

Assessing Student Learning Outcomes: Getting From Here to There

Choosing Assessment Tools



Why Assess?

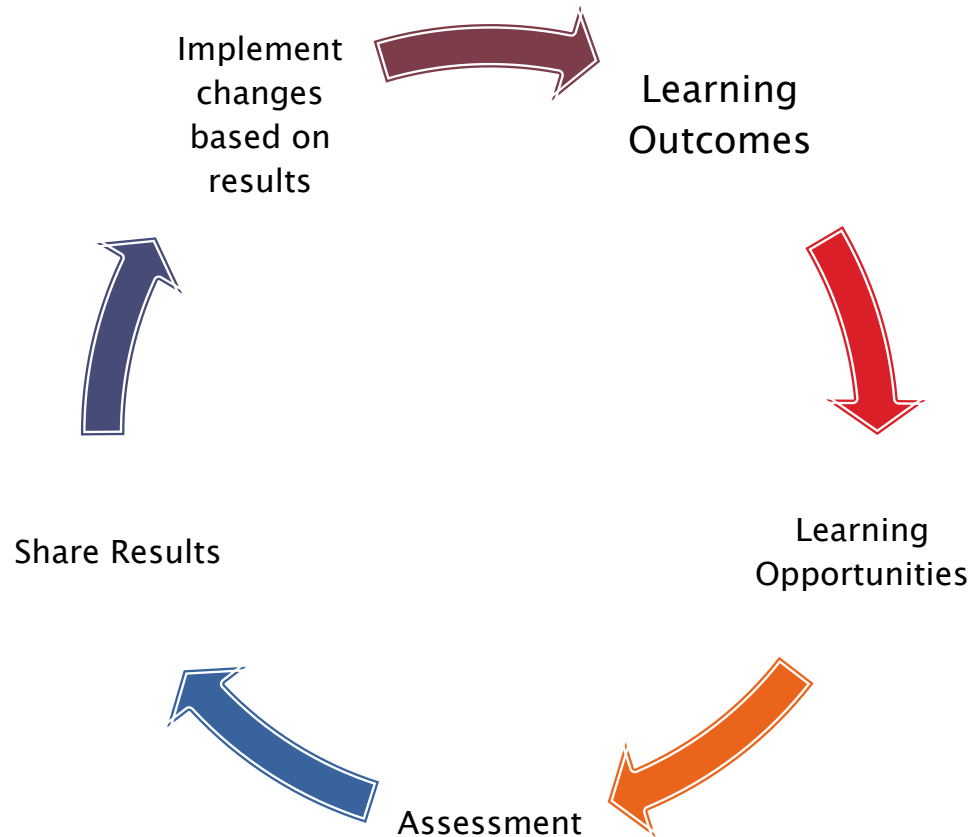
Assessment answers two basic questions: **What are our students learning, and how do we know?** (Angelo and Cross, *Classroom Assessment Techniques*, 1993)

Assessment is the ongoing process of:

- ▶ 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

(Suskie, Linda (2009). *Assessing Student Learning: A Common Sense Guide*. San Francisco: Jossey-Bass, p. 4.)

The Teaching-Learning-Assessment Cycle



What is a learning outcome?

- ▶ Learning outcomes (also called learning goals) are goals that describe how students will be different because of a learning experience. More specifically, learning outcomes are the knowledge, skills, attitudes and habits of mind that students take with them from a learning experience.

Types of learning outcomes:

- ❖ Knowledge outcomes
- ❖ Skills outcomes
- ❖ Values/attitude outcomes (“habits of mind”)

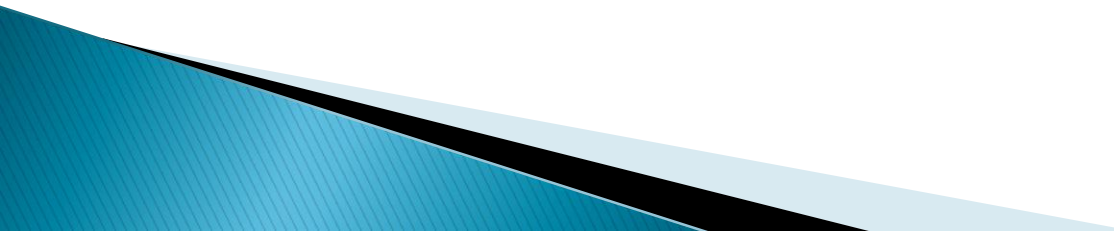
Direct and Indirect Assessment Measures

It is useful to include both direct and indirect assessment measures in your assessments.

