use when reviewing program-level learning outcome statements (Maki 2004):

Checklist to Review an Institution- or Program-Level Draft of Learning Outcome Statements							
	Describes what students should represent, demonstrate, or produce?	Relies on active verbs?	Aligns with collective intentions translated into the curriculum and co-curriculum?	Maps to curriculum, co-curriculum, and educational practices?	Is collaboratively authored and collectively accepted?	Incorporates or adapts professional organizations' outcome statements when they exist?	Can be assessed quantitatively and/or qualitatively?
Outcome #1							
Outcome #2							
Etc.							

APPENDIX – How to Write Program Mission Statements

Partly based on:

- Material from the University of Central Florida, as given in the "UCF Academic Program Assessment Handbook", and presentations at the Association for Institutional Research Annual Forum.

Mission Statement of the Program

The Program Mission Statement is a concise statement of the general values and principles which guide the curriculum. It sets a tone and a philosophical position from which follow a program's goals and objectives. The Program Mission Statement should define the broad purposes the program is aiming to achieve, describe the community the program is designed to serve, and state the values and guiding principles which define its standards.

Program Mission Statements must also be consistent with the principles of purpose set forth in the University's mission and goals statements. Accrediting bodies expect that Program Mission Statements are in harmony with mission statements of the institution, school/college, and/or department. Therefore, a good starting point for any program mission statement is to consider how the program mission supports or complements the University, school/college, and department missions and strategic goals.

A Program Mission Statement

- Is a broad statement of *what the program or unit is*, *what it does*, and *for whom it does* it
- Is a clear description of the *purpose* of the program or unit and the learning environment
- Reflects how the program contributes to the education and careers of students graduating from the program or how the unit supports its customers
- May reflect how the teaching and research efforts are used to enhance student learning
- Is *aligned* with department, college, and university missions
- Should be distinctive for the program or unit

Components of a Program Mission Statement

- **Primary functions** or activities of the program or unit – most important functions, operations, outcomes, and/or offerings of the program or unit
- **Purpose** of the program or unit – primary reasons *why* you perform your major activities or operations
- **Stakeholders** – groups or individuals that participate in the program and those that will benefit from the program or unit

Attributes of a well written Mission Statement:

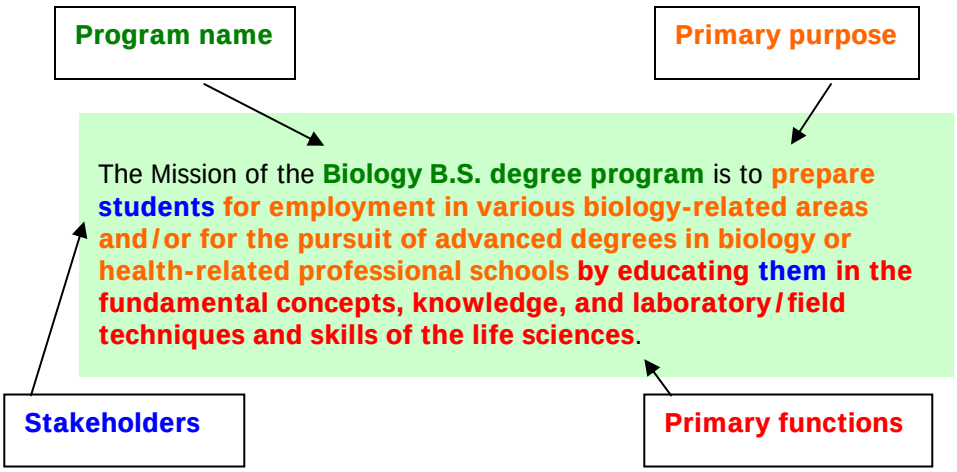
- The statement leads with the educational purpose distinctive to the degree and field of study.
- The statement identifies the signature feature of the program.
- The statement defines clarity of purpose and sticks in your mind after one reading.
- The statement explicitly promotes the alignment of the program with system, campus, college and department missions.
- An expanded statement of purpose explicitly states vision and values that are realistic and achievable, and is based on expressed understanding of students served and interests of other important stakeholders.

Structure of a Program Mission Statement

> "The mission of (**name of your program or unit**) is to (**your primary purpose**) by providing (**your primary functions or activities**) to (**your stakeholders**)." (**Additional clarifying statements**)

(Note: the order of the pieces of the mission statement may vary from the above structure.)

Program Mission Statement Example



Another similar simple format:

The _____ (organization) will _____ for _____ by _____.

This tells *who* the organization is, *what* it intends to do, *for whom* it intends to do it, and *by what means (how)* it intends to do it.

Checklist for a Mission Statement

- Is the statement clear and concise?
- Is it distinctive and memorable?
- Does it clearly state the purpose of the program?
- Does it indicate the primary function or activities of the program?
- Does it indicate who the stakeholders are?
- Does it support the mission of the department, college, and university?
- Does it reflect the program's priorities and values?

APPENDIX – How to Write Program Goals

Partly based on:

- Material from the University of Central Florida, as given in the "UCF Academic Program Assessment Handbook", and presentations at the Association for Institutional Research Annual Forum.

Goals of the Program

Program Goals are general statements of what the program intends to accomplish. Program Goals are broad statements of the kinds of learning we hope students will achieve – they describe learning outcomes and concepts (what you want students to learn) in general terms (e.g., clear communication, problem-solving skills, etc.) Program Goals are statements of long range intended outcomes of the program and the curriculum. They describe the knowledge, skills, and values expected of graduates and should be consistent with the mission of the program and the mission of the institution.

Program Goals flow from the mission and provide the framework for determining the more specific educational learning objectives and outcomes of a program. Goals describe overarching expectations such as *"Students will develop effective written communication skills."* or *"Students will understand the methods of science."*

The main function of the Program Goals statement is to form a bridge between the lofty language of the Mission Statement and the concrete-specific nuts and bolts of program objectives. The Program Goals statement becomes a blueprint for implementing the mission by answering the following questions:

- How do program goals relate to the program mission?
- How does this program fit into a student's overall development?
- What general categories of knowledge and abilities will distinguish your graduates?
- For each principle of the mission, what are the key competency categories graduates of the program should know or be able to do?

Possible Approaches for Generating Goals

"Ideal graduate":

- Describe the "perfect student" in your program in terms of his/her knowledge, abilities, values, and attitudes. Which of these characteristics can be directly attributed to the program experience?
- Describe the "ideal student" at various phases in your program, focusing on the abilities, knowledge, values, and attitudes that this student has either acquired or has had supported as a result of your program. Then answer
    - What does the student know? (cognitive)
    - What can the student do? (performance/skills)
    - What does the student care about? (affective)
- Think what an ideal unit or program would look like and how its services and operations (refer to your mission) would need to be conducted to reach that vision – think of how you would improve, minimize, maximize, provide, etc. Then state these ideas as goals.
- List the skills and achievements expected of graduates of the program. Describe the program alumni in terms of their achievements, such as career accomplishments, lifestyles, and community involvement. Use these to identify overarching goals.

Existing material review

- Review current material which may shed light on program goals; e.g., catalog descriptions, program review reports, mission and vision statements, accrediting agency documents, etc. List five to seven of the most important goals identified in the sources listed above. Prioritize the list of important goals in terms of their importance to your program and their contribution to a student's knowledge, abilities, attitudes, and values.

Course goals inventory

- Review course syllabi, assignments, tests, and any additional materials and categorize the instructional materials into (i) recall or recognition of factual information, (ii) application and comprehension, or (iii)

critical thinking and problem solving. From this inventory, determine the goals which are taught and use them as a starting point for determining program goals.

Review other programs' goals

- Often broad overarching goal statements are quite similar from program to program and from institution to institution. Looking at what is in use elsewhere can reaffirm or serve as a starting point for brainstorming.

Note: a single goal may have many specific subordinate learning objectives.

Structure of a Goal Statement

"To (action verb) (object) (modifiers)"

Examples:

to graduate students who are prepared for industry
to adequately prepare students for graduate school

Example of Program Mission, Goals, and Outcomes

University Mission:

Broad exposure to the liberal arts . . .for students to develop their powers of written and spoken expression ...

Program Goal:

The study of English enables students to improve their writing skills, their articulation ...

English Composition Course Goal:

Students will learn to acknowledge and adjust to a variety of writing contexts.

Learning Outcome:

The student will demonstrate through discussion an awareness that audiences differ and that readers' needs/expectations must be taken into account as one writes

Checklist for Goals

- Are they consistent with your mission?
- Are your goals aligned with your values?
- Do your goals describe desired performance?

APPENDIX – How to Write Program Learning Objectives/Outcomes

Partly based on:

- Material from the University of Central Florida, as given in the "UCF Academic Program Assessment Handbook", and presentations at the Association for Institutional Research Annual Forum.

Objectives

Goals and *Objectives* are similar in that they describe the intended purposes and expected results of teaching activities and establish the foundation for assessment. *Goals* are statements about general aims or purposes of education that are broad, long-range intended outcomes and concepts; e.g., "clear communication", "problem-solving skills", etc. *Objectives* are brief, clear statements that describe the desired learning outcomes of instruction; i.e., the specific skills, values, and attitudes students should exhibit that reflect the broader goals.

There are three types of learning objectives, which reflect different aspects of student learning:

- *Cognitive* objectives: "*What do you want your graduates to know?*"
- *Affective* objectives: "*What do you want your graduates to think or care about?*"
- *Behavioral* Objectives: "*What do you want your graduates to be able to do?*"

Objectives can also reflect different levels of learning:

- Mastery objectives are typically concerned with the minimum performance essentials – those learning tasks/skills that must be mastered before moving on to the next level of instruction.
- Developmental objectives are concerned with more complex learning outcomes – those learning tasks on which students can be expected to demonstrate varying degrees of progress.

Instructional *Objectives* describe in detail the behaviors that students will be able to perform at the conclusion of a unit of instruction such as a class, and the conditions and criteria which determine the acceptable level of performance.

What are the differences between Goals and Objectives? Both goals and objectives use the language of outcomes – the characteristic which distinguishes goals from objectives is the level of specificity. Goals express intended outcomes in general terms and objectives express them in *specific* terms.

Outcomes

Learning Outcomes are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course or program. Learning Outcomes identify what the *learner will know and be able to do* by the end of a course or program – the essential and enduring knowledge, abilities (skills) and attitudes (values, dispositions) that constitute the integrated learning needed by a graduate of a course or program.

The learning outcomes approach to education means basing program and curriculum design, content, delivery, and assessment on an analysis of the integrated knowledge, skills and values needed by both students and society. In this outcomes-based approach to education, the ability to demonstrate learning is the key point.

What are the differences between Objectives and Outcomes? Objectives are intended results or consequences of instruction, curricula, programs, or activities. *Outcomes* are achieved results or consequences of what was learned; i.e., evidence that learning took place. Objectives are focused on specific types of performances that students are expected to demonstrate at the end of instruction. Objectives are often written more in terms of teaching intentions and typically indicate the subject content that the teacher(s) intends to cover. Learning outcomes, on the other hand, are more student-centered and describe what it is that the learner should learn.

Learning outcomes are statements that specify what learners will know or be able to do as a result of a learning activity; i.e., the outcomes that students must meet on the way to attaining a particular degree. Outcomes are

more precise, specific, and measurable than goals. There can be more than one outcome related to each goal and a particular learning outcome can support more than one goal.

Questions which learning outcomes address include

- What knowledge, skills, abilities and dispositions should the ideal student graduating from our program demonstrate?
- How will they be able to demonstrate these capacities?
- How well does our program prepare students for careers, graduate, professional study, and/or lifelong learning?
- What assessments can we use to demonstrate growth in students' knowledge, skills, abilities and dispositions as they progress through our program?

Structure of a Learning Outcome statement

- an ***action*** word that identifies the performance to be demonstrated
- a ***learning statement*** that specifies what learning will be demonstrated in the performance
- a broad statement of the ***criterion*** or standard for acceptable performance

Possible formats of a learning outcome statement:

Format #1: To (action verb) (object) (target) (modifiers)
Format #2: The (target) (action verb) (modifiers) (object)

Example:

Poor: *Students should know the historically important systems of psychology.*

This is poor because it says neither what systems nor what information about each system students should know. Are they supposed to know everything about them or just names? Should students be able recognize the names, recite the central ideas, or criticize the assumptions?

Better: *Students should know the psychoanalytic, Gestalt, behaviorist, humanistic, and cognitive approaches to psychology.*

This is better because it says what theories students should "know", but it still does not detail exactly what they should "know" about each theory, or how deeply they should understand whatever it is they should understand.

Best: *Students should be able to recognize and articulate the foundational assumptions, central ideas, and dominant criticisms of the psychoanalytic, Gestalt, behaviorist, humanistic, and cognitive approaches to psychology.*

This is the clearest and most specific statement of the three examples. It clarifies how one is to demonstrate that he/she "knows". It provides even beginning students an understandable and very specific target to aim for. It provides faculty with a reasonable standard against which they can compare actual student performance.

How to Write Learning Objectives/Outcomes

Learning objectives specify both an observable behavior and the object of that behavior.

"Students will be able to write a research paper."

In addition, the criterion could also be specified:

"Students will be able to write a research paper in the appropriate scientific style."

Optionally, the condition under which the behavior occurs can be specified:

"At the end of their field research, students will be able to write a research paper in the appropriate scientific style."

Note that the verb you choose will help you focus on what you assess. For example, consider the following

"Students will be able to do research."

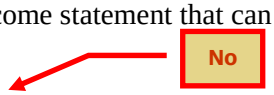
Here the verb do is vague and open to many interpretations; i.e., Do you mean identify an appropriate research question, review the literature, establish hypotheses, use research technology, collect data, analyze data, interpret

results, draw conclusions, recommend further research, or all of those? Each of the verbs in those statements is appropriately specific.

Characteristics of Good Learning Outcomes

Learning outcome statements should

- Specify the level, criterion, or standard for the knowledge, skill, ability, or disposition that the student must demonstrate.
- Include conditions under which they should be able to demonstrate their knowledge, skills, abilities or dispositions.
- Contain active verbs
- Be measurable (some more easily than others)
- Be stated so that the outcome can be measured by more than one assessment method (ideally)
- Be written such that you do not join elements in one outcome statement that can not be assessed by a single method



Customers will be highly satisfied with the service and requests for service will increase
(Here you need to measure satisfaction separately from the number of requests for service.)

Guidelines for writing student learning outcome statements

- Student learning outcome statements should be aligned with mission statements (and goals if applicable).
- Student learning outcome statements should clearly indicate the level and type of competence that is required of graduates of a program. The following information should be included in a well-defined learning outcome statement.
  - Areas/fields that are the focus of the assessment.
  - Knowledge, abilities, values and attitudes that a student in your program is expected to have within that area/field.
  - Depth of the knowledge, abilities, values and attitudes expected of a student in your program.
- Student learning outcome statements should be distinctive and specific. Examples of generic and distinctive outcomes are provided below:

  Example of a generic outcome:

  Students completing the Engineering program will be practiced in design skills.

  Example of a distinctive outcome:

  Engineering graduates will demonstrate knowledge of math, science, and engineering fundamentals. Specifically, the student will have the ability to: demonstrate general design principles; use fundamental engineering techniques, skills, and tools for engineering practice; analyze and interpret data to produce meaningful conclusions and recommendations.
- Student learning outcome statements should be framed in terms of the program and not individual courses or students.
- Student learning outcome statements should be simple. Do not join elements in one objective statement that cannot be assessed by a single assessment method.

  Example of a "bundled" statement:

  Engineering graduates will demonstrate knowledge of math, science, and engineering fundamentals, and gain competency in basic skills as writing reports, communicating research ideas and oral presentations.

  Note: This would likely require two different methods of assessment. Oral presentations would require a different approach than assessing knowledge of mathematics.
- Student learning outcome statements should describe intended learning outcomes and not the actual outcomes. Learning outcome statements should describe the abilities, knowledge, values and attitudes expected of students after completion of the program and not the actual results.
- Student learning outcome statements should be stated such that the outcome can be measured by more than one assessment method. An outcome statement should not impose restrictions on the type or number

of assessment methods that have to be used to evaluate the outcome. At least two measures should be identified for each learning outcome statement.

Example of an outcome statement that can only be measured by one specific assessment method:

Students completing the Engineering program will score over 95% on a locally-developed examination.

Note: In this outcome statement only one measure can be used to evaluate the student's performance since this is what is specified in the statement.

Example of an outcome statement that can be measured by several assessment methods:

Students completing the Engineering program will demonstrate competence and the ability to apply engineering principles.

Note: Specific assessment methods have not been identified in the outcome statement and thus several measures can be used to evaluate the knowledge that the students have gained as a result of the program.

How do you fix an unclear outcome?

Many program brochures include learning outcomes which are unclear or represent elements of curriculum rather than some action the participants will demonstrate. Consider the example

"Participants will develop an appreciation of cultural diversity in the workplace."

If you ask a simple question ("**Can it be measured?**"), you see readily that this learning outcome has shortcomings. It is not measurable – one needs to know how a student will demonstrate that he/she "appreciates". If you modify this outcome statement by changing the action verb a useful statement will result:

Participants will summarize in writing their feelings about cultural diversity in the workplace."

Learners now have a much better idea of what is expected of them. What is the importance of action verbs? Since the learner's performance should be observable and measurable, the verb chosen for each outcome statement should be an action verb which results in overt behavior that can be observed and measured.

Examples

A. Fine Arts

Broad: *Students will demonstrate knowledge of the history, literature and function of the theatre, including works from various periods and cultures.*

More specific: *Students will be able to explain the theoretical bases of various dramatic genres and illustrate them with examples from plays of different eras.*

Even more specific, specifying the conditions: *During the senior dramatic literature course, the students will be able to explain the theoretical bases of various dramatic genres and illustrate them with examples from plays of different eras.*

B. Philosophy

Broad: *The student will be able to discuss philosophical questions.*

More specific: *The student is able to develop relevant examples and to express the significance of philosophical questions.*

C. General Education

Broad: *Students will be able to think in an interdisciplinary manner.*

More specific: *Asked to solve a problem in the student's field, the student will be able to draw from theories, principles, and/or knowledge from other disciplines to help solve the problem.*

D. Business

Broad: *Students will understand how to use technology effectively.*

More specific: *Each student will be able to use word processing, spreadsheets, databases, and presentation graphics in preparing their final research project and report.*

Practical Approaches to Developing Program Goals/Objectives/Outcomes

- From the many ... one
    1. Graphically display all courses--the learning goals/outcomes specified in each course for the program.
    2. Identify common themes or elements across the courses.
    3. Given these common elements discuss with program faculty whether these are the most important elements to develop students' knowledge, skills, attitudes and dispositions – Are there some that

should be added, deleted? Is there a balance? Is there a logical progression in the development of student competencies related to the major, general education, etc.? Is there coherence to the curriculum?

4. Discuss how these relate to the existing program goals/learning outcomes and make refinements. Or, use this as a basis to create new program goals/learning objectives.
5. Once a consensus is reached, then the discussion can move to methods to assess the program goals/learning outcomes.

- From the one...many
    1. Review current department/program goals/learning objectives, perhaps from a recent self-study document – Do they reflect the current mission and priorities of the institution? Is the linkage apparent? Do they reflect current professional standards in the field for undergraduate (graduate) courses offered? Are they broad or specific enough to encompass known learning goals/outcomes of the various courses offered? If answers are yes, move to the next step.
    2. Given the current program goal/learning outcomes discuss with faculty in the unit how these are specifically linked in their course level goals and learning outcomes. Graphically display their answers for each course.
    3. Examining the program curriculum then as a whole – Are there holes? Are there any program goals/learning objectives not addressed by any course or addressed very weakly?
- You might work through the following questions:
    - What would the ideal graduate of our program look like (knowledge, skills, beliefs and values)?
    - What experiences (assignments, papers, productions, internships, etc.) do students carry out through our program that would provide evidence of their achievements?
    - What standards would we expect our students to achieve for those experiences?
    - Can we express those experiences and standards in ways that would both guide our students in determining whether they have achieved what we want and provide us clear criteria for our assessments?
- Inventories:
    - Review the syllabi for all of your courses to list what is taught in each course. Based upon the review, what appear to be the broad goals or the learning outcomes for the program? Create a spreadsheet that lists the broad goals or the learning outcomes in the left hand column, then list all the courses across the top row, and then note which courses address which goals. Sometimes, doing this curriculum mapping exercise reveals gaps in the program or unnecessary repetition of the same skills in many courses.
    - List all the major assignments and tests in all your courses. Given the breadth and depth of all the courses, is the distribution of these assignments appropriate for addressing the learning outcomes you want from your program?
- Research:
    - Contact colleagues from across the nation to learn what they are doing.
    - Go online to find out what other departments are doing in your field.
    - Note assessment sessions at your national conferences.
    - If your discipline has teaching journals, review articles on assessment.
- Review:
    - Catalog copy to determine whether you tell prospective majors what they should expect to learn by the time they graduate from your program.
    - Other materials you have already produced: annual reports, program reviews, accreditation reports, recruiting materials.

<u>Checklist for Outcomes</u>

- Are the outcomes aligned with the mission, vision, values, and goals?
- Do the outcomes clearly describe and define the expected abilities, knowledge, values, and attitudes of graduates of the program?
- Are the outcomes simply stated?
- Is it possible to collect accurate and reliable data for each outcome?
- Taken together, would the indicators associated with the outcomes accurately reflect the key results of the programs, operations, or service offered by your unit or program?

- Are the outcomes distinctive and specific to the program?
- Are they stated so that it is possible to use a single method to measure the outcome? Are they stated so that outcomes requiring different assessment methods are not bundled into one statement?
- Are they stated so that more than one measurement method can be used?
- Can they be used to identify areas to improve?
- Are they written using action verbs to specify definite, observable behaviors?
- Does the language describe student rather than teacher behaviors?
- Does the language describe a learning outcome, not a process?

To sum up, objectives/outcomes provide the necessary specificity which allows students to know what it is they are to learn. To reach this level of specificity often requires several iterations.

APPENDIX – Learning Taxonomies

Based on:

(a) Anderson, Lorin W. and Krathwohl, David R. (Eds.) with Airasian, Peter W., Cruikshank, Kathleen A., Mayer, Richard E., Pintrich, Paul R., Raths, James, and Wittrock, Merlin C., A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives, Addison Wesley Longman, Inc. 2001.
(b) Bloom, Benjamin S. (Ed.), Englehart, Max D., Furst, Edward J., Hill, Walker H., and Krathwohl, David R., Taxonomy of Educational Objectives, The Classification of Educational Goals, Handbook I: Cognitive Domain, David McKay Company, Inc. New York, 1954, 1956.
(c) Dabbagh, Nadda web material at http://www.acu.edu/academics/adamscenter/services/instructional/taxonomies.html
(d) Gronlund, N. E., Measurement and evaluation in teaching, 4th ed., Macmillan Publishing (1981)
(e) Harrow, Anita J., A taxonomy of the psychomotor domain: a guide for developing behavioral objectives, David McKay Company, Inc., 1972
(f) Krathwohl, David R., Bloom, Benjamin S., and Masia, Bertram B., Taxonomy of Educational Objectives, The Classification of Educational Goals, Handbook II: Affective Domain, Longman Inc., 1964
(g) McBeath, R. J., (Ed.), Instructing and evaluating in higher education: A guidebook for planning learning outcomes, Educational Technology, (1992)
(h) Rogers, Gloria, AAHE Workshop notes, 2004
(i) Simpson, E.J., The Classification of Educational Objectives in the Psychomotor Domain, Gryphon House, 1972

Beginning in 1948, a group of educators undertook the task of classifying education goals and objectives. The intention was to develop a classification system for three domains:

- Cognitive domain (intellectual capability, mental skills, i.e., *Knowledge*)
- Affective domain (growth in feelings, emotions, or behavior, i.e., *Attitude*)
- Psychomotor domain (manual or physical skills, i.e., *Skills*)

This taxonomy of learning behaviors can be thought of as the goals of training; i.e., after a training session, the learner should have acquired new skills, knowledge, and/or attitudes. This has given rise to the obvious short-hand variations on the theme which summarize the three domains; for example, Skills-Knowledge-Attitude, KAS, Do-Think-Feel, etc.

