Aligning Test Items with Course Learning Objectives

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Learning objectives for today’s workshop

After attending today’s workshop, you will be able to:

- Identify levels of learning from Bloom’s taxonomy and corresponding verbs and activities.
- Differentiate between limited-choice test items and open-ended test items.
- Describe various steps in writing effective exam items.
- Construct test items that are aligned with a course’s learning objectives.
What are learning objectives?
Student Learning Outcomes/Objectives

• Student learning outcomes/objectives are the knowledge, skills, attitudes, and values that students gain from a learning experience.

• Student learning outcomes/objectives define what students know, are able to do, and value by the end of a learning experience.
What is the difference between student learning outcomes and objectives?

• Student Learning Outcomes (SLOs) are program-level statements describing the knowledge, skills, attitudes, and values that students gain from the program. They are more overarching and often encompass multiple courses.

• Learning Objectives are course-level statements describing the knowledge, skills, attitudes, and values that students gain from a course. They are more detailed and course content-specific.
Where does one find learning objectives?

The basis for the minimum learning objectives a course should address can be found in the course content summaries.

Textbooks often provide learning objectives for each chapter.
Learning Objectives should be SMART:

- **S**pecific
- **M**easurable
- **A**ttainable
- **R**esults-oriented
- **T**ime-bound
Measurable?

Refer to Bloom’s taxonomy of educational objectives as a resource to help ensure that the learning objectives are observable and measurable. In other words, what must the students do to demonstrate that they have achieved a learning objective?

Bloom’s taxonomy (or hierarchy) identifies three learning domains:

- Cognitive (*knowing*)
- Affective (*feeling*)
- Psychomotor (*doing*)
Measurable?

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Bloom’s taxonomy (or hierarchy) identifies three learning domains:

• Cognitive (*knowing*)
• Affective (*feeling*)
• Psychomotor (*doing*)
Levels of Bloom’s Taxonomy: Cognitive Domain
(lowest to highest)

<table>
<thead>
<tr>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge/Remembering</td>
</tr>
<tr>
<td>Comprehension/Understanding</td>
</tr>
<tr>
<td>Application/Applying</td>
</tr>
<tr>
<td>Analysis/Analyzing</td>
</tr>
<tr>
<td>Synthesis/Creating</td>
</tr>
<tr>
<td>Evaluation/Evaluating</td>
</tr>
</tbody>
</table>
Examples of Learning Objectives from NOVA Course Content Summaries

• Upon the completion of this course, the student should be able to identify accepted theories of leadership and motivation as they relate to utilizing effective communication and the management of individual and group behavior. (BUS 200)
• As a result of the learning experience provided in this course, the student should be able to solve simple gas law problems. (CHM 101-102)
• Upon completion of the course, the student will be able to distinguish the major classes of rocks and explain their origin. (GOL 105)
• Upon completion of this course the student will be able to explain how laws affect the buying and selling of consumer goods and services. (MKT 200)
• Upon completion of this course, the student should be able to use basic anatomical terms. (NAS 150)
• Upon the completion of this course, the student should be able to summarize major historical changes in the development of modern tourism. (TRV 100)
Examples of Learning Objectives from NOVA Course Content Summaries – To Revise

• Upon the successful completion of this course, the student should be able to understand the legal principles involving consumer-merchant transactions.
• Upon the completion of this course, the student should be able to demonstrate a knowledge of the role of global management for the domestic manager.
• Upon completion of this course the student will be able to protect themselves from fraudulent business practices and "come on" marketing techniques used by unethical businesses.
• Students will develop an appreciation and understanding of the evolution of American Civilization.
• Upon completion of this course, the student should be able to understand the basic concepts associated with consumer credit and the various forms of consumer insurance including life insurance, health insurance and property insurance.
Choosing Appropriate Testing Formats
Types of Testing Items
(re: answering)

- Limited-Choice: Students choose from alternatives provided
  - True/False
  - Multiple Choice
  - Matching

- Open-Ended: Students formulate their own answers
  - Fill-in-the-blank/Completion
  - Short Answers
  - Essays
  - Problem-solving
  - Performance test items
Choosing Appropriate Type of Test Item

Certain types of exam items (limited-choice vs. open-ended) are better suited than others for measuring different types of learning objectives. The verb in the learning objective can often limit the type of item that can be used.

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Most Suitable Test Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student will be able to <strong>name</strong> the parts of the human skeletal system.</td>
<td>Limited-choice</td>
</tr>
<tr>
<td>The student will be able to <strong>identify</strong> common characteristics of various genres of literature.</td>
<td>Limited-choice</td>
</tr>
<tr>
<td>The student will <strong>explain</strong> the processes and outcomes of communication and miscommunication within groups, teams, and leadership.</td>
<td>Open-ended</td>
</tr>
<tr>
<td>The student will <strong>describe</strong> the differences between translating, transliterating, and interpreting.</td>
<td>Open-ended</td>
</tr>
<tr>
<td>The student will <strong>demonstrate</strong> appropriate laboratory safety skills.</td>
<td>Open-ended</td>
</tr>
</tbody>
</table>
Choosing Appropriate Types of Activities

After determining which type of test item would be appropriate for a given learning objective (limited-choice items and open-ended items), one must then decide which type of activity would effectively evaluate student learning.