Direct Assessment Measures

Direct measures ask students to demonstrate their learning.

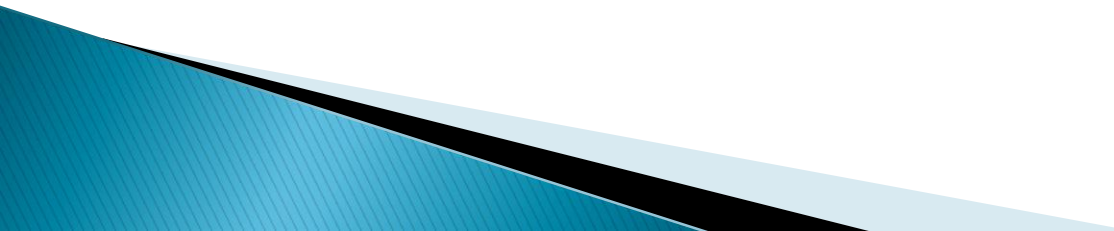
Direct assessment measures include:

- ▶ objective tests
 - ▶ essays
 - ▶ case studies
 - ▶ problem solving exercises
 - ▶ presentations
 - ▶ classroom assignments
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Indirect Assessment Measures

Indirect methods ask students to reflect on their learning.

Indirect assessment methods include:

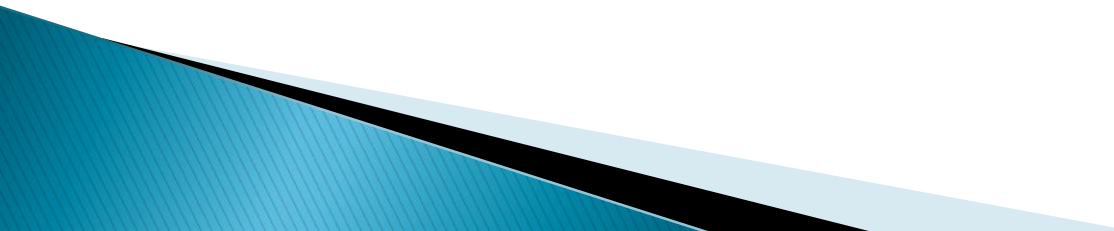
- ▶ surveys
 - ▶ interviews
 - ▶ student reflection essays
 - ▶ self-assessment essays
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RUBRICS

PROS:

- ▶ Defines clear expectations
- ▶ Can be used to score many kinds of assignments or exams, or a body of work over a semester.
- ▶ Faculty define standards and criteria and how they will be applied.

CONS:

- ▶ Faculty must agree on how to define standards and criteria and how they will be applied.
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Scientific Reasoning Rubric

Skills	BEGINNING	DEVELOPING	COMPETENT	ACCOMPLISHED
1) Student can describe methods of scientific inquiry and apply them to investigating, questioning, and solving problems	<p>The student cannot:</p> <ol style="list-style-type: none"> 1. Identify a scientific problem 2. Recognize that problems have solutions 3. Recognize the definition of an hypothesis 	<p>The student can:</p> <ol style="list-style-type: none"> 1. Identify and clearly state a scientific problem 2. Select one possible solution to the problem 3. Select a hypothesis appropriate to the problem 	<p>The student can:</p> <ol style="list-style-type: none"> 1. Restate the scientific problem in a question format 2. Predict one or more possible solutions to the problem 3. Generate a testable hypothesis appropriate to the problem 	<p>The student can:</p> <ol style="list-style-type: none"> 1. Develop a proper research question 2. Evaluate alternate solutions to the problem 3. Propose how to evaluate a hypothesis appropriate to the problem
2) Student can describe and carry out experimental procedures.	<p>The student cannot:</p> <ol style="list-style-type: none"> 1. Recognize the purpose/ objective of an experiment 2. Determine the materials needed to complete the experimental procedure 3. Recognize experimental variables 	<p>The student can:</p> <ol style="list-style-type: none"> 1. State the purpose/ objective of the experiment in their own words 2. Determine the materials needed to complete the procedure 3. Differentiate between independent and dependent variables 	<p>The student can:</p> <p>State the purpose/ objective of the experiment in their own words</p> <p>Determine the materials needed to complete the procedure</p> <p>Differentiate between independent, dependent, and confounding variables and controls</p>	<p>The student can:</p> <ol style="list-style-type: none"> 1. Explain the purpose/ objective of the experiment in their own words 2. Determine the materials needed to complete the procedure 3. Select the experimental variables and controls 4. Manipulate the independent variable

Scientific Reasoning Rubric, cont.