The cognitive domain involves knowledge and the development of intellectual skills. This includes the recall or recognition of specific facts, procedural patterns, and concepts that serve in the development of intellectual abilities and skills. The affective domain includes the manner in which we deal with things emotionally, such as feelings, values, appreciation, enthusiasms, motivations, and attitudes. The psychomotor domain includes physical movement, coordination, and use of the motor-skill areas.

Cognitive Domain - Bloom's Taxonomy

Work on the cognitive domain was completed in 1956 and is commonly referred to as *Bloom's Taxonomy of the Cognitive Domain*, since the editor of the volume was Benjamin S. Bloom, although the full title was *Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain*, 1956 by Longman Inc. with the text having four other authors (Max D. Engelhart, Edward J. Furst, Walker H. Hill, and David R. Krathwohl).

The major idea of the taxonomy is that what educators want students to know (and, therefore, statements of educational objectives) can be arranged in a hierarchy from less to more complex. Bloom identified six levels within the cognitive domain, from the simple recall or recognition of facts, as the lowest level, through increasingly more complex and abstract mental levels, to the highest order which is classified as evaluation.

In general, research over the last 40 years has confirmed the taxonomy as a hierarchy; although it is uncertain whether synthesis and evaluation should be reversed (i.e., evaluation is less difficult to accomplish than synthesis) or whether synthesis and evaluation are at the same level of difficulty but use different cognitive processes. In any case it is clear that students can "know" about a topic or subject at different levels. While most teacher-made tests still test at the lower levels of the taxonomy, research has shown that students remember more when they have learned to handle the topic at the higher levels of the taxonomy.

A description of the six levels is given below.

Cognitive learning is demonstrated by knowledge recall and the intellectual skills: comprehending information, organizing ideas, analyzing and synthesizing data, applying knowledge, choosing among alternatives in problem-solving, and evaluating ideas or actions

Level and Definition	Illustrative Verbs	Example
Knowledge is defined as the remembering of previously learned material. This may involve the recall of a wide range material, from specific facts to complete theories, but all that is required is for the student to bring to mind the appropriate information. Knowledge represents the lowest level of learning outcomes in the cognitive domain.	arrange, define, describe, duplicate, identify, label, list, match, memorize, name, order, outline, recognize, relate, recall, repeat, reproduce, select, state	Memory of specific facts, terminology, rules, sequences, procedures, classifications, categories, criteria, methodology, principles, theories and structure. Recite a policy. Quote prices from memory to a customer. Know the safety rules. Describe the painting.
Comprehension is defined as the ability to grasp the meaning of material. This may be shown by translating material from one form to another (words to numbers), by interpreting material (explaining or summarizing), and by estimating future trends (predicting consequences or effects). These learning outcomes go one step beyond the simple remembering of material, and represent the lowest level of understanding.	classify, convert, defend, describe, discuss, distinguish, estimate, explain, express, extend, generalize, give examples, identify, indicate, infer, locate, paraphrase, predict, recognize, rewrite, report, restate, review, select, summarize, translate	Stating problem in own words. Translating a chemical formula. Understanding a flow chart. Translating words and phrases from a foreign language. Explains in one's own words the steps for performing a complex task. What is the subject or theme?
Application refers to the ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws, and theories. Learning outcomes in this area require a higher level of understanding than those under comprehension.	apply, change, choose, compute, demonstrate, discover, dramatize, employ, illustrate, interpret, manipulate, modify, operate, practice, predict, prepare, produce, relate, schedule, show, sketch, solve, use, write	Taking principles learned in math and applying them to figuring the volume of a cylinder in an internal combustion engine. Use a manual to calculate an employee's vacation time. If you could interview the artist, what questions would you ask?
Analysis refers to the ability to break down material into its component parts so that its organizational structure may be understood. This may include the identification of the parts, analysis of the relationships between parts, and recognition of the organizational principles involved. Learning outcomes here represent a higher intellectual level than comprehension and application because they require an understanding of both the content and the structural form of the material.	analyze, appraise, break down, calculate, categorize, compare, contrast, criticize, diagram, differentiate, discriminate, distinguish, examine, experiment, identify, illustrate, infer, model, outline, point out, question, relate, select, separate, subdivide, test	Discussing how fluids and liquids differ. Detecting logical fallacies in a student's explanation of Newton's 1st law of motion. Recognize logical fallacies in reasoning. Gathers information from a department and selects the required tasks for training. Explain what you think the artist is trying to say about the subject matter.

Synthesis refers to the ability to put parts together to form a new whole. This may involve the production of a unique communication (theme or speech), a plan of operations (research proposal), or a set of abstract relations (scheme for classifying information). Learning outcomes in this area stress creative behaviors, with major emphasis on the formulation of new patterns of structures. Integrate.	arrange, assemble, categorize, collect, combine, comply, compose, construct, create, design, develop, devise, design, explain, formulate, generate, integrate, manage, modify, organize, plan, prepare, propose, rearrange, reconstruct, relate, reorganize, revise, rewrite, set up, summarize, synthesize, tell, write	Writing a comprehensive report on a problem-solving exercise. Planning a program or panel discussion. Writing a comprehensive term paper. Integrates training from several sources to solve a problem. What ways would you render the subject differently?
Evaluation is concerned with the ability to judge the value of material (statement, novel, poem, research report) for a given purpose. The judgments are to be based on definite criteria. These may be internal criteria (organization) or external criteria (relevance to the purpose), and the student may determine the criteria or be given them. Learning outcomes in this area are highest in the cognitive hierarchy because they contain elements of all of the other categories, plus conscious value judgments based on clearly defined criteria.	appraise, argue, assess, attach, choose, compare, conclude, contrast, defend, describe, discriminate, estimate, evaluate, explain, judge, justify, interpret, relate, predict, rate, select, summarize, support, value	Making judgments based on internal evidence or external criteria. Evaluating alternative solutions to a problem. Detecting inconsistencies in the speech of a student government representative. Explain and justify a new budget. Hire the most qualified candidate. What is your opinion of the painting? Why?

Affective Domain - Krathwohl's Taxonomy

Bloom's Taxonomy second domain, the Affective Domain, was detailed by Bloom, Krathwhol and Masia in 1964 (*Taxonomy of Educational Objectives: Volume II, The Affective Domain*). Bloom's theory advocates this structure and sequence for developing attitude – also now commonly expressed in the modern field of personal development as 'beliefs'. Again, as with the other domains, the Affective Domain detail provides a framework for teaching, training, assessing and evaluating the effectiveness of training and lesson design and delivery, and also the retention by and affect upon the learner or trainee.

Krathwohl's affective domain taxonomy is perhaps the best known of any of the affective taxonomies. The taxonomy is ordered according to the principle of internalization. Internalization refers to the process whereby a person's affect toward an object passes from a general awareness level to a point where the affect is 'internalized' and consistently guides or controls the person's behavior.

Affective learning is demonstrated by behaviors indicating attitudes of awareness, interest, attention, concern, and responsibility, ability to listen and respond in interactions with others, and ability to demonstrate those attitudinal characteristics or values which are appropriate to the test situation and the field of study

Level and Definition	Illustrative Verbs	Example
Receiving refers to the student's willingness to attend to particular phenomena of stimuli (classroom activities, textbook, music, etc.). Learning outcomes in this area range from the simple awareness that a thing exists to selective attention on the part of the learner. Receiving represents the lowest level of learning outcomes in the affective domain.	asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, sits erect, replies, uses	Listening to discussions of controversial issues with an open mind. Respecting the rights of others. Listen for and remember the name of newly introduced people.
Responding refers to active participation on the part of the student. At this level he or she not only attends to a particular phenomenon but also reacts to it in some way. Learning outcomes in this area may emphasize acquiescence in responding (reads assigned material), willingness to respond (voluntarily reads beyond assignment), or satisfaction in responding (reads for pleasure or enjoyment). The higher levels of this category include those instructional objectives that are commonly classified under “interest”; that is, those that stress the seeking out and enjoyment of particular activities.	answers, assists, complies, conforms, discusses, greets, helps, labels, performs, practices, presents, reads, recites, reports, selects, tells, writes	Completing homework assignments. Participating in team problem-solving activities. Questions new ideals, concepts, models, etc. in order to fully understand them.
Valuing is concerned with the worth or value a student attaches to a particular object, phenomenon, or behavior. This ranges in degree from the simpler acceptance of a value (desires to improve group skills) to the more complex level of commitment (assumes responsibility for the effective functioning of the group). Valuing is based on the internalization of a set of specified values, but clues to these values are expressed in the student's overt behavior. Learning outcomes in this area are concerned with behavior that is consistent and stable enough to make the value clearly identifiable. Instructional objectives that are commonly classified under “attitudes” and “appreciation” would fall into this category.	completes, describes, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, shares, studies, works	Accepting the idea that integrated curricula is a good way to learn. Participating in a campus blood drive. Demonstrates belief in the democratic process. Shows the ability to solve problems. Informs management on matters that one feels strongly about.
Organization is concerned with bringing together different values, resolving conflicts between them, and beginning the building of an internally consistent value system. Thus the emphasis is on comparing, relating, and synthesizing values. Learning outcomes may be concerned with the conceptualization of a value (recognizes the responsibility of each individual for improving human relations) or with the organization of a value system (develops a vocational plan that satisfies his or her need for both economic security and social service). Instructional objectives relating to the development of a philosophy of life would fall into this category.	adheres, alters, arranges, combines, compares, completes, defends, explains, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes	Recognizing own abilities, limitations, and values and developing realistic aspirations. Accepts responsibility fro one’s behavior. Explains the role of systematic planning in solving problems. Accepts professional ethical standards. Prioritizes time effectively to meet the needs of the organization, family, and self.
Characterization by a value or value set. The individual has a value system that has controlled his or her behavior for a sufficiently long time for him or her to develop a characteristic “life-style.” Thus the behavior is pervasive, consistent, and predictable. Learning outcomes at this level cover a broad range of activities, but the major emphasis is on the fact that the behavior is typical or characteristic of the student. Instructional objectives that are concerned with the student's general patterns of adjustment (personal, social, emotional) would be appropriate here.	acts, discriminates, displays, influences, listens, modifies, performs, practices, proposes, qualifies, questions, revises, serves, solves, uses, verifies	A person's lifestyle influences reactions to many different kinds of situations. Shows self-reliance when working independently. Uses an objective approach in problem solving. Displays a professional commitment to ethical practice on a daily basis. Revises judgments and changes behavior in light of new evidence.

Various people have since built on Bloom's work, notably in the third domain, the 'psychomotor' or skills, which Bloom originally identified in a broad sense, but which he never fully detailed. This was apparently because Bloom and his colleagues felt that the academic environment held insufficient expertise to analyze and create a suitable reliable structure for the physical ability 'Psychomotor' domain. As a result, there are several different contributors providing work in this third domain, such as Simpson and Harrow which are described below.

Simpson's Taxonomy of Psychomotor Domain

The psychomotor domain includes physical movement, coordination, and use of the motor-skill areas. Development of these skills requires practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution. The seven major categories listed from the simplest behavior to the most complex are shown below.

Psychomotor learning is demonstrated by physical skills: coordination, dexterity, manipulation, grace, strength, speed; actions which demonstrate the fine motor skills such as use of precision instruments or tools, or actions which evidence gross motor skills such as the use of the body in dance or athletic performance

Level and Definition	Illustrative Verbs	Example
Perception: The ability to use sensory cues to guide motor activity. This ranges from sensory stimulation, through cue selection, to translation.	chooses, describes, detects, differentiates, distinguishes, identifies, isolates, relates, selects, separates	Listening to the sounds made by guitar strings before tuning them. Recognizing sounds that indicate malfunctioning equipment. Estimates where a ball will land after it is thrown and then moving to the correct location. Adjusts heat of stove to correct temperature by smell and taste of food.
Set: Readiness to act. It includes mental, physical, and emotional sets. These three sets are dispositions that predetermine a person's response to different situations (sometimes called mindsets).	begins, displays, explains, moves, proceeds, reacts, responds, snows, starts, volunteers	Knowing how to use a computer mouse. Having instrument ready to play and watching conductor at start of a musical performance. Showing eagerness to assemble electronic components to complete a task. Knows and acts upon a sequence of steps in a manufacturing process. Recognize one's abilities and limitations.
Guided response: The early stages in learning a complex skill that includes imitation and trial and error. Adequacy of performance is achieved by practicing.	assembles, builds, calibrates, constructs, dismantles, displays, dissects, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches	Using a torque wrench just after observing an expert demonstrate a its use. Experimenting with various ways to measure a given volume of a volatile chemical. Performs a mathematical equation as demonstrated. Follows instructions to build a model.
Mechanism: This is the intermediate stage in learning a complex skill. Learned responses have become habitual and the movements can be performed with some confidence and proficiency.	assembles, builds, calibrates, constructs, dismantles, displays, dissects, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches	Demonstrating the ability to correctly execute a 60 degree banked turn in an aircraft 70 percent of the time. Use a personal computer. Repair a leaking faucet.
Complex or overt response: The skillful performance of motor acts that involve complex movement patterns. Proficiency is indicated by a quick, accurate, and highly coordinated performance, requiring a minimum of energy. This category includes performing without hesitation, and automatic performance. For example, players often utter sounds of satisfaction or expletives as soon as they hit a tennis ball or throw a football, because they can tell by the feel of the act what the result will produce.	assembles, builds, calibrates, constructs, dismantles, displays, dissects, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches	Dismantling and re-assembling various components of an automobile quickly with no errors. Maneuvers a car into a tight parallel parking spot. Operates a computer quickly and accurately. Displays competence while playing the piano.
Adaptation: Skills are well developed and the individual can modify movement patterns to fit special requirements.	adapts, alters, changes, rearranges, reorganizes, revises, varies	Using skills developed learning how to operate an electric typewriter to operate a word processor. Responds effectively to unexpected experiences. Modifies instruction to meet the needs of the learners. Perform a task with a machine that it was not originally intended to do.
Origination: Creating new movement patterns to fit a particular situation or specific problem. Learning outcomes emphasize creativity based upon highly developed skills.	arranges, combines, composes, constructs, creates, designs, originates	Designing a more efficient way to perform an assembly line task. Constructs a new theory. Develops a new and comprehensive training program. Creates a new gymnastic routine.

Harrow's Taxonomy of Psychomotor Domain

Another taxonomy for the psychomotor domain due to Harrow is organized according to the degree of coordination including involuntary responses as well as learned capabilities. Simple reflexes begin at the lowest level of the taxonomy, while complex neuromuscular coordination make up the highest level.

Reflex movements are actions elicited without learning in response to some stimuli. Examples include: flexion, extension, stretch, postural adjustments.

Basic fundamental movement are inherent movement patterns which are formed by combining of reflex movements and are the basis for complex skilled movements. Examples are: walking, running, pushing, twisting, gripping, grasping, manipulating.

Perceptual refers to interpretation of various stimuli that enable one to make adjustments to the environment. Visual, auditory, kinesthetic, or tactile discrimination. Suggests cognitive as well as psychomotor behavior. Examples include: coordinated movements such as jumping rope, punting, or catching.

Physical activities require endurance, strength, vigor, and agility which produces a sound, efficiently functioning body. Examples are: all activities which require a) strenuous effort for long periods of time; b) muscular exertion; c) a quick, wide range of motion at the hip joints; and d) quick, precise movements.

Skilled movements are the result of the acquisition of a degree of efficiency when performing a complex task. Examples are: all skilled activities obvious in sports, recreation, and dance.

Non-discursive communication is communication through bodily movements ranging from facial expressions through sophisticated choreographics. Examples include: body postures, gestures, and facial expressions efficiently executed in skilled dance movement and choreographics.

APPENDIX – Writing Instructional Objectives

Based on:

- Mager, Robert F., Preparing Instructional Objectives, Fearon Publishers 1962
- Mager, Robert F., Preparing Instructional Objectives: A critical tool in the development of effective instruction 3rd edition, The Center for Effective Performance, Inc. 1997

An ***objective***

- Is an *intent* communicated by a statement describing a proposed change in a learner
- Is a statement of what the learner is to be like when he/she has successfully completed a learning experience

An instructional objective *describes an intended outcome* rather than a description or summary of content. A usefully stated objective is stated in behavioral, or performance, terms that describe what the learner will be doing when demonstrating his/her achievement of the objective. The statement of objectives for an entire program of instruction will consist of several specific statements.

An instructional objective must

[1] Describe what the learner will be doing when demonstrating that he/she has reached the objective; i.e., *What should the learner be able to do?* (**Performance**)
[2] Describe the important conditions under which the learner will demonstrate his/her competence; i.e., *Under what conditions do you want the learner to be able to do it?* (**Conditions**)
[3] Indicate how the learner will be evaluated, or what constitutes acceptable performance; i.e., *How well must it be done?* (**Criterion**)

Course objective:

- What a successful learner is able to do at the end of the course
- Is a description of a *product*, of what the learner is supposed to be like as a result of the process

The statement of objectives of a program must denote *measurable* attributes *observable* in the graduate of the program; otherwise it is impossible to determine whether or not the program is meeting the objectives. Tests or examinations are the milestones along the road of learning and are supposed to tell the teacher and the student the degree to which both have been successful in their achievement of the course objectives. But unless goals are clearly and firmly fixed in the minds of both parties, tests are at best misleading; at worst, they are irrelevant, unfair, or useless. To be useful they must measure performance in terms of the goals.

An advantage of clearly defined objectives is that the student is provided the means to evaluate his/her own progress at any place along the route of instruction; thus, the student knows which activities on his/her part are relevant to his/her success. A meaningfully stated objective is one that succeeds in communicating to the reader the writer's instructional intent and one that excludes the greatest number of possible alternatives to your goal.

"*BAD*" words (open to many interpretations)	"*GOOD*" words (open to fewer interpretations)
To KNOW	To WRITE
To UNDERSTAND	To RECITE
To ENJOY	To IDENTIFY
To APPRECIATE	To DIFFERENTIATE
To GRASP THE SIGNIFICANCE OF	To SOLVE
To COMPREHEND	To CONSTRUCT
To BELIEVE	To LIST
	To COMPARE
	To CONTRAST

The idea is to describe what the learner will be *doing* when demonstrating that he/she "understands" or "appreciates".

Steps to write objectives that will describe the desired behavior of the learner:

[1] Identify the terminal behavior or *performance* by name; i.e., specify the kind of behavior that will be accepted as evidence that the learner has achieved the objective.
[2] Define the desired behavior further by describing the important *conditions* under which the behavior will be expected to occur.
[3] Specify the *criteria* of acceptable performance by describing how well the learner must perform to be considered acceptable.

Step [1] Identifying the terminal behavior

A useful objective *identifies the kind of performance* that will be accepted as evidence that the learner has achieved the objective. An objective always states what a learner is expected to be able to do and/or produce to be considered competent. Two examples:

Be able to ride a unicycle. → the performance stated is *ride*
Be able to write a letter. → the performance stated is *writing*, the product is a letter

Performances may be visible, like writing, repairing, or painting; or invisible, like adding, solving, or identifying. *If a statement does not include a visible performance, it isn't yet an objective.*

Overt (visible) performance
To identify the kind of performance associated with the objective, you need to answer the question: ***What will the learner be DOING when demonstrating achievement of the objective?***

Example:

Given all available engineering data regarding a proposed product, be able to write a product profile. The profile must describe and define all of the commercial characteristics of the product appropriate to its introduction to the market, including descriptions of at least three major product uses.

→ performance = "*write a product profile*"

Covert (invisible) performance
Some performances are not visible to the naked eye, such as solving, discriminating, and identifying. Statements such as

Be able to solve …
Be able to discriminate …
Be able to identify …

are inadequate because they don't describe a visible performance. ***Whenever the main intent of the objective is covert, you need to add an indicator behavior to reveal how the covert performance can be directly detected.*** An indicator behavior is one that tells you whether a covert performance is happening to your satisfaction.

Example:

Consider the covert performance '*Be able to discriminate counterfeit money'*. *A*n indicator behavior would be for this performance could be to *'sort the money into two piles'*, counterfeit and genuine. Thus, a suitable objective could be *"Be able to discriminate (sort) counterfeit money."*

Scheme to fulfill Step [1]:

Write a statement describing one of your educational intents and then modify it until it answers the question: *"What is the learner doing when he/she is demonstrating that he/she has achieved the objective?"*

Examples:

Stated in behavioral terms	Stated in performance terms
"To develop an appreciation for music"	*"The learner correctly answers 95 multiple-choice questions on the history of music"*
"To be able to solve quadratic equations"	
"To be able to repair a radio"	*"To be able to write a summary of the factors leading to the depression of 1929"*
"To know how an amplifier works"	
"To know the rules of football"	

Step [2] further defining the terminal behavior

To state an objective that will successfully communicate your educational intent, you will sometimes have to define terminal behavior further by stating the *conditions* you will impose upon the learner when he/she is demonstrating his/her mastery of the objective. As a simple example:

(a) *"To be able to solve problems in algebra."*
vs. (b) *"Given a linear-algebraic equation with one unknown, the learner must be able to solve for the unknown without the aid of references, tables, or calculating devices."*

In (b) we clearly see a more well-defined statement of the conditions under which solving an algebraic equation will occur.

You should be detailed enough to be sure the target behavior would be recognized by another competent person, and detailed enough so that other possible behaviors would not be mistaken for the desired behavior. You should describe enough conditions for the objective to imply clearly the kind of test items appropriate for sampling the behavior you are interested in developing.

Examples:

"Given a list of 35 chemical elements, be able to recall and write the valences of at least 30."

'*Given a list* – Tells us something about the conditions under which the learner will be recalling the valences of elements.

'*at least 30*' – Tells us something about what kind of behavior will be considered 'passing'; 30 out of 35 is the *minimum acceptable skill.*

"*Given a product and prospective customer, be able to describe the key features of the product.*"
The performance is to occur in the presence of a *product* and a *customer*; these are the conditions that will influence the nature of the performance, and so they are stated in the objective.

To avoid surprises when working with objectives, we state the main intent of the objective and describe the main condition under which the performance is to occur. For example, "*Be able to hammer a nail …*" is different from "*Given a brick, be able to hammer a nail …*".

Miscommunications can be avoided by adding relevant conditions to the objective by simply describing the conditions that have a significant impact on the performance – in other words, describe the givens and/or limitations within which the performance is expected to occur. Some simple examples:

With only a screwdriver …
Without the aid of references …
Given a standard set of tools and the TS manual …

Guiding questions:

- What will the learner be expected to use when performing (e.g., tools, forms, etc.)?
- What will the learner not be allowed to use while performing (e.g., checklists or other aids)?
- What will be the real-world conditions under which the performance will be expected to occur (e.g., on top of a flagpole, under water, in front of a large audience, in a cockpit, etc.)?
- Are there any skills that you are specifically *not* trying to develop? Does the objective exclude such skills?

Scheme to fulfill step [2]:

Given an objective and a set of test items or situations, accept or reject each test item on the basis of whether the objective defines (includes) the behavior asked for. If you must accept all kinds of test items as appropriate, the objective needs to be more specific. If the objective allows you to accept those items you intend to use and allows you to reject those items you do not consider relevant or appropriate, the objective is stated clearly enough to be useful.

Some simple examples:

(i) Objective: *"When asked a question in French, the student must be able to demonstrate his/her understanding of the question by replying, in French, with an appropriate sentence."*

Inappropriate test situations:

"Translate the following French sentences."

"Translate the following French questions."

Appropriate test situation:

"Reply, in French, to the following questions."

(ii) Objective: *"To be able to solve a simple linear equation."*

Inappropriate test situation:

"If seven hammers cost seven dollars, how much does one hammer cost?"

Appropriate test situation:

"Solve for x in the following 2 + 4x = 12"

Key point: If you expect the student to learn how to solve word problems, then *teach* him/her how to solve word problems. Do not expect him/her to learn to solve *word problems* by teaching him/her how to solve *equations*. The only appropriate way to test to see whether they have learned to *solve* equations (as stated in the objective) is to ask them to *solve equations*.

(iii) Objective: *"Given a DC motor of ten horsepower or less that contains a single malfunction, and given a standard kit of tools and references, the learner must be able to repair the motor within a period of 45 minutes."*

Test question: *"Given a motor with trouble in it, locate the trouble."*

Appropriate (Yes or No)?:

No! The objective asked for repairing behavior rather than locating behavior. *'Repair the motor'* means to make it work. *Making it work* is the desired behavior. The test item sampled *only a portion* of the behavior called for by the objective.