<table>
<thead>
<tr>
<th>Learning Objectives</th>
<th>Most Suitable Test Item</th>
<th>Type of Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student will be able to <strong>name</strong> the parts of the human skeletal system.</td>
<td>Limited-choice</td>
<td>Fill-in-the-blanks</td>
</tr>
<tr>
<td>The student will be able to <strong>identify</strong> common characteristics of various genres of literature.</td>
<td>Limited-choice</td>
<td>Matching</td>
</tr>
<tr>
<td>The student will <strong>explain</strong> the processes and outcomes of communication and miscommunication within groups, teams, and leadership.</td>
<td>Open-ended</td>
<td>Essay</td>
</tr>
<tr>
<td>The student will <strong>describe</strong> the differences between translating, transliterating, and interpreting.</td>
<td>Open-ended</td>
<td>Short answers</td>
</tr>
<tr>
<td>The student will <strong>demonstrate</strong> appropriate laboratory safety skills.</td>
<td>Open-ended</td>
<td>Performance</td>
</tr>
</tbody>
</table>
Is it either/or?

“A common myth depicts objective items [limited-choice items] as measuring simple factual recall and essays as evaluating higher-order thinking. But multiple choice items, for example, can be written to measure reasoning, comprehension, application, analysis, and other complex thinking processes. Limited-choice items that require students to classify statements as fact or opinion go beyond rote learning.”

http://www.indiana.edu/~best/write_better_tests.shtml
One or the Other?

From http://cte.illinois.edu/testing/exam/test_ques.html:

“Essay and objective exams can be used to measure the same content or ability.

Both item types can measure similar content or learning objectives. Research has shown that students respond almost identically to essay and objective test items covering the same content. Studies by Sax & Collet (1968) and Paterson (1926) conducted forty-two years apart reached the same conclusion:

"...there seems to be no escape from the conclusions that the two types of exams are measuring identical things." (Paterson, p. 246)

This conclusion should not be surprising; after all, a well written essay item requires that the student (1) have a store of knowledge, (2) be able to relate facts and principles, and (3) be able to organize such information into a coherent and logical written expression, whereas an objective test item requires that the student (1) have a store of knowledge, (2) be able to relate facts and principles, and (3) be able to organize such information into a coherent and logical choice among several alternatives."
Suggestions for Writing Limited-Choice Items Which Measure Higher Objectives

1. Present practical or real-world situations to the students. These problems may use short paragraphs describing a problem in a practical situation. Items can be written which call for the application of principles to the solution of these practical problems, or the evaluation of several alternative procedures.

2. Present the student with a diagram of equipment and ask for application, analysis, or evaluations, e.g., "What happens at point A if ...?" "How is A related to B?"

3. Present actual quotations taken from newspapers or other published sources or contrived quotations that could have come from such sources. Ask for the interpretation or evaluation of these quotations.

4. Use pictorial materials that require students to apply principles and concepts.

5. Use charts, tables or figures that require interpretation.

http://www.indiana.edu/~best/write_better_tests.shtml
Writing Essay Items at Different Levels of Bloom's Taxonomy

The goal is to write essay items that measure higher cognitive processes. The question should represent a problem situation that tests the student's ability to use knowledge in order to analyze, justify, explain, contrast, evaluate, and so on. Try to use verbs that elicit the kind of thinking you want them to demonstrate.

However, while essays can be used to evaluate lower levels of understanding (e.g., knowledge), if you want to measure only the lower levels, limited-choice items can be more efficient.

http://www.indiana.edu/~best/write_better_tests.shtml
Preparing Students to Take Essay Exams

• Essay tests are valid measures of student achievement only if students know how to take them.
• Many college freshmen do not know how to take an essay exam, because they haven't been required to learn this skill in high school.
• You may need to take some class time to tell students how to prepare for and how to take an essay exam.
• You might use some of your old exam questions and let students see what an A answer looks like and how it differs from a C answer.

http://www.indiana.edu/~best/write_better_tests.shtml
Activity: Identify possible test item types for today learning objectives

After attending today’s workshop, you will be able to:

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• Differentiate between limited-choice test items and open-ended test items.
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Considerations When Constructing Exams
How many items per learning objective?

It’s important to ensure the test encompasses a representative sample of both content (topics) and cognitive objectives (levels of understanding from Bloom’s taxonomy). Constructing a blueprint or matrix (also called a “table of specifications”) could be helpful to determine if the content and objectives are in the same proportion on the text as they were addressed during instruction.