Skills	BEGINNING	DEVELOPING	COMPETENT	ACCOMPLISHED
Skills	BEGINNING	DEVELOPING	COMPETENT	ACCOMPLISHED
3) <i>Student can perform laboratory tasks appropriate to the field.</i>	The student cannot : 1. Obey safety rules and handle lab equipment safely 2. Follow written procedures 3. Identify scientific tools appropriate to the task 4. Work independently	The student can, with frequent reminders: 1. Obey safety rules and handle lab equipment safely 2. Follow written procedures accurately 3. Employ scientific tools with proper technique 4. Measure and record data	The student can independently: Obey safety rules and carefully handle lab equipment Follow written procedures accurately Employ scientific tools with proper technique Measure and record data with minimal errors	The student takes initiative to: Obey safety rules and carefully handle lab equipment Follow written procedures accurately Employ scientific tools with proper technique Measure and record data accurately
4) <i>Student can interpret and communicate scientific information using written, oral and/or graphical means</i>	The student cannot : 1. Interpret quantitative information from tables and graphs using basic vocabulary	The student can: Interpret quantitative information from tables and graphs using vocabulary appropriate to the discipline Construct data tables and represent information graphically	The student can, with few errors: 1. Interpret quantitative information from tables and graphs results using technical vocabulary 2. Independently construct data tables and represent information graphically. 3. Communicate experimental or	The student can, with few to no errors: 1. Accurately interpret quantitative information using highly technical vocabulary and make appropriate inferences 2. Independently construct data tables and represent information graphically 3. Clearly communicate

Scientific Reasoning Rubric, cont.

Skills	BEGINNING	DEVELOPING	COMPETENT	ACCOMPLISHED
<p>5) <i>Student can describe and analyze one or more relationships among science, technology and society and demonstrate an understanding of scientific applications in everyday life</i></p>	<p>The student cannot:</p> <ol style="list-style-type: none"> 1. Identify a technological breakthrough and its connection to science 	<p>The student can:</p> <ol style="list-style-type: none"> 1. Identify a technological breakthrough and its connection to science 2. Place a technological breakthrough in an historical context 3. Explain some of its impacts on society 	<p>The student can:</p> <p>Identify a technological breakthrough and its connection to science</p> <p>Place a technological breakthrough in an historical context</p> <p>Explain some of its impacts on society</p> <p>Explain one or more scientific principles behind a technology</p>	<p>The student can:</p> <ol style="list-style-type: none"> 1. Identify a technological breakthrough and its connection to science 2. Place a technological breakthrough in an historical context 3. Explain and analyze some of its impacts on society 4. Explain one or more scientific principles behind a technology 5. Describe examples or possible future developments related to science, technology, and society
<p>6) <i>Student can demonstrate logical reasoning in explaining natural phenomena,</i></p>	<p>The student struggles to:</p> <p>Identify logical explanations for observed phenomena</p>	<p>The student can:</p> <ol style="list-style-type: none"> 1. Identify logical explanations for observed phenomena 2. Identify fallacies or illogical conclusions 	<p>The student can:</p> <ol style="list-style-type: none"> 1. Identify possible alternative logical explanations for observed phenomena 	<p>The student can:</p> <ol style="list-style-type: none"> 1. Develop possible alternative logical explanations for observed phenomena