<u>Step [3] stating the criterion</u>

You can increase the ability of an objective to communicate what it is you want the learner to be able to do by telling the learner *how well* you want him/her to be able to do it. If you can specify at least the minimum acceptable performance for each objective, you will have a performance standard against which to test your instructional programs; you will have a means for determining whether your programs are successful in achieving your instructional intent. Indicate in your statement of objectives what the acceptable performance will be, by adding words that describe the *criterion* of success.

Some examples of ways in which minimum acceptable performance can be specified:

(i) time limit

Ex.: *"The student must be able to correctly solve at least seven simple linear equations within a period of thirty minutes."*

(ii) minimum number of correct responses that will be accepted

or number of principles that must be applied

or number or principles that must be identified

or number of words that must be spelled correctly

Ex.: *"Given a human skeleton, the student must be able to correctly identify by labeling at least 40 of the following bones (list of bones inserted here)."*

(iii) indicate the percentage or proportion
Ex.: *"The student must be able to spell correctly at least 80% of the words called out to him/her during an examination period."*

(iv) define the important characteristics of performance accuracy
Ex.: *"... and to be considered correct, problem solutions must be accurate to the nearest whole number."*

An objective describes the criteria of acceptable performance; that is, it says how well someone would have to perform to be considered competent. For example,

"Given a computer with word-processing software, be able to write a letter"

could have a criteria of "*all words are spelled correctly, there are no grammatical or punctuation errors, and the addressee is not demeaned or insulted"*. Thus, you complete your objective by adding information that describes the criterion for success keeping in mind that if it isn't measurable, it isn't an objective.

Questions to answer leading to a useful objective:

- What is the main intent of the objective?
- What does the learner have to do to demonstrate achievement of the objective?
- What will the learner have to do it with or to? And what, if anything, will the learner have to do it without?
- How will we know when the performance is good enough to be considered acceptable?

Scheme to fulfill step [3]:

Ask the following questions of statements used to assess performance:

(a) Does the statement describe what the learner will be doing when he/she is demonstrating that he/she has reached the objectives?

(b) Does the statement describe the important conditions (givens or restrictions) under which the learner will be expected to demonstrate his/her competence?

(c) Does the statement indicate how the learner will be evaluated? Does it describe at least the lower limit of acceptable performance?

Summary

- A statement of instructional objectives is a collection of words or symbols describing one of your educational *intents*.
- An objective will communicate your intent to the degree you have described what the learner will be *doing* when demonstrating his/her achievement and how you will know when he/she is doing it.
- To describe terminal behavior (what the learner will be doing)
    - Identify and name the overall behavior act.
    - Define the important conditions under which the behavior is to occur (givens or restrictions).
    - Define the criterion of acceptable performance.
- To prepare an objective
    - Write a statement that describes the main intent or performance expected of the student.
    - If the performance happens to be covert, add an indicator behavior through which the main intent can be detected.
    - Describe relevant or important conditions under which the performance is expected to occur. Add as much description as is needed to communicate the intent to others.
- Revise as needed to create a useful objective, i.e., continue to modify a draft until these questions are answered:
    - What do I want students to be able to do?
    - What are the important conditions or constraints under which I want them to perform?
    - How well must students perform for me to be satisfied?
- Write a separate statement for each objective; the more statements you have, the better chance you have of making clear your intent.

APPENDIX – Samples of Professional Association Learning Goals/Objectives/Outcomes

Sociology

As indicated in the American Sociological Association's 2004 publication *Liberal Learning and the Sociology Major Updated: Meeting the Challenge of Teaching Sociology in the Twenty-First Century* by K. McKinney, C. Howery, K. Strand, E. Kain, and C. Berheide; A Report of the ASA Task Force on the Undergraduate Major, 2004, American Sociological Association

LEARNING GOALS FOR THE SOCIOLOGY MAJOR

The sociology major should study, review, and *demonstrate*[*] understanding of the following:

1. The discipline of sociology and its role in contributing to our understanding of social reality, such that the student will be able to:
   (a) describe how sociology differs from and is similar to other social sciences and to give examples of these differences;
   (b) describe how sociology contributes to a liberal arts understanding of social reality; and
   (c) apply the sociological imagination, sociological principles, and concepts to her/his own life.

2. The role of theory in sociology, such that the student will be able to:
   (a) define theory and describe its role in building sociological knowledge;
   (b) compare and contrast basic theoretical orientations;
   (c) show how theories reflect the historical context of the times and cultures in which they were developed; and
   (d) describe and apply some basic theories or theoretical orientations in at least one area of social reality.

3. The role of evidence and qualitative and quantitative methods in sociology, such that the student will be able to:
   (a) identify basic methodological approaches and describe the general role of methods in building sociological knowledge;
   (b) compare and contrast the basic methodological approaches for gathering data;
   (c) design a research study in an area of choice and explain why various decisions were made; and
   (d) critically assess a published research report and explain how the study could have been improved.

4. The technical skills involved in retrieving information and data from the Internet and using computers appropriately for data analysis. The major should also be able to do (social) scientific technical writing that accurately conveys data findings and to show an understanding and application of principles of ethical practice as a sociologist.

5. Basic concepts in sociology and their fundamental theoretical interrelations, such that the student will be able to define, give examples, and demonstrate the relevance of culture; social change; socialization; stratification; social structure; institutions; and differentiations by race/ethnicity, gender, age, and class.

6. How culture and social structure operate, such that the student will be able to:
   (a) show how institutions interlink in their effects on each other and on individuals;
   (b) demonstrate how social change factors such as population or urbanization affect social structures and individuals;
   (c) demonstrate how culture and social structure vary across time and place and the effect is of such variations; and
   (d) identify examples of specific policy implications using reasoning about social-structural effects.

7. Reciprocal relationships between individuals and society, such that the student will be able to:
   (a) explain how the self develops sociologically;
   (b) demonstrate how societal and structural factors influence individual behavior and the self's development;
   (c) demonstrate how social interaction and the self influences society and social structure; and
   (d) distinguish sociological approaches to analyzing the self from psychological, economic, and other approaches.

8. The macro/micro distinction, such that the student will be able to:
   (a) compare and contrast theories at one level with those at another;
   (b) summarize some research documenting connections between the two; and
   (c) develop a list of research or analytical issues that should be pursued to more fully understand the connections between the two.

9. In depth at least two specialty areas within sociology, such that the student will be able to:
   (a) summarize basic questions and issues in the areas;
   (b) compare and contrast basic theoretical orientations and middle range theories in the areas;
   (c) show how sociology helps understand the area;
   (d) summarize current research in the areas; and
   (e) develop specific policy implications of research and theories in the areas.

10. The internal diversity of American society and its place in the international context, such that the student will be able to describe:
   (a) the significance of variations by race, class, gender, and age; and
   (b) will know how to appropriately generalize or resist generalizations across groups.

Two more generic goals that should be pursued in sociology are:

11. To think critically, such that the student will be able to:
   (a) move easily from recall analysis and application to synthesis and evaluation;
   (b) identify underlying assumptions in particular theoretical orientations or arguments;
   (c) identify underlying assumptions in particular methodological approaches to an issue;
   (d) show how patterns of thought and knowledge are directly influenced by political-economic social structures;
   (e) present opposing viewpoints and alternative hypotheses on various issues; and
   (f) engage in teamwork where many or different viewpoints are presented.

12. To develop values, such that the student will see:
   (a) the utility of the sociological perspective as one of several perspectives on social reality; and
   (b) the importance of reducing the negative effects of social inequality.

* "Demonstrate" means that the student will be able to show or document appropriate mastery of the material and/or skills, and thus that this mastery can be assessed (with an exam, a presentation, by a portfolio, and so forth).

Psychology

UNDERGRADUATE PSYCHOLOGY MAJOR LEARNING GOALS AND OUTCOMES: A Report
(March 2002) American Psychological Association, Task Force Members: Jane S. Halonen, Drew C. Appleby, Charles L. Brewer, and the APA Board of Directors, William Buskist, Angela R. Gillem, Diane Halpern, G. William Hill IV, Margaret A. Lloyd, and the APA Board of Educational Affairs, Jerry L. Rudmann, Valjean M. Whitlow

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Undergraduate Psychology Learning Goals and Outcomes

Knowledge, Skills, and Values Consistent with the Science and Application of Psychology

Goal 1. Knowledge Base of Psychology
Demonstrate familiarity with the major concepts, theoretical perspectives, empirical findings, and historical trends in psychology.
Suggested Learning Outcomes
1.1. Characterize the nature of psychology as a discipline.
   (a) Explain why psychology is a science.
   (b) Identify and explain the primary objectives of psychology: describing, understanding, predicting, and controlling behavior and mental processes.
   (c) Compare and contrast the assumptions and methods of psychology with those of other disciplines.
   (d) Describe the contributions of psychology perspectives to interdisciplinary collaboration.
1.2. Demonstrate knowledge and understanding representing appropriate breadth and depth in selected content areas of psychology:
   (a) theory and research representing each of the following four general domains:
      [1] learning and cognition

[2] individual differences, psychometrics, personality, and social processes, including those related to sociocultural and international dimensions
[3] biological bases of behavior and mental processes, including physiology, sensation, perception, comparative, motivation, and emotion
[4] developmental changes in behavior and mental processes across the life span

(b) the history of psychology, including the evolution of methods of psychology, its theoretical conflicts, and its sociocultural contexts
(c) relevant levels of analysis: cellular, individual, group/systems, and culture
(d) overarching themes, persistent questions, or enduring conflicts in psychology, such as
[1] the interaction of heredity and environment
[2] variability and continuity of behavior and mental processes within and across species
[3] free will versus determinism
[4] subjective versus objective perspective
[5] the interaction of mind and body
(e) relevant ethical issues, including a general understanding of the APA Code of Ethics

1.3. Use the concepts, language, and major theories of the discipline to account for psychological phenomena.
(a) Describe behavior and mental processes empirically, including operational definitions
(b) Identify antecedents and consequences of behavior and mental processes
(c) Interpret behavior and mental processes at an appropriate level of complexity
(d) Use theories to explain and predict behavior and mental processes
(e) Integrate theoretical perspectives to produce comprehensive and multi-faceted explanations

1.4. Explain major perspectives of psychology (e.g., behavioral, biological, cognitive, evolutionary, humanistic, psychodynamic, and sociocultural).
(a) Compare and contrast major perspectives
(b) Describe advantages and limitations of major theoretical perspectives

Goal 2. Research Methods in Psychology

Understand and apply basic research methods in psychology, including research design, data analysis, and interpretation.

Suggested Learning Outcomes

2.1. Describe the basic characteristics of the science of psychology.

2.2. Explain different research methods used by psychologists.
(a) Dscribe how various research designs address different types of questions and hypotheses
(b) Articulate strengths and limitations of various research designs
(c) Distinguish the nature of designs that permit causal inferences from those that do not

2.3. Evaluate the appropriateness of conclusions derived from psychological research.
(a) Interpret basic statistical results
(b) Distinguish between statistical significance and practical significance
(c) Describe effect size and confidence intervals
(d) Evaluate the validity of conclusions presented in research reports

2.4. Design and conduct basic studies to address psychological questions using appropriate research methods.
(a) Locate and use relevant databases, research, and theory to plan, conduct, and interpret results of research studies
(b) Formulate testable research hypotheses, based on operational definitions of variables
(c) Select and apply appropriate methods to maximize internal and external validity and reduce the plausibility of alternative explanations
(d) Collect, analyze, interpret, and report data using appropriate statistical strategies to address different types of research questions and hypotheses
(e) Recognize that theoretical and sociocultural contexts as well as personal biases may shape research questions, design, data collection, analysis, and interpretation

2.5. Follow the APA Code of Ethics in the treatment of human and nonhuman participants in the design, data collection, interpretation, and reporting of psychological research.

2.6. Generalize research conclusions appropriately based on the parameters of particular research methods.
(a) Exercise caution in predicting behavior based on limitations of single studies
(b) Recognize the limitations of applying normative conclusions to individuals
(c) Acknowledge that research results may have unanticipated societal consequences
(d) Recognize that individual differences and sociocultural contexts may influence the applicability of research findings

Goal 3. Critical Thinking Skills in Psychology

Respect and use critical and creative thinking, skeptical inquiry, and, when possible, the scientific approach to solve problems related to behavior and mental processes.

Suggested Learning Outcomes

3.1. Use critical thinking effectively.
   (a) Evaluate the quality of information, including differentiating empirical evidence from speculation and the probable from the improbable
   (b) Identify and evaluate the source, context, and credibility of information
   (c) Recognize and defend against common fallacies in thinking
   (d) Avoid being swayed by appeals to emotion or authority
   (e) Evaluate popular media reports of psychological research
   (f) Demonstrate an attitude of critical thinking that includes persistence, open-mindedness, tolerance for ambiguity and intellectual engagement
   (g) Make linkages or connections between diverse facts, theories, and observations

3.2. Engage in creative thinking.
   (a) Intentionally pursue unusual approaches to problems
   (b) Recognize and encourage creative thinking and behaviors in others
   (c) Evaluate new ideas with an open but critical mind

3.3. Use reasoning to recognize, develop, defend, and criticize arguments and other persuasive appeals.
   (a) Identify components of arguments (e.g., conclusions, premises/assumptions, gaps, counterarguments)
   (b) Distinguish among assumptions, emotional appeals, speculations, and defensible evidence
   (c) Weigh support for conclusions to determine how well reasons support conclusions
   (d) Identify weak, contradictory, and inappropriate assertions
   (e) Develop sound arguments based on reasoning and evidence

3.4. Approach problems effectively.
   (a) Recognize ill-defined and well-defined problems
   (b) Articulate problems clearly
   (c) Generate multiple possible goals and solutions
   (d) Evaluate the quality of solutions and revise as needed
   (e) Select and carry out the best solution

Goal 4. Application of Psychology

Understand and apply psychological principles to personal, social, and organizational issues.

Suggested Learning Outcomes

4.1. Describe major applied areas of psychology (e.g., clinical, counseling, industrial/organizational, school, health).

4.2. Identify appropriate applications of psychology in solving problems, such as
   (a) the pursuit and effect of healthy lifestyles
   (b) origin and treatment of abnormal behavior
   (c) psychological tests and measurements
   (d) psychology-based interventions in clinical, counseling, educational, industrial/organizational, community, and other settings and their empirical evaluation

4.3. Articulate how psychological principles can be used to explain social issues and inform public policy.
   (a) Recognize that sociocultural contexts may influence the application of psychological principles in solving social problems
   (b) Describe how applying psychological principles can facilitate change

4.4. Apply psychological concepts, theories, and research findings as these relate to everyday life.

4.5. Recognize that ethically complex situations can develop in the application of psychological principles.

Goal 5. Values in Psychology

Value empirical evidence, tolerate ambiguity, act ethically, and reflect other values that are the underpinnings of psychology as a science.

Suggested Learning Outcomes

5.1. Recognize the necessity for ethical behavior in all aspects of the science and practice of psychology.

5.2. Demonstrate reasonable skepticism and intellectual curiosity by asking questions about causes of behavior.

5.3. Seek and evaluate scientific evidence for psychological claims.

5.4. Tolerate ambiguity and realize that psychological explanations are often complex and tentative.

5.5. Recognize and respect human diversity and understand that psychological explanations may vary across populations and contexts.

5.6. Assess and justify their engagement with respect to civic, social, and global responsibilities

5.7. Understand the limitations of their psychological knowledge and skills.

Knowledge, Skills, and Values Consistent with Liberal Arts Education that are Further Developed in Psychology

Goal 6. Information and Technological Literacy

Demonstrate information competence and the ability to use computers and other technology for many purposes.

Suggested Learning Outcomes

6.1. Demonstrate information competence at each stage in the following process:
   (a) Formulate a researchable topic that can be supported by database search strategies
   (b) Locate and, choose relevant sources from appropriate media, which may include data and perspectives outside traditional psychology and Western boundaries
   (c) Use selected sources after evaluating their suitability based on
      - appropriateness, accuracy, quality, and value of the source
      - potential bias of the source
      - the relative value of primary versus secondary sources, empirical versus non-empirical sources, and peer-reviewed versus nonpeer-reviewed sources
   (d) Read and accurately summarize the general scientific literature of psychology

6.2. Use appropriate software to produce understandable reports of the psychological literature, methods, and statistical and qualitative analyses in APA or other appropriate style, including graphic representations of data.

6.3. Use information and technology ethically and responsibly.
   (a) Quote, paraphrase, and cite correctly from a variety of media sources
   (b) Define and avoid plagiarism
   (c) Avoid distorting statistical results
   (d) Honor commercial and intellectual copyrights

6.4. Demonstrate these computer skills:
   (a) Use basic word processing, database, email, spreadsheet, and data analysis programs
   (b) Search the World Wide Web for high quality information
   (c) Use proper etiquette and security safeguards when communicating through email

Goal 7. Communication Skills

Communicate effectively in a variety of formats.

Suggested Learning Outcomes

7.1. Demonstrate effective writing skills in various formats (e.g., essays, correspondence, technical papers, note taking) and for various purposes (e.g., informing, defending, explaining, persuading, arguing, teaching).
   (a) Demonstrate professional writing conventions (e.g., grammar, audience awareness, formality) appropriate to purpose and context
   (b) Use APA style effectively in empirically-based reports, literature reviews, and theoretical papers

7.2. Demonstrate effective oral communication skills in various formats (e.g., group discussion, debate, lecture) and for various purposes (e.g., informing,. defending, explaining, persuading, arguing, teaching).

7.3. Exhibit quantitative literacy.
   (a) Apply basic mathematical concepts and operations to support measurement strategies
   (b) Use relevant probability and statistical analyses to facilitate interpretation of measurements
   (c) Articulate clear and appropriate rationale for choice of information conveyed in charts, tables, figures, and graphs
   (d) Interpret quantitative visual aids accurately, including showing vigilance about misuse or misrepresentation of quantitative information

7.4. Demonstrate effective interpersonal communication skills.
   (a) Listen accurately and actively
   (b) Use psychological concepts and theory to understand interactions with others
   (c) Identify the impact or potential impact of their behaviors on others
   (d) Articulate ideas thoughtfully and purposefully
   (e) Use appropriately worded questions to improve interpersonal understanding
   (f) Attend to nonverbal behavior and evaluate its meaning in the communications context
   (g) Adapt communication style to accommodate diverse audiences
   (h) Provide constructive feedback to colleagues in oral and written formats

7.5. Exhibit the ability to collaborate effectively.
   (a) Work with groups to complete projects within reasonable timeframes
   (b) Solicit and integrate diverse viewpoints
   (c) Manage conflicts appropriately and ethically
   (d) Develop relevant workplace skills: mentoring, interviewing, crisis management

Goal 8. Sociocultural and International Awareness

Recognize, understand, and respect the complexity of sociocultural and international diversity.

Suggested Learning Outcomes

8.1. Interact effectively and sensitively with people from diverse backgrounds and cultural perspectives.

8.2. Examine the sociocultural and international contexts that influence individual differences.

8.3. Explain how individual differences influence beliefs, values, and interactions with others and vice versa.

8.4. Understand how privilege, power, and oppression may affect prejudice, discrimination, and inequity.
8.5. Recognize prejudicial attitudes and discriminatory behaviors that might exist in themselves and others.

Goal 9. Personal Development

Develop insight into their own and others' behavior and mental processes and apply effective strategies for self-management and self-improvement.

Suggested Learning Outcomes

9.1. Reflect on their experiences and find meaning in them.
  (a) Identify their personal and professional values
  (b) Demonstrate insightful awareness of their feelings, emotions, motives, and attitudes based on psychological principles
9.2. Apply psychological principles to promote personal development.
  (a) Demonstrate self-regulation in setting and achieving goals
  (b) Self-assess performance quality accurately
  (c) Incorporate feedback for improved performance
  (d) Purposefully evaluate the quality of one's thinking (metacognition)
9.3. Enact self-management strategies that maximize healthy outcomes.
9.4. Display high standards of personal integrity with others.

Goal 10. Career Planning and Development

Pursue realistic ideas about how to implement their psychological knowledge, skills, and values in occupational pursuits in a variety of settings.

Suggested Learning Outcomes

10.1. Apply knowledge of psychology (e.g., decision strategies, life span processes, psychological assessment, types of psychological careers) to formulating career choices.
10.2. Identify the types of academic experience and performance in psychology and the liberal arts that will facilitate entry into the work force, post-baccalaureate education, or both.
10.3. Describe preferred career paths based on accurate self-assessment of abilities, achievement, motivation, and work habits.
10.4. Identify and develop skills and experiences relevant to achieving selected career goals.
10.5. Demonstrate an understanding of the importance of lifelong learning and personal flexibility to sustain personal and professional development as the nature of work evolves.

APPENDIX – Samples of Program Learning Objectives

University of Colorado at Boulder

http://www.colorado.edu/pba/outcomes/units/unitindx.htm

Chemical Engineering

The educational objectives in the undergraduate program in the Department of Chemical Engineering are to:

- educate students in chemical engineering fundamentals and practice;
- train students in chemical process design and integration;
- train students in critical thinking and in the identification, formulation, and solution of open-ended engineering problems;
- help students be aware of their responsibility to conduct ethical, safe, and environmentally conscious engineering;
- train students to be good communicators and function effectively as individuals and in teams;
- provide students with knowledge of contemporary issues and understanding of the impact of engineering practices in global and societal contexts; and
- teach students the necessity and tools for continued, life-long learning.

In addition, students completing the undergraduate program in chemical engineering acquire the ability and skills to:

- apply knowledge of mathematics, science, and engineering;
- design and conduct experiments and analyze and interpret data;
- use modern engineering tools, skills, and methods for engineering practice;
- design processes and systems to meet desired performance specifications;
- identify, formulate, and solve engineering problems;
- understand professional and ethical responsibilities;
- communicate effectively in oral and written forms;
- function effectively on multidisciplinary teams;
- understand the impact of engineering solutions in global and societal contexts;
- know contemporary issues; and
- recognize the need for and have an ability to engage in life-long learning.

English

The undergraduate degree in English emphasizes knowledge and awareness of:

- canonical and noncanonical works of English and American literature;
- the general outlines of the history of British and American literature;
- literary theories, including recent theoretical developments; and
- the social and historical contexts in which the traditions developed.

In addition, students completing the degree in English are expected to acquire the ability and skills to:

- analyze literary texts;
- interpret texts on the basis of such analysis;
- relate analyses and interpretations of different texts to one another; and
- communicate such interpretations competently in written form.

The undergraduate degree in creative writing emphasizes knowledge and awareness of:

- literary works, including the genres of fiction, poetry, playwriting, and screenwriting, and the major texts of contemporary writers;
- literary history, including the origins and development of genres, major writers of the past, and the role of the writer in society; and
- literary analysis, including theories of literary composition and critical theory.

In addition, students completing the degree in creative writing are expected to acquire the ability and skills to:

- write in different poetic modes and styles;
- write in various fictive styles; and
- evaluate other students' written work.

History

The undergraduate degree in history emphasizes knowledge and awareness of:

- the main topics in the political, social, cultural, and economic history of the United States, from its origins to the present;
- the main topics in the political, social, cultural, and economic history of western civilization, from its origins in antiquity to the present;

- the main topics in the political, social, cultural, and economic history of one or more geographic areas outside Europe and America; and
- methodology in historical studies.

In addition, students completing the degree in history are expected to acquire the ability and skills to:

- research and conduct an investigation, consulting appropriate works for developing a bibliography;
- distinguish between primary and secondary sources, analyze arguments and interpretations, and recognize interpretative conflicts;
- interpret evidence found in primary sources and develop an historical argument based on and sustained by the evidence available; and
- produce historical essays that are coherent, cogent, and grammatically correct.

Mathematics

The undergraduate degree in mathematics emphasizes knowledge and awareness of:

- basic real analysis of one variable;
- calculus of several variables and vector analysis;
- basic linear algebra and theory of vector spaces;
- the structure of mathematical proofs and definitions; and
- at least one additional specialized area of mathematics.

In addition, students completing a degree in mathematics are expected to acquire the ability and skills to:

- use techniques of differentiation and integration of one and several variables;
- solve problems using differentiation and integration;
- solve systems of linear equations;
- give direct proofs, proofs by contradiction, and proofs by induction;
- formulate definitions;
- read mathematics without supervision; and
- utilize mathematics.