Coordinating test items with course content builds content validity of the test. Using a testing blueprint also helps an instructor to address all levels of learning and therefore avoid a very common mistake in tests (i.e., writing all the items at the knowledge level).
### Testing Blueprint Example

<table>
<thead>
<tr>
<th>Topic to be tested</th>
<th>% of period being devoted to topic</th>
<th>Level of Understanding (from Bloom’s Taxonomy)</th>
<th># of questions</th>
<th>% of test devoted to topic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Questions measuring recall/comprehension</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Questions measuring application/analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Questions measuring synthesis/evaluation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Average time needed for test item types

<table>
<thead>
<tr>
<th>Item Type</th>
<th>Average Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>True-false</td>
<td>30 seconds</td>
</tr>
<tr>
<td>Multiple-choice</td>
<td>1 minute</td>
</tr>
<tr>
<td>Multiple-choice of higher level learning objectives</td>
<td>1.5 minutes</td>
</tr>
<tr>
<td>Short Answer</td>
<td>2 minutes</td>
</tr>
<tr>
<td>Completion</td>
<td>1 minute</td>
</tr>
<tr>
<td>Matching</td>
<td>30 seconds per response</td>
</tr>
<tr>
<td>Short Essay</td>
<td>10-15 minutes</td>
</tr>
<tr>
<td>Extended Essay</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Visual Image</td>
<td>30 seconds</td>
</tr>
</tbody>
</table>

[http://www.park.edu/cetl2/quicktips/writingtest.html](http://www.park.edu/cetl2/quicktips/writingtest.html)
Guidelines for Writing Exam Items

- Compose test items throughout the semester.
- Determine length and format of the test.
- Consider the time available for both preparing the exam and scoring the exam. While limited-choice items typically take longer to write than open-ended items, they typically take less time to score.
- Include a variety of test item formats.
- Determine the relative importance and weighting of each objective so that the number of questions targeting each objective matches the importance and weighting of that objective.
- Write test items at a level of difficulty that matches the learning objective.
Guidelines for Writing Exam Items

• Make sure that all questions map to a learning objective.
• If using a publisher's testbank, review each item for its relevance to course-specific learning goals.
• Consider how open-ended items will be evaluated. For instance, will a rubric be used to promote systematic and objective evaluation?
• Consider how much content should be addressed on the exam. Items requiring shorter answers can cover more material than items requiring longer answers.
Resources for Writing Tests

- http://cte.illinois.edu/testing/exam/test_ques.html
- http://ucat.osu.edu/read/teaching/evaluating/evaluating_designingplanning.html
- http://www.indiana.edu/~best/write_better_tests.shtml
- http://www.ion.uillinois.edu/resources/tutorials/assessment/bloomtaxonomy.asp
- http://www.park.edu/cetl2/quicktips/writingtest.html
The following Administrative Offices are listed in alphabetical order:

- Academic Assessment
- Academic Services
- Academic and Student Services
- Administrative Information System (AIS)
- Affirmative Action and Minority & Legal Affairs
- Alumni Federation
- Budget Office
Welcome to Academic Assessment

The Office of Academic Assessment, a part of the Office of Institutional Research, Planning and Assessment, provides college-wide leadership and coordination for assessment activities, which include program review, annual planning and evaluation of instructional programs, and a wide variety of student learning outcomes assessment activities.

The focus of academic assessment is on student learning outcomes and includes the review of all academic programs that award a degree or certificate as well as classroom-based assessment and research.
RESOURCES & LINKS

WEAVEonline
- NOVA WEAVEonline Log-In
- NOVA WEAVEonline Manual (Sept. 2010)

Annual Planning and Evaluation Reports
- Template for Annual Planning and Evaluation Report (Microsoft Word required to view)
- Checklist for Annual Planning and Evaluation Report
- Sample Program's Annual Planning and Evaluation Report
- Data for Annual Planning and Evaluation Reports

Faculty Training Workshops
- Workshop 1: Student Learning Outcomes in NOVA Programs and Classrooms
- Workshop 2: Writing and Mapping Student Learning Outcomes Assessment Techniques
- Handout: Assessment Readings
- Workshop 3: Methods for Assessing Student Learning Outcomes

LEARN MORE
- Welcome
- For Students
- Program Evaluation
- Student Learning Outcomes
- Assessment Loop Resources
- Reports
- Resources & Links
- Staff
- Contact Us

OFFICES
- College Planning
- OIR
- OIRPA
ASSESSMENT LOOP RESOURCES

Assessment Cycle of Continuous Improvement

The loop represents the continuous nature of assessing student learning outcomes. Assessment is comprised of several steps. Click on any step to access information and resources on that topic.

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Questions?

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