Information Literacy Rubric

Information Literacy Skill	Beginning	Developing	Competent	Accomplished
<p>Project rests on a framed research question (ACRL 1.1--1.4)</p>	<ul style="list-style-type: none"> • Student did not formulate focused research question • Student had an unclear idea of breadth and depth of topic and information needed 	<ul style="list-style-type: none"> • Student formulated a basic research question • Student had basic idea of breadth and depth of topic and information needed 	<ul style="list-style-type: none"> • Student formulated a focused research question which demonstrated a clear understanding of topic • Student had a clear idea of breadth and depth of topic and information needed 	<ul style="list-style-type: none"> • Student formulated a fully-developed research question which showed an excellent understanding of topic • Student had a well-developed idea of breadth and depth of topic and information needed, and modified the topic accordingly
<p>Sources located, searched and selected for this project are within the proper scope (ACRL 1.2; 2.2)</p>	<ul style="list-style-type: none"> • Student had an unclear understanding of appropriate keywords • Student used inappropriate tools and unclear search strategy to find information • Student identified 	<ul style="list-style-type: none"> • Student had a basic understanding of appropriate keywords • Student used a few appropriate search tools and had a basic search strategy • Student found a 	<ul style="list-style-type: none"> • Student had a clear understanding of appropriate keywords • Student used search tools effectively and had a clear and focused search strategy 	<ul style="list-style-type: none"> • Student had excellent understanding of appropriate keywords • Student used multiple search strategies to find the best sources for the topic • Student's source

Information Literacy Rubric, cont.

<p>Project reflects student efforts to evaluate sources critically (ACRL 3.1-- 3.7)</p>	<ul style="list-style-type: none"> • Student showed no effort to judge credibility, relevance, accuracy, or timeliness of information • Student uncritically accepted all information found • Student made no effort to use diverse sources or formats • Information used did not match criteria specified for project 	<ul style="list-style-type: none"> • Student showed some effort to judge credibility, relevance, accuracy, or timeliness of information • Student made limited judgments about what to keep and what to discard • Student made some effort to use diverse sources and/or formats • Information used somewhat matched criteria specified for project 	<ul style="list-style-type: none"> • Student evaluated the information for credibility, relevance, accuracy, and timeliness • Student made generally good judgments about what to keep and what to discard • Student compared diverse and appropriate sources and formats • Information used matched criteria specified for project 	<ul style="list-style-type: none"> • Student thoroughly evaluated the information for credibility, relevance, accuracy, timeliness, bias, and context • Student made thoughtful judgments about what to keep and what to discard • Student compared a wide variety of diverse and appropriate sources/ formats • Information used exceeded criteria specified for project
<p>Final product shows evidence of accomplishing the objectives of research project (ACRL 4.1-- 4.3)</p>	<ul style="list-style-type: none"> • Student showed no evidence of grasping information literacy concepts or skills 	<ul style="list-style-type: none"> • Information used reflects grasp of most of information literacy concepts and skills 	<ul style="list-style-type: none"> • Information used suggests ability to find and evaluate information from a variety of sources 	<ul style="list-style-type: none"> • Information used suggests excellent command of finding and evaluating information from a variety of

Information Literacy Rubric, cont.

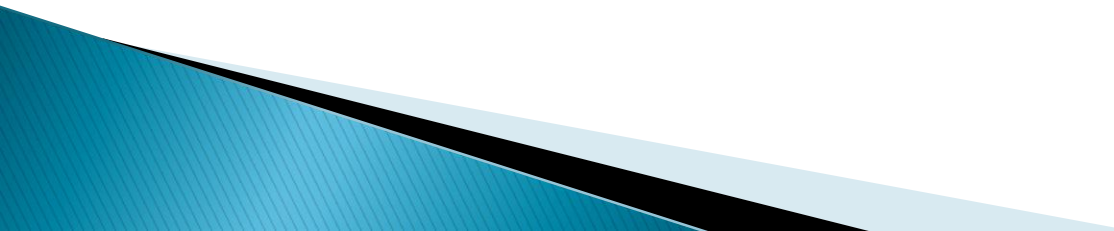
<p>Sources were used ethically and appropriately and facilitate tracing to original information (ACRL 5.1—5-3)</p>	<ul style="list-style-type: none"> • Student provided inadequate, incorrect, or no citation for others' ideas • Student work reflects lack of awareness of what plagiarism means • Student did not create a workable bibliography or works cited page 	<ul style="list-style-type: none"> • Student cited information with mistakes regarding proper format • Student work shows acceptable understanding of plagiarism rules • Student created a bibliography or works cited page that contained just a few sources 	<ul style="list-style-type: none"> • Student created a bibliography or works cited page using appropriate citation style • Student created a bibliography or works cited page containing required number of sources. • Student showed thorough understanding of plagiarism and strategies for avoiding plagiarism , and recognizes examples of plagiarism 	<ul style="list-style-type: none"> • Student created a meticulous bibliography or works cited page using appropriate citation style • Student showed excellent understanding of plagiarism and strategies for avoiding plagiarism , and recognizes examples of plagiarism • Student created a bibliography or works cited page exceeding the required number of sources.
<p>Self-Assessment</p>	<ul style="list-style-type: none"> • Student was unable to identify major strengths and weaknesses in work • Student did not seek and/or resist instructor assistance 	<ul style="list-style-type: none"> • Student attempted to identify strengths and weaknesses in work • Student did not resist instructor feedback 	<ul style="list-style-type: none"> • Student identified strengths and weaknesses in work • Student sought instructor assistance when needed 	<ul style="list-style-type: none"> • Student self-identified learning strengths and weaknesses and made efforts to improve • Student used instructor assistance