Sociology

The undergraduate degree in sociology emphasizes knowledge and awareness of:

- the basic data, concepts, theories, and modes of explanation appropriate to the understanding of human societies;
- the structure of modern American society, its social stratification, its ethnic, racial, religious, and gender differentiation, and its main social institutions - family, polity, economy, and religion;
- the basic social processes that maintain and alter social structure, especially the processes of integration, organization, and conflict; and
- the diversity of human societies, including the differences between major historical types such as foraging, agricultural, industrial, and post-industrial societies.

In addition, students completing the degree in sociology are expected to acquire the ability to:

- locate and consult works relevant to a sociological investigation and write a sociological paper that is coherent, cogent, and grammatically correct;
- understand the basic procedures of sociological research and analyze sociological data;
- understand and interpret the results of sociological research; and
- integrate and evaluate sociological writings.

University of Illinois at Urbana-Champaign

http://www.anthro.uiuc.edu/outcomes/

Each program must identify its general goals; learning objectives in three main areas: declarative knowledge, intellectual skills, and student attitudes.

English

General goals of the Undergraduate program:

The undergraduate majors in English and Rhetoric aim to develop students'

- familiarity with literatures written in English and with the outlines of British and American literary tradition;
- understanding of texts in their cultural and historical contexts;
- appreciation for the aesthetic qualities of literature and literary production;
- awareness of critical and interpretive methods;
- critical reading, thinking, and communication skills.

Desired Learning Outcomes:

Declarative Knowledge: The English and Rhetoric majors aim to increase students' familiarity with:

- literary terms, forms, and genres;
- representative authors and cultural characteristics of major literary historical periods;
- critical and interpretive methods;
- principles of composition and bibliographic reference.

Intellectual Skills and Abilities: The English and Rhetoric majors aim to improve students' ability

- to comprehend texts from a variety of historical periods and cultures and to relate them to each other formally, thematically, culturally, or historically;
- to understand the process by which literature is produced in response to and in reaction against prior literary texts and cultural settings;
- to construct critical and interpretive arguments;
- to reflect self-consciously on the cultural, psychological, and aesthetic bases of literary response;
- to write clear, coherent, and persuasive essays;
- to locate, evaluate, and use responsibly a variety of research materials from both the print and electronic media;
- to create original poetry, prose fiction, or drama;
- to adapt expository writing to different audiences and purposes.

Attitudes: The English and Rhetoric majors aim to increase students'

- appreciation for the aesthetic pleasures of literature and good writing;
- openness to a variety of cultural or ethnic perspectives;
- awareness of and reflection on personal values and openness to the possibility of self-transformation through reading and creating literature;
- commitment to intellectual honesty and integrity in the use of sources;
- confidence in critical thinking and analytic skills.

General Goals: the English Graduate Program in Literature and Writing Studies seeks to develop:

- the ability to conduct significant research in the fields of literary criticism and writing studies;
- the ability to teach a range of courses in Composition and in English, American, and World Literatures in English;
- the ability to understand and contribute to issues and debates in the field.

Desired Learning Outcomes

Declarative knowledge:

- broad knowledge of several of the historical fields in, literary genres of, and major critical approaches to English, American, and World Literatures in English; or, broad knowledge of Writing Studies issues and methodologies;
- specialized competence in the primary and secondary literature of an appropriate specialized sub-field of Literature or Writing Studies;
- development of a range of teaching methods and strategies appropriate for particular courses.

Intellectual Skills and Abilities:

- the ability to analyze literary and cultural texts with originality and rigor in the light of contemporary theory and to contribute to the field;
- the ability to write publishable critical essays and a book-length dissertation;
- teaching excellence.

Attitudes:

- respect for and understanding of the literatures and cultures of different historical periods, nationalities, genders, and ethnicities;
- respect for and appropriate use and acknowledgment of the scholarly work of others;
- respect for and commitment to students' intellectual growth.

History

General Goals: the undergraduate program in history seeks to develop:

- Effective learning and reasoning skills;
- Understanding of some of the various areas of history, including historiography and methodology.
- Career-Transferable Skills: transferable, functional abilities that are required in many different problem-solving and task-oriented situations.
    - information management skills
    - design and planning skills
    - research and investigation skills
    - communications skills

- human relations and interpersonal skills
- critical thinking skills
- management and administration skills

Learning Objectives.

Declarative Knowledge

The student should command:

- An understanding of the central concepts and language of history; and
- General competence in the historical areas the student has chosen to study.

Intellectual Skills:

- Ability to formulate and solve research problems; and
- Effective written and verbal communication skills.
  - Focus: A well-focused piece of writing or presentation is one in which all of the elements work together toward a common, coherent goal. Such a piece of writing might discuss many different perspectives, but the goal of the discussion will be clear, and the different elements will each contribute toward meeting that goal.
  - Support: Supporting evidence plays a crucial role in any academic writing or presentation, because academic writing is generally argumentative or persuasive. To convince or persuade in a logic-driven genre, one needs evidence.
  - Organization: A well-organized piece of writing makes the reader's job easier -- it helps bring the reader efficiently and comfortably to the thesis or objective and then through the argumentation which supports that thesis. Organization is all about intentionality -- when an academic writer is writing well, the arrangement of her material is rarely accidental, but rather is carefully chosen so that her argument is represented in the best possible way.

Attitudes. The student should:

- Promote cross-cultural awareness and understanding
- Subscribe to the ethical codes of the historical discipline based on the American Historical Association's Statement on Standards of Professional Conduct, 1998 Edition.

Business Administration

Desired Learning Outcomes

Students pursuing either the B.S. degree or the M.S. degree in Business Administration are expected to have:

- knowledge and understanding of the basic functional areas of business management;
- knowledge and understanding of one or more areas of concentration including the critical skills necessary to solve business problems;
- knowledge of written and verbal communication skills, and computer use;
- knowledge of the legal and international environments in which businesses operate;
- knowledge of mathematics and statistics sufficient to apply quantitative reasoning and analysis;
- knowledge of the economic, political science and behavioral science fields to be able to manage human and material resources effectively.

In addition, students completing these two degrees are expected to demonstrate the ability to:

- apply basic business principles to solve new and recurring decision problems;
- conceptualize and analyze business problems;
- communicate their conceptualization, analyses, and solutions effectively, both verbally and in writing.

Materials Science and Engineering

Desired Learning Outcomes

The mission of the Department of Materials Science and Engineering is to meet the needs of society and our profession through excellence in education, research and service; to educate scientist and engineers who will become leaders in their chosen field; and to generate new science and engineering- based knowledge for the benefit of society and the profession.

Specific Goals of the Program

Undergraduate Program

- To provide undergraduate students with an understanding of the underlying principles of synthesis, characterization and processing of materials and of the interrelationships among structure, properties and processing.
- To prepare graduates for professional careers in a wide variety of industries as well as for advanced study.

Graduate program

- To provide students with expertise in the principles of synthesis, characterization and processing of a materials area and of the interrelationships between structure, properties and processing.
- To prepare graduates for positions of leadership in industry, government and academia.

Department Educational Objectives

Undergraduate Program

- To provide students with the necessary foundation for entry level industrial positions in materials related industries or advanced study programs through rigorous instruction in the fundamentals of materials science and engineering.
- To provide students with an introduction to team work and communication techniques to prepare them for successful careers in industry or advanced study programs.
- To provide students with the opportunity to broaden their education in engineering and science or expand their knowledge in a particular technical area by offering a choice of technical and free electives. To provide students with the opportunity to participate in the Co-op and Study Abroad programs.
- To provide students with opportunities to learn and grow as individuals, contribute to society and to appreciate the ability to achieve their goals through life-long learning.

Graduate program

- To provide graduate students with the necessary foundation for advanced level positions in materials related industrial, government, and academic positions.
- To provide graduate students with the opportunity to perform original research either individually or as a member of a team.
- To provide graduate students with the opportunity to develop and utilize written and oral communication skills.
- To provide graduate students with the opportunity to broaden their knowledge base through a choice of courses in materials related subjects.
- To provide graduate students with opportunities to learn and grow as individuals, contribute to society and to appreciate the desirability of life-long learning.

Educational Outcomes

Undergraduate program

The educational outcomes for undergraduate students are determined by the educational outcomes set by ABET. Undergraduate students will have

- An ability to apply knowledge of mathematics, science and engineering to materials science and engineering problems.
- An ability to design and conduct experiments.
- An ability to analyze and interpret data.
- An ability to design systems or processes to meet needs.
- An ability to function on multi-disciplinary teams.
- An ability to identify, formulate and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- A broad education.
- A recognition for the need to engage in life-long learning.
- A knowledge of contemporary issues.
- An ability to use techniques, skills and tools necessary for materials engineering practice.
- Familiarity with chemistry, physics and advanced mathematics.

Graduate program

Graduate students will have:

- An ability to conduct original research.
- An ability to utilize and evaluate existing literature.
- An ability to apply knowledge of mathematics, science and engineering to materials science and engineering problems.
- An ability to design and conduct experiments.
- An ability to analyze and interpret data.
- An ability to design systems, components or processes to meet needs.
- An ability to identify, formulate and solve materials science and engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- An in-depth and broad knowledge of materials science and engineering.
- A recognition for the need to engage in life-long learning.

San Diego State University

http://dus.sdsu.edu/assessment/department_learning_goals.pdf

College of Arts and Letters

Africana Studies

Goal 1 Demonstrate a thorough knowledge of African culture and worldview.

Objective 1.1 Explain the major principles and values of Africana worldview and culture.

Objective 1.2 Explain the major moral, philosophical and ethical elements of Africana worldview and culture.

Objective 1.3 Explain the role of Africana worldview in contemporary society.

Classics and Humanities

Goal 1 Develop critical faculties to describe literary and artistic form and content, to interpret meaning, and to gauge effect.

Objective 1.1 Apply sound rhetorical principles to argumentation and discussion.

Objective 1.2 Distinguish between literal and figurative expression and between sound logic and fallacy.

Economics

Goal 1 Develop the ability to explain core economic terms, concepts and theories.

Objective 1.1 Explain supply, demand, and the function of markets and prices as allocative mechanisms.

Objective 1.2 Apply the concept of equilibrium at the macro and micro economic levels.

Objective 1.3 Identify key macroeconomic indicators and measures of economic changes and growth.

Objective 1.4 Identify and discuss the key concepts underlying international trade and international financial flows.

Objective 1.5. Assess the role of both domestic and international institutions and laws in shaping different economic outcomes, especially in the context of market- based economies.

European Studies

Goal 1 Illustrate knowledge of the cultural history of Europe.

Objective 1.1 Compare the origins of a specific cultural manifestation in two or more European countries.

Objective 1.2 Differentiate among the diverse cultures that form modern Europe.

Objective 1.3 Interpret differing perspectives on European unity.

Linguistics & Oriental Languages

Goal 1 Demonstrate the ability to think critically, reason logically, and comprehend scholarly writing on a linguistic topic.

Objective 1.1 Produce academic papers synthesizing notions from topics in linguistics.

Objective 1.2 Articulate similarities and differences across different theoretical positions in linguistics.

Women's Studies

Goal 1 Understand the intersectionality of different dimensions of social organization gender, race, class, culture, etc) as concepts and as lived experience.

Objective 1.1 Articulate a way of looking at the world from the standpoint of diverse women nationally and internationally.

Objective 1.2 Discuss the way that gender is shaped by race, class, and culture.

Objective 1.3 Identify ways that people negotiate and represent multiple identities.

College of Business Administration

School of Accountancy

Goal 1 Demonstrate a fundamental knowledge of accounting regulation, including application of income taxation and assurance standards.

Objective 1.1 Analyze, research, implement, and report on federal income tax provisions in the context of planning and compliance decisions.

Objective 1.2 Analyze, research, implement, and report assurance (attestation and audit) standards in audit planning, audit program design and implementation, and accountants' reporting for the major types of engagements.

Financial Services

Goal 1 Understand consumer financial needs and the mechanism available for fulfilling their needs.

Objective 1.1 Describe the various financial products, services and strategies offered by a variety of financial services institutions.

Objective 1.2 Evaluate financial products and strategies offered by a variety of financial services institutions for suitability and appropriateness in meeting consumer needs.

Objective 1.3 Prepare a plan for efficient wealth creation and management including planning for cash and debt management, investing, insurance, retirement, education needs, incapacity, and efficient wealth transfer.

Goal 2 Understand the role of technology and the legal, ethical and economic environment as it relates to financial services.

Objective 2.1 Analyze the impact of tax and pension law on various financial decisions including accumulation and transfer of wealth.

Objective 2.2 Identify conflicts of interest between market participants and between principal and agent.

Objective 2.3 Evaluate the economic environment and the impact of governmental economic policies on consumers and financial services firms.

Objective 2.4 Describe the impact that financial innovation, advances in technology, and changes in regulations has had on the structure of the financial services industry.

Masters of Business Administration

Goal 1 Develop a solid foundation in theoretical concepts and managerial skills needed to lead business organizations.

Objective 1.1 Apply concepts and decision models in organizational behavior, finance, economics, marketing, and production to make business decisions.

Objective 1.2 Employ methods of financial and cost accounting and statistical data analysis to support business decision-making.

Goal 2 Develop an awareness of the domestic and global economic, legal, ethical, and technological environment in which managers make and implement decisions.

Objective 2.1 Identify and critically analyze salient legal and moral business issues.

Objective 2.2 Evaluate the impact that changes in the domestic and global economic environment have on the business climate.

Objective 2.3 Analyze the impact that technological and product innovations have on the competitiveness of firms.

College of Education

Postsecondary Education Leadership Program

Goal 1 Describe and evaluate the major theories of adult learning and select a theory(ies) upon which to build practice in a postsecondary environment.

Objective 1.1 Recognize the major adult developmental stages affecting learning.

Objective 1.2 Design a lesson, unit, or program taking into account adult developmental tasks associated with one or more stages.

Objective 1.3 Construct a philosophy about adult learning and teaching adults utilizing adult learning theories.

College of Professional Studies and Fine Arts

Child and Family Development

Goal 1 Understand family dynamics and interaction across the life span.

Objective 1.1 Discuss theories of family dynamics throughout the life span.

Objective 1.2 Explain the dynamics of prevention and treatment in families.

Objective 1.3 Apply family theories to contemporary and ethnically diverse families.

College of Sciences

Biology Department

Goal 1 Explain the interactions of organisms with their environments and with each other.

Objective 1.1 Describe ecosystems as existing of populations of organisms plus physical characteristics, nutrient cycles, energy flow and controls.

Objective 1.2 Explain how populations of the same and different species interact dynamically in communities.

Objective 1.3 Propose one or more hypotheses that plausibly suggest how species can play similar roles and co-exist in a community.

Goal 2 Explain the process of natural selection and how it contributes to the formation of species and biodiversity.

Objective 2.1 Compare the modes of sorting for biological variation, including natural selection, random drift and sexual selection.

Objective 2.2 Explain how genes, chromosomes and alleles are related to one another, and compare their roles in the transmission of genetic information.

Objective 2.3 Propose one or more hypotheses that plausibly suggest mechanisms for changing gene frequencies within and among populations.

Goal 3 Explain the mechanisms by which biomolecules assemble and function to form uni-and multicellular organisms.

Objective 3.1 Describe the structural characteristics and mechanisms of assembly of the main categories of biomolecules (nucleic acids, proteins and lipids), and how each group of biomolecules contributes to cellular structure and function.

Objective 3.2 Explain prokaryotic and eukaryotic cellular structures, and their functions, and discuss the ways in which prokaryotic cells exist in their environments, and the ways in which eukaryotic cells contribute to tissue and organ structure and function.

Objective 3.3 Discuss cellular energetics by describing the processes of glycolysis, oxidative phosphorylation, photosynthesis, the flow of carbon amongst these processes, and how the chemical energy resulting from the process is used to support life at the cellular level.

Psychology

Goal 1 Understand the developmental, cognitive, social, and biological bases of normal and abnormal/maladaptive behavior.

Objective 1.1 Explain the roles of persons and situations as causes of behavior.

Objective 1.2 Explain the nature-nurture controversy, and cite supportive findings from different areas of psychology for each side.

Goal 2 Understand the process of psychological inquiry, including the formulation of hypotheses and the methods and designs used to test hypotheses.

Objective 2.1 Formulate scientific questions using operational definitions.

Objective 2.2 Demonstrate familiarity with the concepts and techniques of testing hypotheses.

APPENDIX – An Example of Objectives/Outcomes and Curriculum Mapping

The material below is a comprehensive approach to showing how individual course objectives support overall program goals/objectives/outcomes and how courses in a curriculum align to provide intended learning outcomes. For an article describing the system see http://www.engineer.ucla.edu/stories/2004/eeweb1.htm

UCLA Electrical Engineering Department

Oct 22, 2005

Program Objectives taken from http://www.eeweb.ee.ucla.edu/department_mission.php

Department Mission Statement:

In partnership with its constituencies, the mission of the Electrical Engineering Department at UCLA is:

- To produce highly qualified, well-rounded, and motivated students with fundamental knowledge in Electrical Engineering to serve California, the Nation, and the World.
- To pursue creative research and new technologies in Electrical Engineering and across disciplines in order to serve the needs of industry, government, society, and the scientific community by expanding the body of knowledge in the field.
- To develop partnerships with industrial and government agencies.
- To achieve visibility by active participation in conferences and technical and community activities.
- To publish enduring scientific articles and books.

Program Educational Objectives:

In consultation with its constituents, the Electrical Engineering Department at UCLA has set its educational objectives as follows:

1: Fundamental Knowledge:	Graduates of the program will be skilled in the fundamental concepts of electrical engineering necessary for success in industry or graduate school.
2: Specialization:	Graduates of the program will be prepared to pursue career choices in electrical engineering, computer engineering, biomedical engineering, or related interdisciplinary fields that benefit from a strong background in applied sciences or engineering.
3: Design Skills:	Graduates of the program will be prepared with problem solving skills, laboratory skills, and design skills for technical careers.
4: Professional Skills:	Graduates of the program will be prepared with communication and teamwork skills as well as an appreciation for ethical behavior necessary to thrive in their careers.
5: Self Learning:	Graduates of the program will be prepared to continue their professional development through continuing education and personal development experiences based on their awareness of library resources and professional societies, journals, and meetings.

Program Constituents:

The Program Educational Objectives are determined and evaluated through a regular consultation and examination process that involves four core constituents: Students, Alumni, Industry, and Faculty.

- Student input is obtained through a standing departmental Student Advisory Committee consisting of representatives from several student organizations, student representation in regular faculty meetings, annual departmental Town Hall meetings, exit interviews with graduating students, student evaluation forms, and individual faculty-student advisee interaction.
- Alumni input is obtained through a standing departmental Alumni Advisory Board, surveys with department Alumni, and exit surveys with graduating students.
- Industry input is obtained through surveys with industry participants at the annual departmental Research Symposium, surveys with department Alumni, and surveys with participants in the department's Industry Affiliate Program.
- Faculty input is obtained through a standing ABET departmental committee, regular faculty meetings, annual departmental retreats, and the departmental courses and curriculum committee. Input from other engineering faculty in the School of Engineering and Applied Science is obtained through the Faculty Executive Committee.

In addition, in order to facilitate the participation of the constituencies in the formulation and evaluation of the Program Educational Objectives, and in order to solicit further input and feedback, these objectives are publicized on the Department's web page, in the Department's Annual Report, and in the School of Engineering and Applied Science catalog of courses.

Program Outcomes:

Students graduating from the Electrical Engineering Department at UCLA will be expected and prepared to exercise the skills and abilities (a) through (n) listed in the table of Program Outcomes below. The table also indicates how the Program Outcomes relate to the Program Educational Objectives.

	Program Educational Objectives				
	1	2	3	4	5
a. Ability to apply knowledge of mathematics, science, and engineering.	X	X	X		X
b. Ability to design and conduct experiments, as well as to analyze and interpret data.	X	X	X		X
c. Ability to design a system, component, or process to meet desired needs.	X	X	X		X
d. Ability to function on multi-disciplinary teams.	X	X	X	X	X
e. Ability to identify, formulate, and solve engineering problems.	X	X	X		X
f. Understanding of professional and ethical responsibility.				X	
g. Ability to communicate effectively.				X	X
h. Broad education necessary to understand the impact of engineering solutions in a global and societal context.	X			X	X
i. Recognition of the need for, and an ability to engage in life-long learning.	X			X	X
j. Knowledge of contemporary issues.	X				X
k. Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	X	X	X		X
l. Knowledge of probability and statistics, including applications to electrical engineering.	X	X	X		X
m. Knowledge of mathematics through differential and integral calculus, and basic and engineering sciences, necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components, as appropriate to electrical engineering.	X	X	X		X
n. Knowledge of advanced mathematics, including differential equations, linear algebra, and complex variables.	X	X	X		X

Assessment Tools:

The assessment process of the Program Educational Objectives relies on several tools that seek feedback from students, instructors, alumni, Alumni Advisory Board, and the Student Advisory Committee. The input is analysed by the department, its instructors and its ABET committee.

	Assessment Tool	Administrered By	Examined By
Program outcomes specific to each course	¤ End-of-course surveys (Quarterly).	Department & Instructors	ABET Committee
	¤ Student comments (Quarterly).	Department & Instructors	ABET Committee
	¤ Instructor evaluation reports (Quarterly).	Department	ABET Committee
	¤ ABET problems (Quarterly)	Instructors and TAs	ABET Committee
	¤ Classroom work (Quarterly).	Instructors and TAs	Instructors and TAs
	¤ Course performance reports (Quarterly)	Department	Instructors and TAs
	¤ Course performance history plots (Quarterly)	Department	Instructors and TAs
Program outcomes evaluated over all courses	¤ End-of-course surveys (Quarterly).	Department & Instructors	ABET Committee
	¤ Instructor evaluation reports (Quarterly).	Department	ABET Committee
	¤ ABET problems (Quarterly)	Department	ABET Committee
	¤ Department performance report (Quarterly).	Department	ABET Committee
	¤ Student exit survey (Yearly).	Department	ABET Committee
	¤ Alumni survey (Yearly).	Instructors and TAs	ABET Committee
	¤ Alumni Advisory Board (Twice yearly).	Department	ABET Committee
	¤ Student Advisory Committee (Twice yearly).	Department	ABET Committee
Program Educational Objectives	¤ Department performance report (Yearly)	Department	ABET Committee
	¤ Alumni survey (Yearly).	Department	ABET Committee
	¤ Student exit survey (Yearly).	Department	ABET Committee
	¤ Alumni Advisory Board (Twice yearly).	Department	ABET Committee
	¤ Student Advisory Committee (Twice yearly).	Department	ABET Committee

Implementation:

The assessment process is meant to ensure that the Program Outcomes that are important to the Mission of the Department and its Program Educational Objectives are being monitored and measured. The results of the assessment process are regularly

applied to the improvement of the Program. The diagram below summarizes the feedback process that is in place for the (i) Formulation and Examination of the Program Educational Objectives as well as for its (ii) Application and Evaluation.

The constituents (Faculty, Students, Alumni, and Industry) of the department are engaged in the following manner in the department assessment activities.

Faculty and Instructors. Prior to the start of an undergraduate course, every instructor is advised to review the:

1. ***Course Objectives and Outcomes Form*** of his/her course in order to familiarize themselves with the expected outcomes for the course and how these specific course outcomes relate to the overall Program Outcomes.
2. ***Past Course Performance Form*** of his/her course in order to familiarize themselves with the performance of the course in prior offerings and in order to identify any points of weakness that may require additional emphasis.

During the offering of an undergraduate course, every instructor is asked to:

1. Save samples of student works (homework and exam solutions, lab and design reports) on a regular basis.
2. Assess the contribution of the course to its Strong Program Outcomes through the selection of an ***ABET problem*** and by evaluating student performance on the problem.
3. Upload the information pertaining to the ABET problem, its solution, and sample student responses into the course archives.
4. Complete and file an ***Instructor Evaluation of Student Performance*** in order to comment on the overall course performance towards meeting its objectives and specific outcomes.
5. Encourage students to participate in the **End-of-Course Surveys**.

The teaching assistants of undergraduate courses also participate in the above tasks.

Students. The department engages its undergraduate students and collects their feedback for accreditation purposes through the online ***End-of-Course Student Surveys.*** The Student Surveys collect student input on course material, course organization, and instruction. Besides asking students questions about the quality of a course and its instruction, the surveys also assess, for each course, the main topics that students are expected to have been exposed to during the course. Students are asked to rate, on a scale from Poor to Excellent, whether they feel they have had an opportunity to learn the Specific Course Outcomes well. The student input is then summarized and tracked in:

1. Individual reports on Course Performance for each course offering.
2. Yearly reports on Course Performance during an academic year.
3. Quarterly reports on Department Performance.
4. Yearly reports on Department Performance.

The department also collects student feedback through two additional mechanisms:

1. ***Exit surveys*** administered to graduating seniors.
2. ***Student Advisory Committee.*** The committee is composed of the Presidents of the IEEE and HKN student organizations, representatives of the SWE (Society for Women Engineers), and ESUC (Engineering Society of the University of California), and two graduate student representatives (one MS and one PhD); both graduate students are selected from among those that have completed their undergraduate studies in EE at UCLA. The committee meets twice yearly (Fall and Spring).

Alumni and Industry. The department engages its alumni in its assessment mechanism in two ways:

1. ***Alumni Advisory Board.*** The board consists of 10 alumni members from industry and academia. It meets twice yearly (Fall and Spring) and examines issues related to alumni activities and to department performance in meeting its Educational Objectives and Program Outcomes.
2. ***Alumni Survey*** administered to alumni from prior years.

Since several members of the Alumni Advisory Board are members of industry and hold management positions at leading companies that hire a good number of our graduating seniors, their input is used by the department as the link between the department and its industry partners. Likewise, the alumni survey helps to collect feedback from alumni in various industries.

ABET Problem. The ABET problem functionality engages the instructor rather directly in the assessment mechanism. It is the main mechanism used to obtain instructor feedback on whether the students in the course achieved some of the desired course outcomes. The ABET problem functionality is as follows.

Each undergraduate course in the department contributes to a list of Program Outcomes. Usually, a course contributes strongly to some outcomes and less strongly to other outcomes. While a course may contribute to several ABET outcomes, usually only a subset of its strong outcomes are used for ABET assessment under the ABET problem requirement.

The ABET problem is meant to measure how well the students in a course learned some of the most significant (strong) Program Outcomes that a course contributes to. The ABET problem could be chosen as any of the following:

1. One of the problems in a midterm or a final examination in a lecture course.
2. One of the problems in a quiz in a laboratory course.
3. The instructor's personal evaluation of a student ability to participate in teamwork, to successfully complete a design assignment, to write good technical reports, or to make good presentations. This option, in combination with others, may be useful for laboratory courses required to assess student ability to function in a team or for design courses that do not have examinations or quizzes.

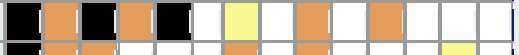
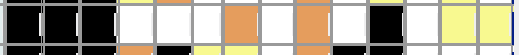
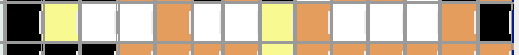
Saving Samples of Student Works. Each undergraduate course is required to save samples of student homework solutions, laboratory reports, project or design reports, and exam solutions, typically from poor to good quality. At the end of each quarter, the teaching assistants of all undergraduate courses must compile a binder containing in addition to the solutions, the corresponding homework questions, exam questions, lab description, and project description. Specifically, each course binder needs to be organized as follows, for each course offering:

1. **Page 1**. A cover page listing the number of the course, the title of the course, the quarter and year, instructor's name, and teaching assistant(s)' name(s).
2. **Page 2**. A copy of the course info handout. Preferably, the completed Class Info page from EEweb should be printed and used.
3. **Page 3.** A table listing the grades of the students whose performance has been tracked for all assignments, exams, and their overall course grade. This information can be obtained from the course gradebook. Do not identify the students. Refer to the students instead as Students A, B, C, and so forth.
4. **Page 4**. A histogram of the course grade distribution. This information can be obtained from the course gradebook as well. The histogram can be printed.
5. **Pages 5-6**. A printout of the ABET problem for the course, its solution, and the instructor's evaluation of the student performance on this problem. The histogram of the ABET problem grade distribution should be printed and included as well.
6. **Afterwards:** Copies of sample student solutions of the ABET problem. Do not identify the students by name. Instead, refer to them as Students A, B, C, and so forth.
7. **Afterwards:** Copies of the homework assignments and the exams. Remove student names and student ID numbers.
8. **Afterwards:**
   Copies of work samples by Student A
   Copies of work samples by Student B
   Copies of work samples by Student C

Curriculum mapping taken from http://www.eeweb.ee.ucla.edu/course_contribution.php

Contribution of Courses to Program Outcomes:

			Program Outcomes													
Type	**Units**	**Course Number & Title**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**	**n**
LEC	4	CHEM20A Chemical Structure														
LEC	4	CHEM20B Chemical Energetics and Change														
LAB	3	CHEM20L General Chemistry Laboratory														
LEC	4	EE1 Electrical Engineering Physics I														
LEC	4	EE2 Physics for Electrical Engineers														
LEC	4	EE10 Circuit Analysis I														
LEC	4	EEM16 Logic Design of Digital Systems														
LEC	4	EE100 Electrical and Electronic Circuits														
LEC	4	EE101 Engineering Electromagnetics														
LEC	4	EE102 Systems and Signals														
LEC	4	EE103 Applied Numerical Computing														
LEC	4	EE110 Circuit Analysis II														
LAB	2	EE110L Circuit Measurements Laboratory														
LEC	4	EE113 Digital Signal Processing														
DES	4	EE113D Digital Signal Processing Design														

DES	4	EE114D Speech and Image Processing Systems Design	
LEC	4	EE115A Analog Electronic Circuits I	
LAB	2	EE115AL Analog Electronics Laboratory I	
LEC	4	EE115B Analog Electronic Circuits II	
LAB	4	EE115BL Analog Electronics Laboratory II	
LEC	4	EE115C Digital Electronic Circuits	
DES	4	EE115D Design Studies in Electronic Circuits	
DES	4	EE116B VLSI System Design	
LEC	4	EEM116C Computer Systems Architecture	
DES	4	EEM116D Digital Design Project Laboratory	
LAB	2	EEM116L Introductory Digital Design Laboratory	
OTH	6	EEM117 Computer Communications Networks: The Physical Layer	
DES	4	EE118D VLSI System Design	
LEC	4	EE121B Principles of Semiconductor Device Design	
LAB	5	EE122AL Semiconductor Devices Laboratory	
LEC	4	EE123A Fundamentals of Solid-State I	
LEC	4	EE123B Fundamentals of Solid-State II	
LEC	4	EE124 Semiconductor Physical Electronics	
DES	4	EE129D Semiconductor Processing and Device Design	
LEC	4	EE131A Probability	
LEC	4	EE131B Introduction to Stochastic Processes	
LEC	4	EE132A Introduction to Communication Systems	
LEC	4	EE132B Data Communications and Telecommunication Networks	
LEC	4	EE141 Principles of Feedback Control	
LEC	4	EE142 Linear Systems: State-Space Approach	
LEC	4	EEM150 Introduction to Micromachining and MEMS	
LAB	2	EEM150L Introduction to Micromachining and MEMS Laboratory	
LEC	4	EE161 Electromagnetic Waves	
LEC	4	EE162A Wireless Communication Links and Antennas	
LEC	4	EE163A Introductory Microwave Circuits	
LEC	4	EE163C Active Microwave Circuits	
LAB	2	EE164AL Microwave Wireless Laboratory I	
DES	2	EE164DL Microwave Wireless Laboratory II	
LAB	4	EEM171L Data Communication Systems Laboratory	
LEC	4	EE172 Introduction to Lasers and Quantum Electronics	
LAB	4	EE172L Laser Laboratory	
LEC	4	EE173 Photonic Devices	
DES	4	EE173DL Photonics and Communication Design Laboratory	
LEC	4	EE174 Semiconductor Optoelectronics	
DES	4	EE180D Systems Design	
LEC	4	EEM185 Introduction to Plasma Electronics	
OTH	4	EE194 Research Group Seminars	
OTH	8	EE199 Special Studies	
LEC	4	ENGR183 Engineering and Society	

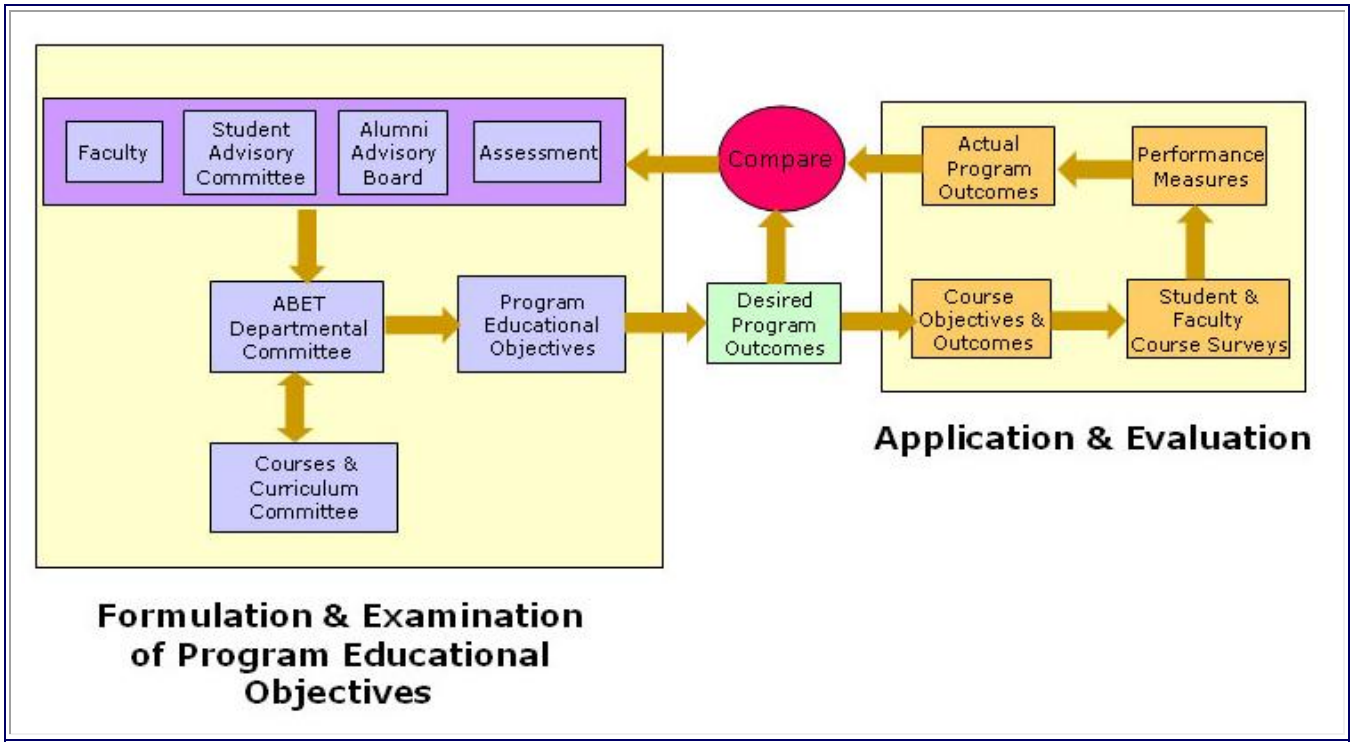
LEC	4	ENGR185 Art of Engineering Endeavors	
LEC	4	MATH31A Differential Calculus	
LEC	4	MATH31B Integration and Infinite Series	
LEC	4	MATH32A Calculus of Several Variables	
LEC	4	MATH32B Calculus of Several Variables	
LEC	4	MATH33A Linear Algebra and Applications	
LEC	4	MATH33B Differential Equations	
LEC	5	PHY1A Physics for Scientists and Engineers: Mechanics	
LEC	5	PHY1B Physics for Scientists and Engineers: Oscillations, Waves, Electric and Magnetic Fields	
Number of courses contributing strongly to each program outcome			63 26 34 12 18 9 10 8 8 9 14 4 12 9

Legend:

LEC - Lecture course
LAB - Laboratory course
DES - Design course
OTH - Other

- Strong contribution
- Average contribution
- Some contribution
- No contribution

Program Outcomes	Courses with Strong Contribution to each Outcome
a	CHEM20A, CHEM20B, CHEM20L, EE1, EE2, EE10, EEM16, EE100, EE101, EE102, EE103, EE110, EE113, EE113D, EE114D, EE115A, EE115AL, EE115B, EE115BL, EE115C, EE115D, EE116B, EEM116C, EEM116D, EEM117, EE118D, EE121B, EE122AL, EE123A, EE123B, EE124, EE129D, EE131A, EE131B, EE132A, EE132B, EE141, EE142, EEM150, EE161, EE162A, EE163A, EE163C, EE164AL, EE164DL, EEM171L, EE172, EE172L, EE173, EE173DL, EE174, EE180D, EEM185, EE194, EE199, MATH31A, MATH31B, MATH32A, MATH32B, MATH33A, MATH33B, PHY1A, PHY1B
b	EE102, EE103, EE110L, EE113, EE113D, EE114D, EE115AL, EE115BL, EE115D, EEM116D, EEM117, EE122AL, EE131A, EE132A, EE141, EEM150L, EE161, EE163C, EE164AL, EE164DL, EEM171L, EE172L, EE173DL, EE180D, EE194, EE199
c	EE102, EE103, EE110L, EE113, EE113D, EE114D, EE115AL, EE115B, EE115BL, EE115C, EE115D, EE116B, EEM116D, EEM117, EE118D, EE122AL, EE129D, EE131A, EE132A, EE141, EEM150, EE161, EE163A, EE163C, EE164AL, EE164DL, EEM171L, EE172L, EE173, EE173DL, EE174, EE180D, EE194, EE199
d	EE110L, EE113D, EE115AL, EE115BL, EE115D, EE122AL, EEM150L, EE180D, EE194, EE199, ENGR183, ENGR185
e	EE10, EE110, EE110L, EE113D, EE114D, EE115AL, EE115BL, EE115C, EE115D, EE116B, EEM116D, EEM117, EE118D, EE129D, EE164DL, EE180D, EE194, EE199
f	EE113D, EE115BL, EEM117, EEM171L, EE173DL, EE194, EE199, ENGR183, ENGR185
g	EE110L, EE113D, EE115AL, EE115D, EE122AL, EE129D, EE173DL, EE194, EE199, ENGR183
h	EE113D, EE115BL, EEM117, EEM171L, EE194, EE199, ENGR183, ENGR185
i	EE113D, EE114D, EE115D, EEM116D, EE194, EE199, ENGR183, ENGR185
j	EE113D, EE122AL, EE132B, EE164DL, EE180D, EE194, EE199, ENGR183, ENGR185
k	EE110L, EE113D, EE115AL, EE115BL, EE115D, EEM116L, EEM117, EEM150, EEM150L, EE164AL, EE164DL, EE180D, EE194, EE199
l	EE131A, EE131B, EE132A, EE132B
m	EE2, EE100, EE102, EE103, EE115D, EEM171L, MATH31A, MATH31B, MATH32A, MATH32B, PHY1A, PHY1B
n	EE2, EE101, EE103, EE172, EEM185, MATH33A, MATH33B, PHY1A, PHY1B



Course Objectives example taken from http://www.eeweb.ee.ucla.edu/class_course_objectives.php?/ee10/1/fall/5

ABET Course Objectives and Outcomes Form

Course number and title:	EE10 Circuit Analysis I
Credits:	4
Instructor(s)-in-charge:	B. Daneshrad (babak@ee.ucla.edu) W. J. Kaiser (kaiser@ee.ucla.edu)
Course type:	Lecture
Required or Elective:	Required for majors in electrical engineering, computer engineering, biomedical engineering, and computer science and engineering.
Course Schedule:	**Lecture:** 3 hrs/week. Meets two to three times weekly. **Dicussion:** 1 hr/discussion section. Multiple discussion sections offered per quarter. **Outside Study:** 9 hrs/week. **Office Hours:** 6 hrs/week by instructor. 2 hrs/week by each teaching assistant.
Course Assessment:	**Homework:** 8 assignments **Exams:** 1 midterm and 1 final.
Grading Policy:	Typically 10% homework, 35% midterm, 55% final.
Course Prerequisites:	EE1 or Physics 1C. Co-requisite Math 33A.
Catalog Description:	Introduction to linear circuit analysis. Resistive circuits, Kirchhoff laws, operational amplifiers, node and loop analysis, Thevenin and Norton theorem, capacitors and inductors, duality, first-order circuits, step response, second-order circuits, natural response, forced response.
Textbook and any related course material:	¤ J. Nilsson and S. Riedel, Electrical Circuits, 6th Edition, Prentice Hall, NJ, 2001.
Course Website	
Topics covered in the course and level of coverage:	¤ Introduction to circuit and system engineering, design, and analysis. 1 hrs. ¤ Fundamental resistive and reactive circuit elements. 2 hrs. ¤ Fundamental circuit laws. 2 hrs. ¤ Nodal and mesh circuit analysis methods. 6 hrs.

¤ Source equivalent circuits: Norton and Thevenin equivalent circuits.	2 hrs.
¤ Introduction to feedback principles.	2 hrs.
¤ Introduction to operational amplifier circuits and applications.	5 hrs.
¤ Analysis of first-order circuit systems.	4 hrs.
¤ Analysis of second-order circuit systems.	4 hrs.
¤ SPICE circuit analysis.	2 hrs.

Course objectives and their relation to the Program Educational Objectives:

This is a required course for electrical engineering, with computer and biomedical engineering options as well as computer science and engineering. EE10 introduces the principles of circuits and systems and their role in electrical engineering . EE10 then introduces and demonstrates the power of the fundamental circuit laws, source equivalent circuits, and analysis methods. This is followed by an introduction to the principle of negative feedback and its impact on circuit performance and design. Operational amplifier properties and operational amplifier circuits follow. Finally, the properties and applications of reactive circuit elements are introduced along with first and second order circuits. Students are prepared to analyze circuit properties with these tools and methods for each circuit type using both manual methods and PSpice tools. This course contributes to the Educational Objectives 1 (Fundamental Knowledge), 2 (Specialization), 3 (Design Skills), and 5 (Self-Learning).

Contribution of the course to the Professional Component:

Engineering Topics:	100 %
General Education:	0 %
Mathematics & Basic Sciences:	0 %

Expected level of proficiency from students entering the course:

Mathematics:	Strong
Physics:	Some
Chemistry:	Not Applicable
Technical writing:	Some
Computer Programming:	Not Applicable

Material available to students and department at end of course:

	Available to students	Available to department	Available to instructor	Available to TA(s)
Course Objectives and Outcomes Form:	X	X	X	X
Lecture notes, homework assignments, and solutions:	X	X	X	X
Samples of homework solutions from 2 students:		X		
Samples of exam solutions from 2 students:		X		
Course performance form from student surveys:		X	X	
End-of-course Instructor Survey:		X	X	

Will this course involve computer assignments? YES **Will this course have TA(s) when it is offered?** YES

Level of contribution of course to Program Outcomes

(a)	Strong
(c)	Average
(e)	Strong
(i)	Average
(k)	Some
(n)	Average

Strong: (a) (e)
Average: (c) (i) (n)
Some: (k)

:: Upon completion of this course, students will have had an opportunity to learn about the following ::

Specific Course Outcomes	Program Outcomes
1. Analyze circuit systems using direct application of Kirchoff's Current and Voltage Laws along with Ohm's Law.	**a e k n**
2. Interpret analytical circuit results to properly assign power, current, and voltage values to circuit graphical representations.	**a e k n**
3. Apply node-voltage analysis techniques to analyze circuit behavior.	**a e k n**
4. Apply mesh-current analysis techniques to analyze circuit behavior.	**a e k n**
5. Construct parallel, series, delta, and Y, resistor equivalent circuits.	**a e k n**
6. Explain the role of negative feedback in establishing amplifier response.	**a e k n**

7.	Explain the characteristics of ideal and non-ideal operational amplifiers.	**a e k n**
8.	Analyze the characteristics of ideal and non-ideal operational amplifier circuits using node-voltage methods.	**a e k n**
9.	Explain the characteristics of capacitor and inductor circuit elements.	**a e k n**
10.	Compute initial conditions for current and voltage in first order R-L and R-C capacitor and inductor circuits.	**a e k n**
11.	Compute time response of current and voltage in first order R-L and R-C capacitor and inductor circuits.	**a e k n**
12.	Compute initial conditions for current and voltage in second order RLC circuits.	**a e k n**
13.	Compute time response of current and voltage in second order RLC circuits.	**a e k n**
14.	Use PSpice tools to create and analyze circuit models.	**a c e k**
15.	Use PSpice tools to design and analyze resistive circuit systems.	**a c e i k**
16.	Use PSpice tools to design and analyze operational amplifier circuit systems.	**a c e i k**
17.	Several homework assignments delving on core concepts and reinforcing analytical skills learned in class.	**a c e i k n**
18.	Opportunities to interact weekly with the instructor and the teaching assistant(s) during regular office hours and discussion sections in order to further the students' learning experience and the students' interest in the material.	**a c e i k n**

Program outcomes and how they are covered by the specific course outcomes

(a)
- Analyze circuit systems using direct application of Kirchoff's Current and Voltage Laws along with Ohm's Law.
- Interpret analytical circuit results to properly assign power, current, and voltage values to circuit graphical representations.
- Apply node-voltage analysis techniques to analyze circuit behavior.
- Apply mesh-current analysis techniques to analyze circuit behavior.
- Construct parallel, series, delta, and Y, resistor equivalent circuits.
- Explain the role of negative feedback in establishing amplifier response.
- Explain the characteristics of ideal and non-ideal operational amplifiers.
- Analyze the characteristics of ideal and non-ideal operational amplifier circuits using node-voltage methods.
- Explain the characteristics of capacitor and inductor circuit elements.
- Compute initial conditions for current and voltage in first order R-L and R-C capacitor and inductor circuits.
- Compute time response of current and voltage in first order R-L and R-C capacitor and inductor circuits.
- Compute initial conditions for current and voltage in second order RLC circuits.
- Compute time response of current and voltage in second order RLC circuits.
- Use PSpice tools to create and analyze circuit models.
- Use PSpice tools to design and analyze resistive circuit systems.
- Use PSpice tools to design and analyze operational amplifier circuit systems.
- Several homework assignments delving on core concepts and reinforcing analytical skills learned in class.
- Opportunities to interact weekly with the instructor and the teaching assistant(s) during regular office hours and discussion sections in order to further the students' learning experience and the students' interest in the material.

(c)
- Use PSpice tools to create and analyze circuit models.
- Use PSpice tools to design and analyze resistive circuit systems.
- Use PSpice tools to design and analyze operational amplifier circuit systems.
- Several homework assignments delving on core concepts and reinforcing analytical skills learned in class.
- Opportunities to interact weekly with the instructor and the teaching assistant(s) during regular office hours and discussion sections in order to further the students' learning experience and the students' interest in the material.

(e)
- Analyze circuit systems using direct application of Kirchoff's Current and Voltage Laws along with Ohm's Law.
- Interpret analytical circuit results to properly assign power, current, and voltage values to circuit graphical representations.
- Apply node-voltage analysis techniques to analyze circuit behavior.
- Apply mesh-current analysis techniques to analyze circuit behavior.
- Construct parallel, series, delta, and Y, resistor equivalent circuits.
- Explain the role of negative feedback in establishing amplifier response.
- Explain the characteristics of ideal and non-ideal operational amplifiers.
- Analyze the characteristics of ideal and non-ideal operational amplifier circuits using node-voltage methods.
- Explain the characteristics of capacitor and inductor circuit elements.
- Compute initial conditions for current and voltage in first order R-L and R-C capacitor and inductor circuits.
- Compute time response of current and voltage in first order R-L and R-C capacitor and inductor circuits.
- Compute initial conditions for current and voltage in second order RLC circuits.
- Compute time response of current and voltage in second order RLC circuits.
- Use PSpice tools to create and analyze circuit models.
- Use PSpice tools to design and analyze resistive circuit systems.
- Use PSpice tools to design and analyze operational amplifier circuit systems.
- Several homework assignments delving on core concepts and reinforcing analytical skills learned in class.
- Opportunities to interact weekly with the instructor and the teaching assistant(s) during regular office hours and discussion sections in order to further the students' learning experience and the students' interest in the material.

(i)
- Use PSpice tools to design and analyze resistive circuit systems.