COMMON FINAL EXAM or COMMON CAPSTONE PROJECT

PROS:

- ▶ Good method to measure growth over time with regards to a course
- ▶ Cumulative
- ▶ The data is more robust if all students complete the same assessment
- ▶ Provides an additional buffer between student learning performance and an individual instructor's teaching performance.

CONS:

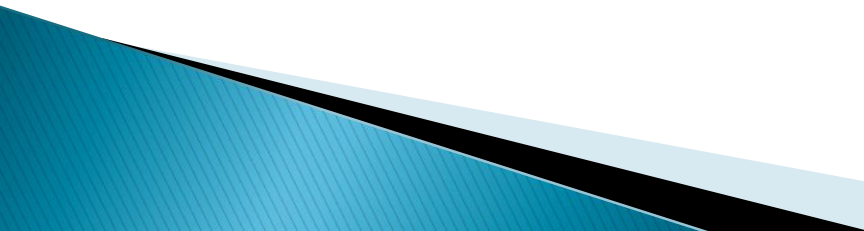
- ▶ Focus and breadth of assessment are important.
 - ▶ Understanding all the variables to produce assessment results is also important
 - ▶ May result in additional course requirements
 - ▶ Requires coordination and agreement on standards
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EMBEDDED TEST QUESTIONS

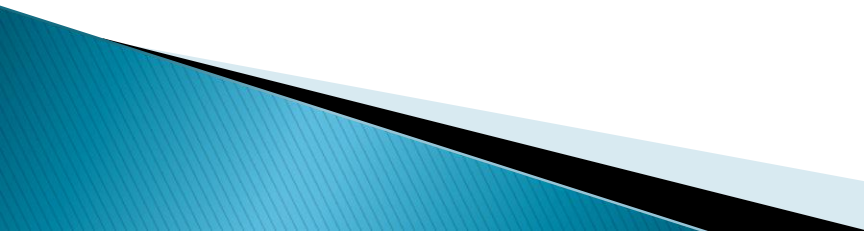
PROS:

- ▶ Good method to measure growth over time with regards to a course
- ▶ Cumulative.
- ▶ The data is more robust if all students complete the same assessment.
- ▶ Provides an additional buffer between student learning performance and an individual instructor's teaching performance.
- ▶ Embedded questions can be reported as an aggregate.

CONS:

- ▶ May result in additional course requirements
 - ▶ Requires coordination and agreement on standards
 - ▶ If some instructors embed and others do not, the data will be difficult to compare and analyze
 - ▶ Separate analysis of embedded set of questions is required
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Other Assessment Tools

- ▶ Problem–Solving Exercises
 - ▶ Case Studies
 - ▶ Student–Created Flowchart or Diagram Assignment
 - ▶ Checklists
 - ▶ Reflective Essays
 - ▶ Student Surveys or Interviews
 - ▶ Standardized Cognitive Tests
 - ▶ Multiple Choice Exams
 - ▶ Pre–Test/Post Test Evaluations
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Design Your Assessment!

- ▶ Choose one student learning outcome from a course that you teach
 - ▶ Then choose one direct assessment and one indirect method to assess this outcome
 - ▶ Design your assessment tools
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