	¤ Use PSpice tools to design and analyze operational amplifier circuit systems. ¤ Several homework assignments delving on core concepts and reinforcing analytical skills learned in class. ¤ Opportunities to interact weekly with the instructor and the teaching assistant(s) during regular office hours and discussion sections in order to further the students' learning experience and the students' interest in the material.
(k)	¤ Analyze circuit systems using direct application of Kirchoff's Current and Voltage Laws along with Ohm's Law. ¤ Interpret analytical circuit results to properly assign power, current, and voltage values to circuit graphical representations. ¤ Apply node-voltage analysis techniques to analyze circuit behavior. ¤ Apply mesh-current analysis techniques to analyze circuit behavior. ¤ Construct parallel, series, delta, and Y, resistor equivalent circuits. ¤ Explain the role of negative feedback in establishing amplifier response. ¤ Explain the characteristics of ideal and non-ideal operational amplifiers. ¤ Analyze the characteristics of ideal and non-ideal operational amplifier circuits using node-voltage methods. ¤ Explain the characteristics of capacitor and inductor circuit elements. ¤ Compute initial conditions for current and voltage in first order R-L and R-C capacitor and inductor circuits. ¤ Compute time response of current and voltage in first order R-L and R-C capacitor and inductor circuits. ¤ Compute initial conditions for current and voltage in second order RLC circuits. ¤ Compute time response of current and voltage in second order RLC circuits. ¤ Use PSpice tools to create and analyze circuit models. ¤ Use PSpice tools to design and analyze resistive circuit systems. ¤ Use PSpice tools to design and analyze operational amplifier circuit systems. ¤ Several homework assignments delving on core concepts and reinforcing analytical skills learned in class. ¤ Opportunities to interact weekly with the instructor and the teaching assistant(s) during regular office hours and discussion sections in order to further the students' learning experience and the students' interest in the material.
(n)	¤ Analyze circuit systems using direct application of Kirchoff's Current and Voltage Laws along with Ohm's Law. ¤ Interpret analytical circuit results to properly assign power, current, and voltage values to circuit graphical representations. ¤ Apply node-voltage analysis techniques to analyze circuit behavior. ¤ Apply mesh-current analysis techniques to analyze circuit behavior. ¤ Construct parallel, series, delta, and Y, resistor equivalent circuits. ¤ Explain the role of negative feedback in establishing amplifier response. ¤ Explain the characteristics of ideal and non-ideal operational amplifiers. ¤ Analyze the characteristics of ideal and non-ideal operational amplifier circuits using node-voltage methods. ¤ Explain the characteristics of capacitor and inductor circuit elements. ¤ Compute initial conditions for current and voltage in first order R-L and R-C capacitor and inductor circuits. ¤ Compute time response of current and voltage in first order R-L and R-C capacitor and inductor circuits. ¤ Compute initial conditions for current and voltage in second order RLC circuits. ¤ Compute time response of current and voltage in second order RLC circuits. ¤ Several homework assignments delving on core concepts and reinforcing analytical skills learned in class. ¤ Opportunities to interact weekly with the instructor and the teaching assistant(s) during regular office hours and discussion sections in order to further the students' learning experience and the students' interest in the material.

:: Last modified: January 2004 by W. J. Kaiser ::

APPENDIX – The Case for Authentic Assessment

From:

- Wiggins, Grant (1990). "The case for authentic assessment". *Practical Assessment, Research & Evaluation*, 2(2). Retrieved October 22, 2005 from http://PAREonline.net/getvn.asp?v=2&n=2

The following article provides an argument for *direct* or *authentic* assessment of student learning outcomes.

The Case for Authentic Assessment.

Grant Wiggins
CLASS

Mr. Wiggins, a researcher and consultant on school reform issues, is a widely-known advocate of authentic assessment in education. This article is based on materials that he prepared for the California Assessment Program.

WHAT IS AUTHENTIC ASSESSMENT?

Assessment is authentic when we directly examine student performance on worthy intellectual tasks. Traditional assessment, by contract, relies on indirect or proxy 'items'--efficient, simplistic substitutes from which we think valid inferences can be made about the student's performance at those valued challenges.

Do we want to evaluate student problem-posing and problem-solving in mathematics? experimental research in science? speaking, listening, and facilitating a discussion? doing document-based historical inquiry? thoroughly revising a piece of imaginative writing until it "works" for the reader? Then let our assessment be built out of such exemplary intellectual challenges.

Further comparisons with traditional standardized tests will help to clarify what "authenticity" means when considering assessment design and use:

- Authentic assessments require students to be effective performers with acquired knowledge. Traditional tests tend to reveal only whether the student can recognize, recall or "plug in" what was learned out of context. This may be as problematic as inferring driving or teaching ability from written tests alone. (Note, therefore, that the debate is not "either-or": there may well be virtue in an array of local and state assessment instruments as befits the purpose of the measurement.)
- Authentic assessments present the student with the full array of tasks that mirror the priorities and challenges found in the best instructional activities: conducting research; writing, revising and discussing papers; providing an engaging oral analysis of a recent political event; collaborating with others on a debate, etc. Conventional tests are usually limited to paper-and-pencil, one- answer questions.
- Authentic assessments attend to whether the student can craft polished, thorough and justifiable answers, performances or products. Conventional tests typically only ask the student to select or write correct responses--irrespective of reasons. (There is rarely an adequate opportunity to plan, revise and substantiate responses on typical tests, even when there are open-ended questions). As a result,
- Authentic assessment achieves validity and reliability by emphasizing and standardizing the appropriate criteria for scoring such (varied) products; traditional testing standardizes objective "items" and, hence, the (one) right answer for each.
- "Test validity" should depend in part upon whether the test simulates real-world "tests" of ability. Validity on most multiple-choice tests is determined merely by matching items to the curriculum content (or through sophisticated correlations with other test results).
- Authentic tasks involve "ill-structured" challenges and roles that help students rehearse for the complex ambiguities of the "game" of adult and professional life. Traditional tests are more like drills, assessing static and too-often arbitrarily discrete or simplistic elements of those activities.

Beyond these technical considerations the move to reform assessment is based upon the premise that assessment should primarily support the needs of learners. Thus, secretive tests composed of proxy items and scores that have no obvious meaning or usefulness undermine teachers' ability to improve instruction and students' ability to improve their performance. We rehearse for and teach to authentic tests--think of music and military training--without compromising validity.

The best tests always teach students and teachers alike the kind of work that most matters; they are enabling and forward-looking, not just reflective of prior teaching. In many colleges and all professional settings the essential challenges are known in advance--the upcoming report, recital, Board presentation, legal case, book to write, etc. Traditional tests, by requiring complete secrecy for their validity, make it difficult for teachers and students to rehearse and gain the confidence that comes from knowing their performance obligations. (A known challenge also makes it possible to hold all students to higher standards).

WHY DO WE NEED TO INVEST IN THESE LABOR-INTENSIVE FORMS OF ASSESSMENT?

While multiple-choice tests can be valid indicators or predictors of academic performance, too often our tests mislead students and teachers about the kinds of work that should be mastered. Norms are not standards; items are not real problems; right answers are not rationales.

What most defenders of traditional tests fail to see is that it is the form, not the content of the test that is harmful to learning; demonstrations of the technical validity of standardized tests should not be the issue in the assessment reform debate. Students come to believe that learning is cramming; teachers come to believe that tests are after-the-fact, imposed nuisances composed of contrived questions--irrelevant to their intent and success. Both parties are led to believe that right answers matter more than habits of mind and the justification of one's approach and results.

A move toward more authentic tasks and outcomes thus improves teaching and learning: students have greater clarity about their obligations (and are asked to master more engaging tasks), and teachers can come to believe that assessment results are both meaningful and useful for improving instruction.

If our aim is merely to monitor performance then conventional testing is probably adequate. If our aim is to improve performance across the board then the tests must be composed of exemplary tasks, criteria and standards.

WON'T AUTHENTIC ASSESSMENT BE TOO EXPENSIVE AND TIME-CONSUMING?

The costs are deceptive: while the scoring of judgment-based tasks seems expensive when compared to multiple-choice tests (about $2 per student vs. 1 cent) the gains to teacher professional development, local assessing, and student learning are many. As states like California and New York have found (with their writing and hands-on science tests) significant improvements occur locally in the teaching and assessing of writing and science when teachers become involved and invested in the scoring process.

If costs prove prohibitive, sampling may well be the appropriate response--the strategy employed in California, Vermont and Connecticut in their new performance and portfolio assessment projects. Whether through a sampling of many writing genres, where each student gets one prompt only; or through sampling a small number of all student papers and school-wide portfolios; or through assessing only a small sample of students, valuable information is gained at a minimum cost.

And what have we gained by failing to adequately assess all the capacities and outcomes we profess to value simply because it is time-consuming, expensive, or labor-intensive? Most other countries routinely ask students to respond orally and in writing on their major tests--the same countries that outperform us on international comparisons. Money, time and training are routinely set aside to insure that assessment is of high quality. They also correctly assume that high standards depend on the quality of day-to-day local assessment--further offsetting the apparent high cost of training teachers to score student work in regional or national assessments.

WILL THE PUBLIC HAVE ANY FAITH IN THE OBJECTIVITY AND RELIABILITY OF JUDGMENT-BASED SCORES?

We forget that numerous state and national testing programs with a high degree of credibility and integrity have for many years operated using human judges:

- the New York Regents exams, parts of which have included essay questions since their inception--and which are scored locally (while audited by the state);
- the Advanced Placement program which uses open-ended questions and tasks, including not only essays on most tests but the performance-based tests in the Art Portfolio and Foreign Language exams;
- state-wide writing assessments in two dozen states where model papers, training of readers, papers read "blind" and procedures to prevent bias and drift gain adequate reliability;
- the National Assessment of Educational Progress (NAEP), the Congressionally-mandated assessment, uses numerous open-ended test questions and writing prompts (and successfully piloted a hands-on test of science performance);

- newly-mandated performance-based and portfolio-based state-wide testing in Arizona, California, Connecticut, Kentucky, Maryland, and New York.

Though the scoring of standardized tests is not subject to significant error, the procedure by which items are chosen, and the manner in which norms or cut-scores are established is often quite subjective--and typically immune from public scrutiny and oversight.

Genuine accountability does not avoid human judgment. We monitor and improve judgment through training sessions, model performances used as exemplars, audit and oversight policies as well as through such basic procedures as having disinterested judges review student work "blind" to the name or experience of the student--as occurs routinely throughout the professional, athletic and artistic worlds in the judging of performance.

Authentic assessment also has the advantage of providing parents and community members with directly observable products and understandable evidence concerning their students' performance; the quality of student work is more discernible to laypersons than when we must rely on translations of talk about stanines and renorming.

Ultimately, as the researcher Lauren Resnick has put it, What you assess is what you get; if you don't test it you won't get it. To improve student performance we must recognize that essential intellectual abilities are falling through the cracks of conventional testing.

ADDITIONAL READING

Archbald, D. & Newmann, F. (1989) "The Functions of Assessment and the Nature of Authentic Academic Achievement," in Berlak (ed.) *Assessing Achievement: Toward the development of a New Science of Educational Testing*. Buffalo, NY: SUNY Press.

Frederiksen, J. & Collins, A. (1989) "A Systems Approach to Educational Testing," *Educational Researcher*, 18, 9 (December).

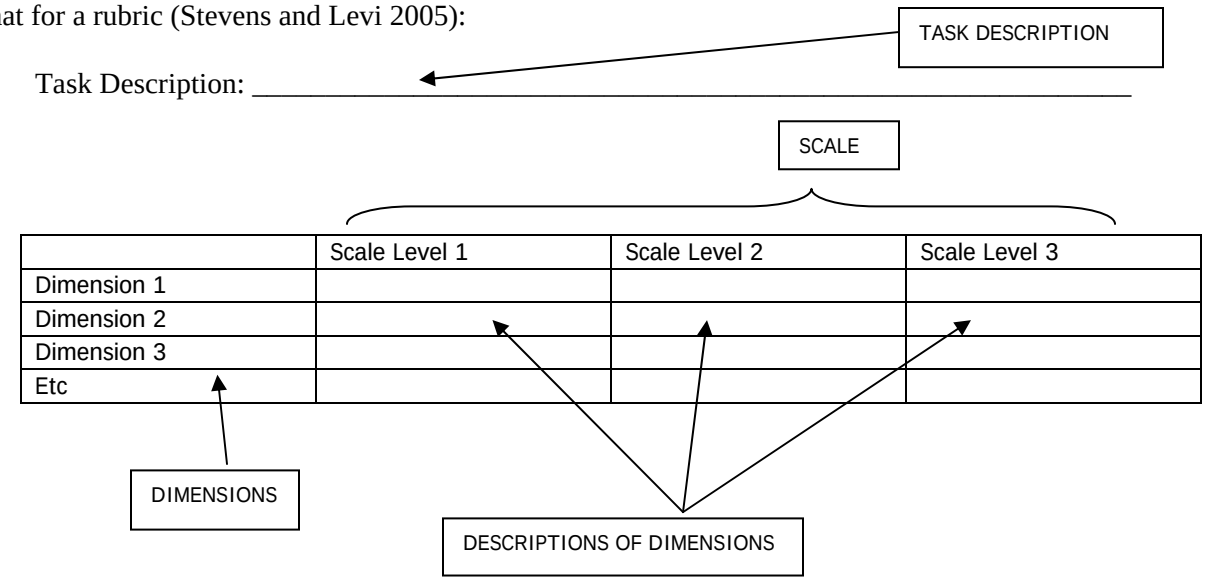
National Commission on Testing and Public Policy (1990) From *Gatekeeper to Gateway: Transforming Testing in America*. Chestnut Hill, MA: NCTPP, Boston College.

Wiggins, G. (1989) "A True Test: Toward More Authentic and Equitable Assessment," *Phi Delta Kappan*, 70, 9 (May).

Wolf, D. (1989) "Portfolio Assessment: Sampling Student Work," *Educational Leadership* 46, 7, pp. 35-39 (April).

APPENDIX – How to create Rubrics

Format for a rubric (Stevens and Levi 2005):



A rubric involves four components:

Part 1: *Task Description*

- Involves a "performance" of some sort by the student
- The task can take the form of a specific assignment; e.g., a paper, a poster, a presentation
- The task can take the form of overall behavior; e.g., participation, use of proper lab protocols, behavioral expectations in the classroom

Part 2: *Scale*

- Describes how well or poorly any given task has been performed
- Positive terms which may be used: "Mastery", "Partial Mastery", "Progressing", "Emerging"
- Nonjudgmental or noncompetitive language: "High level", "Middle level", "Beginning level"
- Commonly used labels:
    - Sophisticated, competent, partly competent, not yet competent
    - Exemplary, proficient, marginal, unacceptable
    - Advanced, intermediate high, intermediate, novice
    - Distinguished, proficient, intermediate, novice
    - Accomplished, average, developing. Beginning
- 3-5 levels are typically used
    - the more levels there are, the more difficult it becomes to differentiate between them and to articulate precisely why one student's work falls into the scale level it does
    - but, more specific levels make the task clearer for the student and they reduce the professor's time needed to furnish detailed grading notes

Part 3: *Dimensions*

- Lay out the parts of the task simply and completely
- Should actually represent the type of component skills students must combine in a successful scholarly work
- Breaking up the assignment into its distinct dimensions leads to a kind of task analysis with the components of the task clearly identified

Example:

Task: *Each student will make a 5-minute presentation on the changes in one community over the past 30 years. The student may focus the presentation in any way he or she wishes, but there needs to be a thesis of some sort, not just a chronological exposition. The presentation should include appropriate photographs, maps, graphs, and other visual aids for the audience.*

	Excellent	Competent	Needs work
Knowledge/understanding 20%			
Thinking/inquiry 30%			
Communication 20%			
Use of visual aids 20%			
Presentation skills 10%			

Part 4: *Description of the Dimensions*

- A rubric should contain at the very least a description or the highest level of performance in that dimension
- Scoring Guide Rubric = a rubric that contains only the description of the highest level of performance

Example Scoring Guide Rubric: (includes description of dimensions at the highest level of performance) (Stevens and Levi 2005)

Task: *Each student will make a 5-minute presentation on the changes in one community over the past 30 years. The student may focus the presentation in any way he or she wishes, but there needs to be a thesis of some sort, not just a chronological exposition. The presentation should include appropriate photographs, maps, graphs, and other visual aids for the audience.*

	Criteria	Comments	Points
Knowledge/understanding 20%	The presentation demonstrates a depth of historical understanding by using relevant and accurate detail. Research is thorough and goes beyond what was presented in class or in the assigned texts.		
Thinking/inquiry 30%	The presentation is centered around a thesis, which shows a highly developed awareness of historiographic or social issues and a high level of conceptual ability.		
Communication 20%	The presentation is imaginative and effective in conveying ideas to the audience. The presenter responds effectively to audience reactions and questions.		
Use of visual aids 20%	The presentation includes appropriate and easily understood visual aids, which the presenter refers to and explains at appropriate moments in the presentation.		
Presentation skills 10%	The presenter speaks clearly and loudly enough to be heard, using eye contact, a lively tone, gestures, and body language to engage the audience.		

Example Three-level Rubric: (includes description of dimensions with <u>all</u> levels of performance described) (Stevens and Levi 2005)

<u>Task</u>: *Each student will make a 5-minute presentation on the changes in one community over the past 30 years. The student may focus the presentation in any way he or she wishes, but there needs to be a thesis of some sort, not just a chronological exposition. The presentation should include appropriate photographs, maps, graphs, and other visual aids for the audience.*

	Excellent	Competent	Needs work
Knowledge/understanding 20%	The presentation demonstrates a depth of historical understanding by using relevant and accurate detail. Research is thorough and goes beyond what was presented in class or in the assigned texts.	The presentation uses knowledge that is generally accurate with only minor inaccuracies and that is generally relevant to the student's thesis. Research is adequate but does not go much beyond what was presented in class or in the assigned text.	The presentation uses little relevant or accurate information, not even that which was presented in class or in the assigned texts. Little or no research is apparent.
Thinking/inquiry 30%	The presentation is centered around a thesis, which shows a highly developed awareness of historiographic or social issues and a high level of conceptual ability.	The presentation shows an analytical structure and a central thesis, but the analysis is not always fully developed or linked to the thesis.	The presentation shows no analytical structure and no central thesis.
Communication 20%	The presentation is imaginative and effective in conveying ideas to the audience. The presenter responds effectively to audience reactions and questions.	Presentation techniques used are effective in conveying main ideas, but they are a bit unimaginative. Some questions from the audience remain unanswered.	The presentation fails to capture the interest of the audience and/or is confusing in what is to be communicated.
Use of visual aids 20%	The presentation includes appropriate and easily understood visual aids, which the presenter refers to and explains at appropriate moments in the presentation.	The presentation includes appropriate visual aids, but these are too few, are in a format that makes the difficult to use or understand, or the presenter does not refer to or explain them in the presentation.	The presentation includes no visual aids or includes visual aids that are inappropriate or too small or messy to be understood. The presenter makes no mention of them in the presentation.
Presentation skills 10%	The presenter speaks clearly and loudly enough to be heard, using eye contact, a lively tone, gestures, and body language to engage the audience.	The presenter speaks clearly and loudly enough to be heard but tends to drone or fails to use eye contact, gestures, and body language consistently or effectively at times.	The presenter cannot be heard or speaks so unclearly that she or he cannot be understood. There is no attempt to engage the audience through eye contact, gestures, or body language.

How to construct a rubric: four stages in constructing a rubric (Stevens and Levi 2005)

1. *Reflecting*. In this stage, we take the time to reflect on what we want from the students, why we created this assignment, what happened the last time we gave it, and what our expectations are.
    a) Why did you create this assignment?
    b) Have you given this assignment or a similar assignment before?
    c) How does this assignment relate to the rest of what you are teaching?
    d) What skills will students need to have or develop to successfully complete this assignment?
    e) What exactly is the task assigned?

f) What evidence can students provide in this assignment that would show they have accomplished what you hoped they would accomplish when you created the assignment?
g) What are the highest expectations you have for student performance on this assignment overall?
h) What is the worst fulfillment of the assignment you can imagine short of simply not turning it in at all?

2. *Listing*. In this stage, we focus on the particular details of the assignment and what specific learning objectives we hope to see in the completed assignment.

   Answers to (d)-(e)-(f) above regarding skills required, the exact nature of the task, and the types of evidence of learning are most often a good starting point to generate this list. Once the learning goals have been listed, you add a description of the *highest* level of performance you expect for each learning goal. These will later contribute to the "Descriptions of Dimensions" on a finished rubric.

3. *Grouping and Labeling*. In this stage, we organize the results of our reflections in Stages 1 and 2, grouping similar expectations together in what will probably become the rubric dimensions. Start with the *highest* performance expectations completed in Stage 2 and group together items which are related. Once the performance descriptions are in groups of similar skills, read them and start to find out what is common across the group and label it. These labels will ultimately become dimensions on the rubric – it is important to keep them clear and neutral; e.g., "Organization", "Analysis", or "Citations".

4. *Application*. In this stage, we apply the dimensions and descriptions from Stage 3 to the final form of the rubric, utilizing the matrix/grid format.

Once you have identified what you are assessing; e.g., critical thinking, here are steps for creating holistic rubrics (Allen 2004):

- Identify the characteristics of what you are assessing; e.g., appropriate use of evidence, recognition of logical fallacies
- Describe the best work you could expect using these characteristics – this describes the top category
- Describe the worst acceptable product using these characteristics – this describes the lowest acceptable category
- Describe an unacceptable product – this describes the lowest category
- Develop descriptions of intermediate-level products and assign them to intermediate categories. You might decide to develop a scale with five levels; e.g., unacceptable, marginal, acceptable, competent, outstanding, or three levels; e.g., novice, competent, exemplary, or any other set that is meaningful.
- Ask colleagues who were not involved in the rubric's development to apply it to some products or behaviors and revise as needed to eliminate ambiguities.

Example:

HOLISTIC rubric for assessing student essays (Allen 2004)	
Inadequate	The essay has at least one serious weakness. It may be unfocused, underdeveloped, or rambling. Problems with the use of language seriously interfere with the reader's ability to understand what is being communicated.
Developing competence	The essay may be somewhat unfocused, underdeveloped, or rambling, but it does have some coherence. Problems with the use of language occasionally interfere with the reader's ability to understand what is being communicated.
Acceptable	The essay is generally focused and contains some development of ideas, but the discussion may be simplistic or repetitive. The language lacks syntactic complexity and may contain occasional grammatical errors, but the reader is able to understand what is being communicated.
Sophisticated	The essay is focused and clearly organized, and it shows depth of development. The language is precise and shows syntactic variety, and ideas are clearly communicated to the reader.

Developing Useful Rubrics: Questions to Ask and Actions to Implement (Huba and Freed 2000)		
	Question	**Action**
1	What criteria or essential elements must be present in the student's work to ensure that it is high in quality? • These should be the criteria that distinguish good work from poor work	Include these as rows in your rubric
2	How many levels of achievement do I wish to illustrate for students? • The levels should generally describe a range of achievement varying from excellent to unacceptable o Example: exemplary, proficient, marginal, unacceptable o Example: sophisticated, competent, partly competent, not yet competent o Example: distinguished, proficient, intermediate, novice o Example: accomplished, average, developing, beginning	Include these as columns in your rubric and label them
3	For each criterion or essential element of quality, what is a clear description of performance at each achievement level? • Avoid undefined terms (e.g., "significant", "trivial", "shows considerable thought") • Avoid value-laden terms (e.g., "excellent", "poor") • Use objective descriptions that help provide guidance to the students for getting better when needed	Include descriptions in the appropriate cells of the rubric
4	What are the consequences of performing at each level of quality?	Add descriptions of consequences to the commentaries in the rubric
5	What rating scheme will I use in the rubric? • Some criteria may be weighted differently than others	Add this to the rubric in a way that fits in with your grading philosophy
6	When I use the rubric, what aspects work well and what aspects need improvement? • Does the rubric help you distinguish among the levels of quality in a student sample? • Do the criteria seem to be appropriate? • Are there too many or too few levels of achievement specified? • Are there any descriptions that are incomplete or unclear?	Revise the rubric accordingly
Additional questions/actions when developing rubrics for specific assignments		
1	What content must students master in order to complete the task well?	Develop criteria that reflect knowledge and/or use of content and add them to the rubric
2	Are there any important aspects of the task that are specific to the context in which the assessment is set?	Identify skills and abilities that are necessary in this context and add related criteria to the rubric
3	In the task, is the *process* of achieving the outcome as important as the *outcome itself*?	Include and describe criteria that reflect important aspects of the process

APPENDIX – A Sample Rubric: The Critical Thinking Rubric

(From Washington State University, http://wsuctproject.ctlt.wsu.edu/ctr.htm)

Objective	Scant	...	...	Substantially Developed
Identifies and summarizes the problem/question at issue (and/or the source's position).	Does not identify and summarize the problem, is confused or identifies a different and inappropriate problem. Does not identify or is confused by the issue, or represents the issue inaccurately.			Identifies the main problem and subsidiary, embedded, or implicit aspects of the problem, and identifies them clearly, addressing their relationships to each other. Identifies not only the basics of the issue, but recognizes nuances of the issue.
Identifies and presents the STUDENT'S OWN perspective and position as it is important to the analysis of the issue.	Addresses a single source or view of the argument and fails to clarify the established or presented position relative to one's own. Fails to establish other critical distinctions.			Identifies, appropriately, one's own position on the issue, drawing support from experience, and information not available from assigned sources.
Identifies and considers OTHER salient perspectives and positions that are important to the analysis of the issue.	Deals only with a single perspective and fails to discuss other possible perspectives, especially those salient to the issue.			Addresses perspectives noted previously, and additional diverse perspectives drawn from outside information.
Identifies and assesses the key assumptions.	Does not surface the assumptions and ethical issues that underlie the issue, or does so superficially.			Identifies and questions the validity of the assumptions and addresses the ethical dimensions that underlie the issue.
Identifies and assesses the quality of supporting data/evidence and provides additional data/evidence related to the issue.	Merely repeats information provided, taking it as truth, or denies evidence without adequate justification. Confuses associations and correlations with cause and effect. Does not distinguish between fact, opinion, and value judgments.			Examines the evidence and source of evidence; questions its accuracy, precision, relevance, completeness. Observes cause and effect and addresses existing or potential consequences. Clearly distinguishes between fact, opinion, & acknowledges value judgments.
Identifies and considers the influence of the context* on the issue.	Discusses the problem only in egocentric or sociocentric terms. Does not present the problem as having connections to other contexts-cultural, political, etc.			Analyzes the issue with a clear sense of scope and context, including an assessment of the audience of the analysis. Considers other pertinent contexts.
Identifies and assesses conclusions, implications and consequences.	Fails to identify conclusions, implications, and consequences of the issue or the key relationships between the other elements of the problem, such as context, implications, assumptions, or data and evidence.			Identifies and discusses conclusions, implications, and consequences considering context, assumptions, data, and evidence. Objectively reflects upon the their own assertions.

*Contexts for Consideration:

1. Cultural/Social – Group, national, ethnic behavior/attitude
2. Scientific – Conceptual, basic science, scientific method
3. Educational – Schooling, formal training
4. Economic – Trade, business concerns costs
5. Technological – Applied science, engineering
6. Ethical – Values
7. Political – Organizational or governmental
8. Personal Experience – Personal observation, informal character

APPENDIX – Tools for Doing Assessment

Based on:

- Prus, Joseph and Johnson, Reid, "A Critical Review of Student Assessment Options", in "*Assessment & Testing Myths and Realities*" edited by Trudy H. Bers and Mary L. Mittler, New Directions for Community Colleges, Number 88, Winter 1994, pp. 69-83. [Augmented by Gloria Rogers (Rose-Hulman Institute of Technology) with Engineering references by Mary Besterfield-Sacre (University of Pittsburgh)]

Information on a variety of instruments useful for doing assessment is given below.

1. *Tests*
    a. Commercial, norm-referenced, standard examinations
    b. Locally developed written examinations (objective or subjective designed by faculty);
    c. Oral examinations (evaluation of student knowledge levels through a face-to-face interrogative dialogue with program faculty).

2. *Competency-Based Methods*
    a. Performance Appraisals - systematic measurement of overt demonstration of acquired skills
    b. Simulations
    c. "Stone" courses (primarily used to approximate the results of performance appraisal, when direct demonstration of the student skill is impractical).

3. *Measures of Attitudes and Perceptions (can be self-reported or third party)*
    a. Written surveys and questionnaires (asking individuals to share their perceptions of their own or others' attitudes and behaviors including direct or mailed, signed or anonymous).
    b. Exit and other interviews (evaluating reports of subjects' attitudes and behaviors in a face-to-face interrogative dialogue).
    c. Focus groups

4. *External Examiner* (using an expert in the field from outside your program – usually from a similar program at another institution – to conduct, evaluate, or supplement the assessment of your students).

5. *Behavioral Observations* – including scoring rubrics and verbal protocol analysis (measuring the frequency, duration and topology of student actions, usually in a natural setting with non-interactive methods).

6. *Archival Records* (biographical, academic, or other file data available from college or other agencies and institutions).

7. *Portfolios* (collections of multiple work samples, usually compiled over time).

The following pages elaborate on these approaches.

Norm-Referenced, Standardized Exams

Definition: Group administered, mostly or entirely multiple-choice, "objective" tests in one or more curricular areas. Scores are based on comparison with a reference or norm group. Typically must be obtained (purchased) from a private vender.

Target of Method: Used primarily on students in individual programs, courses or for a particular student cohort.

Advantages:

- Can be adopted and implemented quickly
- Reduce/eliminate faculty time demands in instrument development and grading (i.e., relatively low "*frontloading*" and "*backloading*" effort)
- Objective scoring
- Provide for externality of measurement (i.e., *external validity* is the degree to which the conclusions in your study would hold for other persons in other places and at other times – ability to generalize the results beyond the original test group.)
- Provide norm reference group(s) comparison often required by mandates.
- May be beneficial or required in instances where state or national standards exist for the discipline or profession.
- Very valuable for benchmarking and cross-institutional comparison studies.

Disadvantages:

- May limit what can be measured.
- Eliminates the process of learning and clarification of goals and objectives typically associated with local development of measurement instruments.
- Unlikely to completely measure or assess the specific goals and objectives of a program, department, or institution.
- "Relative standing" results tend to be less meaningful than *criterion-referenced* results for program/student evaluation purposes.
- *Norm-referenced* data is dependent on the institutions in comparison group(s) and methods of selecting students to be tested. (Caution: unlike many *norm-referenced* tests such as those measuring intelligence, present *norm-referenced* tests in higher education do not utilize, for the most part, randomly selected or well stratified national samples.)
- Group administered multiple-choice tests always include a potentially high degree of error, largely uncorrectable by "guessing correction" formulae (which lowers *validity*).
- Summative data only (no formative evaluation)
- Results unlikely to have direct implications for program improvement or individual student progress
- Results highly susceptible to misinterpretation/misuse both within and outside the institution
- Someone must pay for obtaining these examinations; either the student or program.
- If used repeatedly, there is a concern that faculty may teach to the exam as is done with certain AP high school courses.

Ways to Reduce Disadvantages

- Choose test carefully, and only after faculty have reviewed available instruments and determined a satisfactory degree of match between the test and the curriculum.
- Request and review technical data, especially *reliability* and *validity* data and information on *normative* sample from test publishers.
- Utilize on-campus measurement experts to review reports of test results and create more customized summary reports for the institution, faculty, etc.
- Whenever possible, choose tests that also provide *criterion-referenced* results
- Assure that such tests are only *one* aspect of a multi-method approach in which no firm conclusions based on *norm-referenced* data are reached without *cross-validation* from other sources (*triangulation*.)
- Review curricula and coursework to assure that faculty do not teach to exam

Bottom Line:
Relatively quick, and easy, but useful mostly where group-level performance and external comparisons of results are required. Not as useful for individual student or program evaluation. May not only be ideal, but only alternative for benchmarking studies.

Bibliographic References:

1. Mazurek, D. F., "Consideration of FE Exam for Program Assessment." *Journal of Professional Issues in Engineering Education*, vol. 121, no. 4, 1995, 247-249.

2. Scales, K., C. Owen, S. Shiohare, M. Leonard, "Preparing for Program Accreditation Review under ABET Engineering Criteria 2000: Choosing Outcome Indicators." *Journal of Engineering Education*, July 1998, 207 ff.
3. Watson, J. L., "An Analysis of the Value of the FE Examination for the Assessment of Student Learning in Engineering and Science Topics," *Journal of Engineering Education*, July 1998.

Locally Developed Exams

Definition: Objective and/or subjective tests designed by faculty of the program or course sequence being evaluated.

Target of Method: Used primarily on students in individual classes, a specific program of interest, or for a particular cohort of students

Advantages:

- Content and style can be geared to specific goals, objectives, and student characteristics of the program, curriculum, etc.
- Specific criteria for performance can be established in relationship to curriculum
- Process of development can lead to clarification/crystallization of what is important in the process/content of student learning.
- Local grading by faculty can provide relatively rapid feedback.
- Greater faculty/institutional control over interpretation and use of results.
- More direct implication of results for program improvements.

Disadvantages:

- Require considerable leadership/coordination, especially during the various phases of development
- Cannot be used for benchmarking, or cross-institutional comparisons.
- Costly in terms of time and effort (more "*frontloaded*" effort for objective; more "*backloaded*" effort for subjective)
- Demands expertise in measurement to assure *validity/reliability/utility*
- May not provide for *externality* (degree of objectivity associated with review, comparisons, etc. external to the program or institution).

Ways to Reduce Disadvantages:

- Enter into consortium with other programs, departments, or institutions with similar goals and objectives as a means of reducing costs associated with developing instruments. An element of *externality* is also added through this approach, especially if used for test grading as well as development.
- Utilize on-campus measurement experts whenever possible for test construction and *validation*
- Contract with faculty "consultants" to provide development and grading.
- Incorporate outside experts, community leaders, etc. into development and grading process.
- Embed in program requirements for maximum relevance with minimum disruption (e.g., a "capstone" course).
- Validate results through consensus with other data; i.e., a multi-method approach (*triangulation*.)

Bottom Line:
Most useful for individual coursework or program evaluation, with careful adherence to measurement principles. Must be supplemented for *external validity*.

Bibliographic References:

1. Banta, T.W., "Questions Faculty Ask about Assessment," Paper presented at the Annual Meeting of the American Association for Higher Education (Chicago, IL, April 1989).
2. Banta, T.W. and J.A. Schneider, "Using Locally Developed Comprehensive Exams for Majors to Assess and Improve Academic Program Quality," Paper presented at the Annual Meeting of the American Educational Research Association (70th, San Francisco, CA, April 16-20, 1986).
3. Burton, E. and R.L. Linn, "Report on Linking Study--Comparability across Assessments: Lessons from the Use of Moderation Procedures in England. Project 2.4: Quantitative Models to Monitor Status and Progress of Learning and Performance", National Center for Research on Evaluation, Standards, and Student Testing, Los Angeles, CA, 1993
4. Lopez, C.L., "Assessment of Student Learning," *Liberal Edu*cation, 84(3), Summer 1998, 36-43.
5. Warren, J., "Cognitive Measures in Assessing Learning," *New Directions for Institutional Research*, 15(3), Fall 1988, 29-39.

Oral Examination

Definition: An evaluation of student knowledge levels through a face-to-face interrogative dialogue with program faculty.

Target of Method: Used primarily on students in individual classes or for a particular cohort of students

Advantages

- Content and style can be geared to specific goals, objectives, and student characteristics of the institution, program, curriculum, etc.
- Specific criteria for performance can be established in relationship to curriculum
- Process of development can lead to clarification/crystallization of what is important in the process/content of student learning.
- Local grading by faculty can provide immediate feedback related to material considered meaningful.
- Greater faculty/institutional control over interpretation and use of results.
- More direct implication of results for program improvements.
- Allows measurement of student achievement in considerably greater depth and breadth through follow-up questions, probes, encouragement of detailed clarifications, etc. (= increased *internal validity* and *formative evaluation* of student abilities)
- Non-verbal (paralinguistic and visual) cues aid interpretation of student responses.
- Dialogue format decreases miscommunications and misunderstandings, in both questions and answers.
- Rapport-gaining techniques can reduce "test anxiety," helps focus and maintain maximum student attention and effort.
- Dramatically increases "*formative evaluation*" of student learning; i.e., clues as to how and why they reached their answers.
- Identifies and decreases error variance due to guessing.
- Provides process evaluation of student thinking and speaking skills, along with knowledge content.

Disadvantages

- Requires considerable leadership/coordination, especially during the various phases of development
- Costly in terms of time and effort (more "*frontload*" effort for objective; more "*backload*" effort for subjective)
- Demands expertise in measurement to assure *validity/reliability/utility*
- May not provide for *externality* (degree of objectivity associated with review, comparisons, etc. external to the program or institution).
- Requires considerably more faculty time, since oral exams must be conducted one-to-one, or with very small groups of students at most.
- Can be inhibiting on student responsiveness due to intimidation, face-to-face pressures, oral (versus written) mode, etc. (May have similar effects on some faculty!)
- Inconsistencies of administration and probing across students reduces standardization and *generalizability* of results (= potentially lower *external validity*).

Ways to Reduce Disadvantages

- Prearrange "standard" questions, most common follow-up probes, and how to deal with typical students' problem responses; "pilot" training simulations.
- Take time to establish open, non-threatening atmosphere for testing.
- Electronically record oral exams for more detailed evaluation later.

Bottom Line:
Oral exams can provide excellent results, but usually only with significant – perhaps prohibitive – additional cost. Definitely worth utilizing in programs with small numbers of students ("Low N"), and for the highest priority objectives in any program.

Bibliographic References:

1. Bairan, A. and B.J. Farnsworth, "Oral Exams: An Alternative Evaluation Method," *Nurse Educator*, 22, Jul/Aug 1997, 6-7.
2. De Charruf, L.F., "Oral Testing," *Mextesol Journal*, 8(2), Aug 1984, 63-79.
3. Dressel, J.H., "The Formal Oral Group Exam: Challenges and Possibilities-The Oral Exam and Critical Thinking," Paper presented at the Annual Meeting of the National Council of Teachers of English (81st, Seattle, WA, November 22-27, 1991).

4. Henderson, M.L., "Types of Classroom Tests: Essay Tests and Oral Exams," *American Journal of Pharmaceutical Education*, 48(3), Fall 1984, 290-292.
5. Nelson, J. "Implementing Oral Exams as Part of the School Exam System. In: New Approaches in the Language Classroom: Coping with Change. Proceedings of the National Modern Languages Convention (2nd, Dublin, Ireland, January 31-February 1, 1986).

Performance Appraisals

Definition: A *competency-based* method whereby pre-operationalized abilities are measured in most direct, real-world approach. Systematic measurement of overt demonstration of acquired skills.

Target of Method: Used primarily on students in individual classes or for a particular cohort of students

Advantages:
- Provide a more direct measure of what has been learned (presumably in the program)
- Go beyond paper-and-pencil tests and most other assessment methods in measuring *skills*
- Preferable to most other methods in measuring the *application* and *generalization* of learning to specific settings, situations, etc.
- Particularly relevant to the goals and objectives of professional training programs and disciplines with well defined skill development.

Disadvantages:
- Ratings/grading typically more subjective than standardized tests
- Requires considerable time and effort (especially *front-loading*), thus being costly
- Sample of behavior observed or performance appraised may not be typical, especially because of the presence of observers

Ways to Reduce Disadvantages
- Develop specific, *operational* (measurable) criteria for observing and appraising performance
- Provide training for observers/appraisers
- Conduct pilot-testing in which rate of agreement (*inter-rater reliability*) between observers/appraisers is determined. Continue training and/or alter criteria until acceptable consistency of measurement is obtained
- Conduct observations/appraisals in the least obtrusive manner possible (e.g., use of one-way observational mirrors, videotaping, etc.)
- Observe/appraise behavior in multiple situations and settings
- Consider training and utilizing graduate students, upper level students, community volunteers, etc. as a means of reducing the cost and time demands on faculty.
- Cross-*validate* results with other measures, multiple methods should be used to *validate* the results of appraisals.

Bottom Line:
Generally the most highly valued but costly form of student outcomes assessment – usually the most *valid* way to measure skill development.

Bibliographic References:
1. Burke, Kay, ed. *Authentic Assessment: A Collection*. Illinois: Skylight Training and Publishing, Inc., 1992.
2. Hart, Diane. *Authentic Assessment: A Handbook for Educators*. New York: Addison-Wesley, 1994.
3. Ryan, Alan G. "Towards Authentic Assessment in Science via STS." *Bulletin of Science, Technology & Society*. 1994, v 14, n 5/6, p 290.
4. Wiggins, Grant. "The Case for Authentic Assessment." *ERIC Digest*. December 1990.

Simulations

Definition: A *competency based* measure whereby pre-operationalized abilities are measured in most direct, real-world approach. Simulation is primarily utilized to approximate the results of performance appraisal, but when – due to the target competency involved, logistical problems, or cost – direct demonstration of the student skill is impractical.

Target of Method: Used primarily on students in individual classes or a group of students

Advantages

- Better means of evaluating depth and breadth of student skill development than tests or other performance-based measures (= *internal validity*).
- More flexible; some degree of simulation can be arranged for virtually any student target skill.
- For many skills, can be group administered, thus providing and excellent combination of quality and economy.

Disadvantages

- For difficult skills, the higher the quality of simulation the greater the likelihood of the problems of performance appraisal; e.g., cost, subjectivity, etc. (see "Performance Appraisals").
- Usually requires considerable "*frontloading*" effort; i.e., planning and preparation.
- More expensive than traditional testing options in the short run.

Ways of Reducing Disadvantages

- Reducing problems is relatively easy, since degree of simulation can be matched for maximum *validity* practicable for each situation.
- Can often be "standardized" through use of computer programs (=enhanced *external validity*).

Bottom Line:
An excellent means of increasing the *external* and *internal validity* of skills assessment at minimal long-term costs.

Bibliographic References:

1. Darling-Hammond, Linda. Jacqueline Ancess, and Beverly Falk. *Authentic Assessment in Action*. New York: Teachers College, Press, 1995.
2. Kerka, Sandra. "Techniques for Authentic Assessment." *ERIC Clearinghouse on Adult, Career, and Vocational Education*. Columbus, Ohio. 1995.
3. Paris, Scott G., and Linda R. Ayres. *Becoming Reflective Students and Teachers with Portfolios and Authentic Assessment.* Washington, DC: American Psychological Association, 1994.
4. Ryan, Alan G. "Towards Authentic Assessment in Science via STS." *Bulletin of Science, Technology & Society*. 1994, v 14, n 5/6, p 290.

"Stone" Courses[1]

[1] Often not considered an assessment method in itself.

Definition: Courses, usually required for degree/program completion, which in addition to a full complement of instructional objectives, also serve as primary vehicles of student assessment for program evaluation purposes; e.g., Capstone, Cornerstone, and Keystone courses.

Advantages:

- Provides for a synergistic combination of instructional and assessment objectives.
- A perfect mechanism for course-embedded assessment of student learning and development (i.e., outcomes, pre-program competencies and/or characteristics, "critical indicators," etc.)
- Can add impetus for design of courses to improve program orientation/integration/updating information for students.

Disadvantages:

- None specified

Ways to Reduce Disadvantages:

- None specified

Bottom Line
"Stone" course are-perfect blends of assessment and instruction to serve program quality improvement and accountability goals (capstones for outcomes measures; cornerstones for pre-program measures); and should be considered by all academic programs.

Bibliographic References:

1. Brouse, P. S., "Senior Design Project: ABET 2000 Certification, *Proceedings of the 1999 Frontiers in Education Conference*, Session 11b2-1.

2. Fong, B., "Assessment the Department Major," in Assessing Students' Learning, J. H. McMillan, ed. *New Directions in Teaching and Learning*, No. 34, San Francisco: Jossey-Bass, 1988, 71-83.
3. Michalson, W., and R. Labonte, "Capstone Design in the ECE Curriculum: Assessing the Quality of Undergraduate Projects at WPI," *1997 ASEE Annual Conference Proceedings.*
4. Shaeiwitz, J. A., "Outcomes Assessment in Engineering Education," *Journal of Engineering Education*, July 1996.
5. Trevisan, M. S., D. C. Davis, R. W. Crain, D. E. Calkins, K. L. Gentili, "Developing and Assessing Statewide Competencies for Engineering Design," *Journal of Engineering Education*, April 1998.
6. Worthen, B. R., J. R. Sanders, and J. L Fitzpatrick, *Program Evaluation: Alternative Approaches and Practical Guidelines*, New York: Longman, 1997.

Open and Closed Form Written Surveys/Questionnaires

Definition: Asking individuals to share their perceptions of their own attitudes and/or behaviors or those of others. Includes direct or mailed, signed or anonymous.

Target of Method: Used primarily on students, could be used by third parties, such as student peers, faculty, employers, parents, etc.

Advantages:

- Typically yield the perspective that students, alumni, the public, etc., have of the institution which may lead to changes especially beneficial to relationships with these groups.
- Convey a sense of importance regarding the opinions of constituent groups
- Can cover a broad range of content areas within a brief period of time
- Results ten to be more easily understood by lay persons
- Can cover areas of learning and development which might be difficult or costly to assess more directly.
- Can provide accessibility to individuals who otherwise would be difficult to include in assessment efforts (e.g., alumni, parents, employers).

When 'third-parties' are making the reports there are additional advantages, as follows:

- Can provide unique stakeholder input, valuable in its own right (especially employers and parents). How is our college serving their purposes?
- Offer different perspectives, presumably less biased than either student or assessor.
- Enable recognition and contact with important, often under-valued constituents. Relations may improve by just asking for their input.
- Can increase both *internal validity* (through "*convergent validity*"/"*triangulation*" with other data) and external validity (by adding more "natural" perspective).
- Convey a sense of importance regarding the opinions of stakeholder groups.

Disadvantages

- Results tend to be highly dependent on wording of items, *salience* of survey or questionnaire, and organization of instrument. Thus, good surveys and questionnaires are more difficult to construct than they appear.
- Frequently rely on volunteer samples which tend to be biased.
- Mail surveys tend to yield low response rates.
- Require careful organization in order to facilitate data analysis via computer for large samples.
- Commercially prepared surveys tend not to be entirely relevant to an individual institution and its students.
- Forced response choices may not allow respondents to express their true opinions.
- Results reflect *perceptions* which individuals are willing to report and thus tend to consist of indirect data.
- Locally developed instrument may not provide for *externality* of results.

Third party disadvantages also include:

- As with any indirect data, inference and reports risk high degree of error.
- Third-parties can be biased too, in directions more difficult to anticipate than self-reports.
- Less investment by third-parties in assessment processes often means lower response rates, even lower than student/alumni rates.
- Usually more logistical, time-and-motion problems (e.g., identifying sample, making contact, getting useful responses, etc.), therefore more costly than it looks.
- If information about individuals is requested, confidentiality becomes an important and sometimes problematic issue that must be addressed carefully.

Ways to Reduce Disadvantages:

- Use only carefully constructed instruments that have been reviewed by survey experts
- Include *open-ended*, respondent worded items along with *forced-choice*.
- If random sampling or surveying of the entire target population is not possible, obtain the maximum sample size possible and follow-up with nonrespondents (preferably in person or by phone).
- If commercially prepared surveys are used, add locally developed items of relevance to the institution.
- If locally developed surveys are used, attempt to include at least *some externally-referenced* items (e.g., from surveys for which national data are available).
- Word reports cautiously to reflect the fact that results represent perceptions and opinions respondents are willing to share publicly.
- Use pilot or "try out" samples in local development of instruments and request formative feedback from respondents on content clarity, sensitivity, and format.
- Cross-*validate* results through other sources of data through *triangulation*.

Ways to Reduce Third Party Disadvantages

- Very careful, explicit directions for types and perspectives of responses requested can reduce *variability*.
- Attain informed consent in cases where information about individuals is being requested.
- Coordinate contacts with other campus organs contacting the same groups, to reduce "harassment" syndrome and increase response rates.

Bottom Line:
A relatively inexpensive way to collect data on important evaluative topics from a large number of respondents. Must always be treated cautiously, however, since results only reflect what subjects are willing to report about their perception of their attitudes and/or behaviors.

Bibliographic References:

1. Converse, Jean M. & Stanley Presser (1986). *Survey Questions: Handcrafting the Standardized Questionnaire*. Sage University Paper series on Quantitative Applications in the Social Sciences, series No. 07-063. Newbury Park, CA: Sage.
2. Dovidio, John & Russell Fazio (1991). "New Technologies for the Direct and Indirect Assessment of Attitudes." In J. Tanur (ed.), *Questions About Questions: Inquires into the Cognitive Bases of Surveys*, pp. 204-237. New York: Russell Sage Foundation.
3. Sudman, Seymour & Norman Bradburn (1982). *Asking Questions: A Practical Guide to Questionnaire Design*. San Francisco: Jossey-Bass Publishers.
4. Labaw, Patricia (1981). *Advanced Questionnaire Design*, Abt Books, Incorporated.
5. Lees-Haley, Paul (1980) *Questionnaire Design Handbook*, Rubicon.
6. Fowler, Floyd J. (1993). *Survey Research Methods, 2nd Ed*. Newbury Park, CA: Sage.
7. Rossi, Peter H., James D. Wright, & Andy B. Anderson (1983*). Handbook of Survey Research*. London: Academic Press.
8. Spector, P.E. (1992). *Summated Rating Scale Construction: An Introduction*. Sage University Paper series on Quantitative Applications in the Social Sciences, series no. 07-082. Newbury Park, CA: Sage.
9. Suskie, Linda (1996). *Questionnaire Survey Research: What Works?* Association for Institutional Research, Resources for Institutional Research, Number Six.

Exit Interview and Other Interviews

Definition: Asking individuals to share their perceptions of their own attitudes and/or behaviors or those of others. Evaluating student reports of their attitudes and/or behaviors in a face-to-face interrogative dialogue.

Target of Method: Used primarily on students; could be used by third parties, such as student peers, employers, etc.

Advantages

- Student interviews tend to have most of the attributes of surveys and questionnaires with the exception of requiring direct contact, which may limit accessibility to certain populations. Exit interviews also provide the following additional advantages:
- Allow for more individualized questions and follow-up probes based on the responses of interviewees.
- Provide immediate feedback
- Include same observational and *formative* advantages as oral examinations.

- Frequently yield benefits beyond data collection that comes from opportunities to interact with students and other groups.
- Can include a greater variety of items than is possible on surveys and questionnaires, including those that provide more direct measures of learning and development.

When 'third-parties' are making the reports there are additional advantages, as follows:

- Can provide unique *stakeholder* input, valuable in its own right (especially employers and parents). How is the college/program/project/course serving the purposes of the *stakeholder* group?
- Offer different perspectives, presumably less biased than either student or assessor.
- Enable recognition and contact with important, often under-valued constituents. Relations may improve by just asking for their input.
- Can increase both *internal validity* (through "*convergent validity*"/"*triangulation*" with other data) and *external validity* (by adding more "natural" perspective).

Disadvantages

- Require direct contact, which may be difficult to arrange.
- May be intimidating to interviewees, thus biasing results in the positive direction.
- Results tend to be highly dependent on wording of items and the manner in which interviews are conducted.
- Time consuming, especially if large numbers of persons are to be interviewed.

Third party report disadvantages:

- As with any indirect data, inference and reports risk high degree of error.
- Third-parties can be biased too, in directions more difficult to anticipate than self-reports.
- Less investment by third-parties in assessment processes often means lower response rates, even lower than student/alumni rates.
- Usually more logistical, time-and-motion problems (e.g., identifying sample, making contact, getting useful responses, etc.), therefore more costly than it looks.
- If information about individuals is requested, confidentiality becomes an important and sometimes problematic issue that must be addressed carefully.

Ways to Reduce Disadvantages

- Plan the interviews carefully with assistance from experts
- Provide training sessions for interviewers that include guidance in putting interviewees at ease and related interview skills.
- Interview random samples of students when it is not feasible to interview all.
- Conduct telephone interviews when face-to-face contact is not feasible.
- Develop an interview format and questions with a set time limit in mind.
- Conduct pilot-testing of interview and request interviewee formative feedback.
- Interview small groups of individuals when individual interviewing is not possible or is too costly.

Ways to Reduce Third Party Disadvantages

- Conduct face-to-face or phone interviews wherever possible, increasing *validity* through probing and formative evaluation during dialogue.
- Very careful, explicit directions for types and perspectives of responses requested can reduce *variability*.
- Attain informed consent in cases where information about individuals is being requested.
- Coordinate contacts with other campus organs contacting the same groups, to reduce "harassment" syndrome and increase response rates.

Bottom Line:

Interviews provide opportunities to cover a broad range of content and to interact with respondents. Opportunities to follow-up responses can be very valuable. Direct contact may be difficult to arrange, costly, and potentially threatening to respondents unless carefully planned.

Bibliographic References:

1. Dobson, Ann (1996), *Conducting Effective Interviews: How to Find out What You Need to Know and Achieve the Right Results*, Trans-Atlantic Publications, Inc.
2. Bradburn, Norman and Seymour Sudman (?) *Improving Interview Method and Questionnaire Design*, Books on Demand (ISBN: 0835749703)

Focus Groups[2]

[2] The material for this method was developed by Gloria Rogers and colleagues at Rose-Hulman Institute of Technology

Definition: To discuss a particular topic related to a research or evaluation question with the direction of a moderator. Typically conducted with 7-12 individuals who share certain characteristics that are related to the topic of discussion. Group discussion is conducted (several times, if possible) with similar types of participants to identify trends/patterns in perceptions. Moderator's purpose is to provide direction and set the tone for the group discussion, encourage active participation from all group members, and manage time. Moderator must not allow own biases to enter, verbally or nonverbally. Careful and systematic analysis of the discussions provides information about how a product, service, or opportunity is perceived.

Target of Method: Used primarily on students, could be used by third parties, such as employers, department's visiting board, etc.

Advantages

- Useful to gather ideas, details, new insights, and to improve question design.
- Inexpensive, quick information tool, helpful in the survey design phase.
- Can aid the interpretation of results from mail or telephone surveys.
- Can be used in conjunction with quantitative studies to confirm/broaden one's understanding of an issue.
- Allows the moderator to probe and explore unanticipated issues.

Disadvantages

- Not suited for *generalizations* about population being studied.
- Not a substitute for systematic evaluation procedures.
- Moderators require training.
- Differences in the responses between/among groups can be troublesome.
- Groups are difficult to assemble.
- Researcher has less control than in individual interviews.
- Data are complex to analyze.

Ways to Reduce Disadvantages

- Offer a monetary incentive for participants if possible.
- Over-recruit participants.
- Train moderators to use open-ended questions, pauses and probes, and learn when and how to move into new topic areas.
- Have a basic understanding that focus groups are essentially an exercise in group dynamics.

Bottom Line:
Focus groups are a quick and, if locally done, inexpensive method of gathering information. They are very useful for triangulation to support other assessment methods but they are not a substitute for systematic evaluation procedures. Focus Groups should meet the same rigor as other assessment methods and should be developed and analyzed according to sound qualitative practices.

Bibliographic References:

1. Morgan, D., et. al. (1998) *Focus Groups as Qualitative Research*, University Paper series on Quantitative Applications in the Social Sciences, Newbury Park, CA: Sage.
2. Morgan, D. (1998) *Focus Groups as Qualitative Research*, Thousand Oaks, CA: Sage.
3. Krueger, Richard (1998). *Developing Questions for Focus Groups*, Vol 3. University Paper series on Quantitative Applications in the Social Sciences, Newbury Park, CA: Sage.
4. Steward, D. and P. Shamdasani (1990). *Focus Groups: Theory and Practice*, University Paper series on Quantitative Applications in the Social Sciences, Newbury Park, CA: Sage.
5. Krueger, Richard (1997). *Moderating Focus Groups*, Vol 4. University Paper series on Quantitative Applications in the Social Sciences, Newbury Park, CA: Sage.
6. Morgan, D., and A. Scannell (1997). *Planning Focus Groups*, Vol 2. University Paper series on Quantitative Applications in the Social Sciences, Newbury Park, CA: Sage.

External Examiner

Definition: Using an expert in the field from outside your program, usually from a similar program at another institution to conduct, evaluate, or supplement assessment of your students. Information can be obtained from external evaluators using many methods including surveys, interviews, etc.

Target of method: Used primarily on students in individual classes or for a particular cohort of students; could be used by third parties, such as employers or visiting board, etc.

Advantages:

- Increases impartiality, third party objectivity (=*external validity*)
- Feedback useful for both student and program evaluation. With a knowledgeable and cooperative (or well-paid) examiner, provides an opportunity for a valuable program consultation.
- May serve to stimulate other collaborative efforts between departments/institutions - Incorporate external *stakeholders* and communities
- Students may disclose to an outsider what they might not otherwise share
- Outsiders can "see" attributes to which insiders have grown accustomed
- Evaluators may have skills, knowledge, or resources not otherwise available
- Useful in conducting *goal-free evaluation* (discovery-based evaluation without prior expectations)

Disadvantages:

- Always some risk of a misfit between examiner's expertise and/or expectations and program outcomes
- For individualized evaluations and/or large programs, can be very costly and time consuming
- Volunteers may become "donor weary"

Way to Reduce Disadvantages:

- Share program philosophy and objectives – and agree on assessment criteria - beforehand.
- Form reciprocal external examiner "consortia" among similar programs to minimize costs, swapping external evaluations back and forth.
- Limit external examiner process to program areas where *externality* may be most helpful.

Bottom Line:
Best used as a supplement to your own assessment methods to enhance external validity, but not as the primary assessment option. Other benefits can be accrued from the cross-fertilization that often results from using external examiners.

Bibliographic References:

1. Bossert, James L., *Quality Function Deployment*, Milwaukee: ASQC Quality Press, 1991, especially pp. 52-64.
2. Fitzpatrick, Jody L. and Michael Morris, Eds., *Current and Emerging Ethical Challenges in Evaluation*, San Francisco, CA: Jossey-Bass, 1999.

Behavioral Observations

Definition: Measuring the frequency, duration, *topology*, etc. of student actions, usually in a natural setting with non-interactive methods. For example, formal or informal observations of a classroom. Observations are most often made by an individual and can be augmented by audio or videotape.

Target of Method: Used primarily on individuals or groups of students in classes

Advantages

- Best way to evaluate degree to which attitudes, values, etc. are really put into action (= most *internal validity*).
- Catching students being themselves is the most "natural" form of assessment (= best *external validity*).
- Least intrusive assessment option, since purpose is to avoid any interference with typical student activities.

Disadvantages

- Always some risk of *confounded* results due to "*observer effect*;" i.e., subjects may behave atypically if they know they're being observed.

- Depending on the target behavior, there may be socially or professionally sensitive issues to be dealt with (e.g., invasion of privacy on student political activities or living arrangements) or even legal considerations (e.g., substance abuse or campus crime).
- May encourage "Big Brother" perception of assessment and/or institution.
- Inexperienced or inefficient observers can produce unreliable, invalid results.

Ways to Reduce Disadvantages
- Avoid socially or ethically sensitive target behaviors, especially initially.
- Include representative student input in process of determining "sensitivity" of potential target behaviors.
- Utilize electronic "observers: (i.e., audio and video recorders) wherever possible, for highly accurate, reliable, permanent observation record (although this may increase assessment cost in the short run if equipment is not already available.)
- Strictly adhere to ethical guidelines for the protection of human research subjects.

Bottom Line:
This is the best way to know what students actually do, how they manifest their motives, attitudes and values. Special care and planning are required for sensitive target behaviors, but it's usually worth it for highly *valid*, useful results.

Bibliographic References:

1. Lincoln, Y. S. and E. G. Guba (1985). *Naturalistic Inquiry*. Newbury Park, CA, SAGE Publications.
2. Miles, M. B. and A. M. Huberman (1984). *Qualitative Data Analysis*. Beverly Hills, Sage Publications.

Archival Data

Definition: Biographical, academic, or other file data available from college or other agencies and institutions.

Target of Method: Primarily aggregated student information; can use comparable data from other institutions for benchmarking.

Advantages:
- Tend to be accessible, thus requiring less additional effort.
- Build upon efforts that have already occurred.
- Can be cost efficient if required date is readily retrievable in desired format.
- Constitute unobtrusive measurement, not requiring additional time or effort from students or other groups.
- Very useful for *longitudinal* studies
- Ideal way to establish a baseline for before and after comparisons

Disadvantages:
- Especially in large institutions, may require considerable effort and coordination to determine exactly what data are available campus-wide and to then get that information in desired format.
- To be most helpful, datasets need to be combined. This requires an ability to download and combine specific information for multiple sources. It may require designing a separate database management system for this downloaded information.
- Typically the archived data are not exactly what is required, so that the evaluator must make compromises. In some cases, it may be a stretch to use such data as surrogates for the desired measures.
- If individual records are included, protection of rights and confidentiality must be assured; should obtain Institutional Review Board approval if in doubt.
- Availability may discourage the development of other, more responsive measures or data sources.
- May encourage attempts to "find ways to use data" rather than measurement related to specific goals and objectives.

Ways to Reduce Disadvantages:
- Early-on in the development of an assessment program, conduct a comprehensive review of existing assessment and evaluation efforts and data typically being collected throughout the institution and its units (i.e, "campus data map") – is there someone on campus responsible for "Institutional Research."
- Be familiar with the Family Educational Rights and Privacy Act (Buckley Amendment) and avoid personally identifiable data collection without permission. Assure security/protection of records.
- Only use archival records that are relevant to specific goals and objectives of learning and development.

Bottom Line:
Can be quick, easy, and cost-effective method, if data is available and accessible. Usually limited data quality but integral to valuable longitudinal comparisons. Should be a standard component of all assessment programs.

Bibliographic References:

1. Astin, Alexander W. "Involvement in Learning Revisted: Lessons We Have Learned." *Journal of College Student Development*; v37 n2 p. 123-34, March 1996.
2. Astin, Alexander W.; et al., *Degree Attainment Rates at American Colleges and Universities: Effects of Race, Gender, and Institutional Type*. Higher Education Research Inst., Inc., Los Angeles, CA, 1996.

Portfolios

Definition: Collections of multiple student work samples usually compiled over time. Rated by some type of *rubric*.

Target of Method: Used primarily on students in individual classes or in for a particular cohort of students

Advantages:
- Can be used to view learning and development *longitudinally* (e.g. samples of student writing over time can be collected), which is most valid and useful perspective.
- Multiple components of a curriculum can be measured (e.g., writing, critical thinking, research skills) at the same time.
- Samples in a portfolio are more likely than test results to reflect student ability when pre-planning, input from others, and similar opportunities common to most work settings are available (which increases *generalizability/external validity* of results).
- The process of reviewing and grading portfolios provides an excellent opportunity for faculty exchange and development, discussion of curriculum goals and objectives, review of grading criteria, and program feedback.
- Economical in terms of student time and effort, since no separate "assessment administration" time is required.
- Greater faculty control over interpretation and use of results.
- Results are more likely to be meaningful at all levels (i.e., the individual student, program, or institution) and can be used for diagnostic/prescriptive purposes as well.
- Avoids or minimizes "test anxiety" and other "one shot" measurement problems.
- Increases "power" of maximum performance measures over more artificial or restrictive "speed" measures on test or in-class sample.
- Increases student participation (e.g., selection, revision, evaluation) in the assessment process.

Disadvantages
- Costly in terms of evaluator time and effort.
- Management of the collection and grading process, including the establishment of reliable and valid grading criteria, is likely to be challenging.
- May not provide for *externality*.
- If samples to be included have been previously submitted for course grades, faculty may be concerned that a hidden agenda of the process is to validate their grading.
- Security concerns may arise as to whether submitted samples are the students' own work, or adhere to other measurement criteria.

Ways to Reduce Disadvantages
- Consider having portfolios submitted as part of a course requirement, especially a "capstone course" at the end of a program.
- Utilize portfolios from representative samples of students rather than having all students participate (this approach may save considerable time, effort, and expense but be problematic in other ways).
- Have more than one rater for each portfolio; establish *inter-rater reliability* through piloting designed to fine-tune rating criteria.
- Provide training for raters.
- Recognize that portfolios in which samples are selected by the students are likely represent their best work.
- Cross-validate portfolio products with more controlled student work samples (e.g., in-class tests and reports) for increased *validity* and security.

Bottom Line:
Portfolios are a potentially valuable option adding important longitudinal and "qualitative" data, in a more natural way. Particular care must be taken to maintain *validity*. Especially good for multiple-objective assessment.

Bibliographic References:

1. Barrett, H.C. (1994). *Technology-supported assessment portfolios.* "Computing Teacher," 21(6), 9-12. (EJ 479 843)
2. Hart, D. (1994). *Authentic assessment: a handbook for educators.* Menlo Park, CA: Addison-Wesley.
3. Hodges, D. (1998). *Portfolio: A self-learning guide.* Barrington, IL.
4. Jackson, L. and Caffarella, R.S. (1994). *Experiential learning: A new approach.* San Francisco, CA: Jossey-Bass.
5. Khattru, N., Kane, M., and Reeve, A. (1995). *How performance assessments affect teaching and learning.* Educational Leadership. (11), 80-83.
6. Murphy, S.M. (1998). Reflection: In portfolios and beyond. *Clearing House*,(72), 7-10.
7. Paulson, L.F., Paulson, P.R., & Meyer, C. (1991) *What makes a portfolio a portfolio?* "Educational Leadership," 48(5), 60-63. (EJ 421 352)
8. Porter, C. and Cleland, J. (1995). *The portfolio as a learning strategy.* Portsmouth, NH: Boynton/Cook Publishers.
9. Rogers, Gloria and Timothy Chow, "Electronic Portfolios and the Assessment of Student Learning." *Assessment Update*, Josey-Bass Publisher, January-February 2000, Vol. 12, No. 1, pp. 4-6, 11.

APPENDIX – Choosing the Right Assessment Tools

Based on:

- Fulks, Janet, "Assessing Student Learning in Community Colleges", Bakersfield College, 2004 obtained at http://online.bakersfieldcollege.edu/courseassessment/Default.htm

Examples of various assessment tools are included in the table below. It should be noted that the categorizations may vary depending upon your perspective and the way in which you construct the assessment.

Tool	**Method** D= Direct I= Indirect	**Domain** C= Cognitive P= Psychomotor A= Affective	**Usage Type** F= Formative S= Summative	**Bloom's level** K= Knowledge C= Comprehension A= Application ASE= Analysis or Synthesis or Evaluation	**Pros**	**Cons**
Multiple Choice Exam	D	C	F or S	K, C If carefully constructed ASE	easy to grade; objective	reduces assessment to multiple choice answers
Licensing Exams	D	C	S	K, C, A	easy to score and compare	no authentic testing, may outdate
Standardized Cognitive Tests	D	C	S	K, C, A?	comparable between students	heavily dependent on exposure to topics on test
Checklists	D	C, A, P	F or S	Variable	very useful for skills or performances; students know exactly what is missing	can minimize large picture and interrelatedness; evaluation feedback is basically a yes/no - present/absent - without detail
Essay	D	C, A	F or S	K, C, A, ASE	displays analytical and synthetic thinking well	time consuming to grade, can be subjective
Case Study	D	C, A	F or S	K, C, A, ASE	displays analytical and synthetic thinking well; connects other knowledge to topic	creating the case is time consuming, dependent on student knowledge form multiple areas
Problem Solving	D	C	F or S	K, C, A, ASE	displays analytical and synthetic thinking well; authentic if real world situations are used	difficult to grade due to multiple methods and potential multiple solutions
Oral Speech	D	C	F or S	Variable K, C, A, ASE	easily graded with rubric; allows other students to see and learn what each student learned; connects general education goals with discipline-specific courses	difficult for ESL students; stressful for students; takes course time; must fairly grade course content beyond delivery
Debate	D	C, A	F or S	K, C, A, ASE	provides immediate feedback to the student; reveals thinking and ability to respond based on background knowledge and critical thinking ability	requires good rubric; more than one evaluator is helpful; difficult for ESL students; stressful for students; takes course time

Tool	**Method** D= Direct I= Indirect	**Domain** C= Cognitive P= Psychomotor A= Affective	**Usage Type** F= Formative S= Summative	**Bloom's level** K= Knowledge C= Comprehension A= Application ASE= Analysis or Synthesis or Evaluation	**Pros**	**Cons**
Product Creation & Special Reports	D	C, P, A	F or S	Variable K, C, A, ASE	students can display skills, knowledge, and abilities in a way that is suited to them	must have clearly defined criteria and evaluative measures; "the look" can not over-ride the content
Flowchart or Diagram	D	C	F or S	C, A, ASE	displays original synthetic thinking on the part of the student; perhaps the best way to display overall high level thinking and articulation abilities	more difficult to grade, requiring a checklist or rubric for a variety of different answers; difficult for some students to do on the spot
Portfolios	D	C, P	S	Variable	provides the students with a clear record of their work and growth; best evidence of growth and change over time; students can display skills. knowledge, and abilities in a way that is suited to them; promotes self-assessment	Time consuming to grade; different content in portfolio makes evaluating difficult and may require training; bulky to manage depending on size
Exit Surveys	D and I	A	S	ASE	provides good summative data; easy to manage data if Likert-scaled responses are used	Likert scales limit feedback, open-ended responses are bulky to manage
Performance	D	C, P	F or S	Variable K, C, A, ASE	provides best display of skills and abilities; provides excellent opportunity for peer review; students can display skills. knowledge, and abilities in a way that is suited to them	stressful for students; may take course time; some students may take the evaluation very hard - evaluative statements must be carefully framed
Capstone project or course	D	C, P , A	F orS	ASE	best method to measure growth overtime with regards to a course or program - cumulative	focus and breadth of assessment and understanding all the variables to produce assessment results are important; may result in additional course requirements; requires coordination and agreement on standards
Team Project	D	C, A	F or S	Variable K, C, A, ASE	connects general education goals with discipline-specific courses	must fairly grade individuals as well as team; grading is slightly more complicated; student interaction may be a challenge

Tool	Method D= Direct I= Indirect	Domain C= Cognitive P= Psychomotor A= Affective	Usage Type F= Formative S= Summative	Bloom's level K= Knowledge C= Comprehension A= Application ASE= Analysis or Synthesis or Evaluation	Pros	Cons
Reflective self-assessment essay	D and I	C, A	S	ASE	provides invaluable ability to evaluate affective growth in students	must use evidence to support conclusions, not just self-opinionated assessment
Satisfaction and Perception Surveys	I	C, P, A	S	C, A, ASE	provides good indirect data; data can be compared longitudinally; can be used to determine outcomes over a long period of time	respondents may be influenced by factors other than those being considered; validity and reliability most be closely watched

Assessment Tool Checklist		☑
1.	Does the assessment adequately evaluate academic performance relevant to the desired outcome? (validity)	
2.	Does this assessment tool enable students with different learning styles or abilities to show you what they have learned and what they can do?	
3.	Does the content examined by the assessment align with the content from the course? (Content validity)	
4.	Does this assessment method adequately address the knowledge, skills, abilities, behavior, and values associated with the intended outcome? (Domain validity)	
5.	Will the assessment provide information at a level appropriate to the outcome? (Bloom's)	
6.	Will the data accurately represent what the student can do in an authentic or real life situation? (Authentic assessment)	
7.	Is the grading scheme consistent; would a student receive the *same* grade for the *same* work on multiple evaluations? (Reliability)	
8.	Can multiple people use the scoring mechanism and come up with the same general score? (Reliability)	
9.	Does the assessment provide data that is specific enough for the desired outcomes? (alignment with outcome)	
10.	Is the assessment summative or formative - if formative does it generate diagnostic feedback to improve learning?	
11.	Is the assessment summative or formative - if summative, is the final evaluation built upon multiple sources of data? (AAHE Good practice)	
12.	If this is a summative assessment, have the students had ample opportunity for formative feedback and practice displaying what they know and can do?	
13.	Is the assessment unbiased or value-neutral, minimizing an attempt to give desirable responses and reducing any cultural misinterpretations?	
14.	Are the intended uses for the assessment clear? (Grading, program review, both)	
15.	Have other faculty provided feedback?	
16.	Has the assessment been pilot-tested?	
17.	Has the evaluation instrument been normed?	
18.	Will the information derived from the assessment help to improve teaching and learning? (AAHE Good Practice)	
19.	Will you provide the students with a copy of the rubric or assignment grading criteria?	
20.	Will you provide the students examples of model work?	