Collecting and Analyzing Evidence of Student Learning at the Course- and Program-Level

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Steps to Assess Student Learning Outcomes

1. Identify student learning outcomes for your program
2. Determine practices used to achieve outcomes through curriculum mapping
3. Determine methods of assessment
4. Gather evidence
5. “Close the loop” (use results to continuously improve student learning)
Identify Student Learning Outcomes

Use Results

Curriculum Mapping

Assessment at NOVA

Gather Evidence

Methods of Assessment
Assessment at NOVA

- Identify Student Learning Outcomes
- Curriculum Mapping
- Methods of Assessment
- Gather Evidence
- Use Results
Assessment is...

• an *ongoing process* aimed at understanding and improving student learning. (AAHE Bulletin, Thomas A. Angelo, 1995)

• an *integral component of teaching and learning.*
Levels of Assessment

• Classroom

• Course

• Program

• Institution
Different Levels of Statements of Learning

• Course
  • Course Objectives

• Program
  • Student Learning Outcomes

• Institution
  • General Education Goals
Step 1: Defining SLOs/Course Objectives
What are student learning outcomes/course objectives?
Student learning outcomes/Course objectives

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

- Student learning outcomes/course 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)
  • program-level statements describing the knowledge, skills, attitudes, and values that students gain from the program
  • More overarching and often encompass multiple courses.

• Course Objectives are
  • course-level statements describing the knowledge, skills, attitudes, and values that students gain from a course
  • More detailed and course content-specific
Course Objectives

• Course objectives ...
  • are required elements of all syllabi
  • must include those from the course content summary
  • can include additional course objectives determined by the individual faculty
Step 2: Mapping SLOs/Course Objectives to the Curriculum
# Mapping Course Objectives

<table>
<thead>
<tr>
<th>Course Obj. 1</th>
<th>Ch. 1</th>
<th>Ch. 2</th>
<th>Chapter 3</th>
<th>Chapter 4</th>
<th>Chapter 5</th>
<th>Chapter 6</th>
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<tbody>
<tr>
<td></td>
<td>I</td>
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<td>P</td>
<td>M Quiz</td>
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<td>Course Obj. 2</td>
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<td></td>
<td>P</td>
<td>P</td>
<td>M Final Exam Test Items</td>
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<td>P</td>
<td></td>
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<td>P</td>
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<td>M Quiz</td>
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<tr>
<td>Course Obj. 5</td>
<td>I</td>
<td>P</td>
<td></td>
<td>M Mid-term Test Items</td>
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</table>
## Mapping SLOs to the Program

<table>
<thead>
<tr>
<th></th>
<th>Course 1</th>
<th>Course 2</th>
<th>Course 3</th>
<th>Course 4</th>
<th>Course 5</th>
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<tbody>
<tr>
<td>SLO 1</td>
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<td>SLO 2</td>
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<td>I</td>
<td></td>
<td>P</td>
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<td>Test questions</td>
<td></td>
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<tr>
<td>SLO 3</td>
<td></td>
<td></td>
<td>I</td>
<td>P</td>
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<td>M</td>
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<td></td>
<td>Quiz</td>
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<tr>
<td>SLO 4</td>
<td>I</td>
<td></td>
<td></td>
<td>P</td>
<td>M</td>
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<td>Problem Set</td>
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<tr>
<td>SLO 5</td>
<td>I</td>
<td>P</td>
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<td></td>
<td>Project</td>
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</tr>
</tbody>
</table>
Step 3: Determining Methods of Assessment
Direct Methods of Assessment

- Locally developed tests/test questions
  - Limited-choice (T/F, MC, matching, etc.)
  - Open-ended (+ rubric)
- Student work evaluated with rubrics:
  - Essays
  - Research papers
  - Homework assignments
  - Capstone/culminating projects
  - Labwork
  - Exhibits
  - Presentations
  - Performances
  - Portfolios of student work
- Standardized tests
Indirect Methods of Assessment

• Surveys
  • Student
  • Alumni
  • Employer
• Exit interviews
• Focus groups
• Job placement rates
• Course evaluations
Course-Embedded Assessments

- Main source of evidence for both course-level and program-level assessments of student learning
  - No extra time for student or faculty
  - Student motivation is great
  - Provides both formative and summative data
  - Faculty-driven and therefore more likely to be used for improvements
- Assess what is actually taught
  - Linked to curriculum
  - Can identify specific curricular needs/areas for improvement
- Feedback to faculty and students is quick
Step 4: Gathering Evidence
Beginning with the End in Mind:

What do you want to do with the information you gather?

What can you do with the information you gather?
Typical Assessment Questions at Course-Level

- How well is the class collectively achieving the course’s objectives (at any one point, at the end)?

- How well is the class collectively achieving general or transferable learning outcomes and objectives?

- Are the assignments helping students achieve the expected level of knowledge or skills?
Typical Assessment Questions at Program-Level

• How well are students prepared for the following courses in the sequence?
• Is the course level appropriately targeted for the ability(ies) of the students when they begin?
• With what degree of consistency do different sections of a course achieve similar outcomes?
• How well is the course fulfilling its purpose in a larger curriculum?
Gather Evidence – Course-Level

- Timeline
  - Choosing assignment to collect evidence of student learning
- Recording scores
  - Spreadsheet
  - Word table
  - Other suggestions?
- Using sample or not
Gather Evidence – Program-Level

• Develop an action plan
  • Assign responsibility
  • Set timeline
• Communicate/provide information in a timely manner
• Develop common format for submitting scores
  • Excel spreadsheet
  • Word table
Gather Evidence – Program-Level

• Determine means to collect student work
  • Assessment method is part of grading in course
    • Assessment method is not part of grading
  • Using sample or including all students
• Compile data into one document
Review Data

• Make sure that components of the method align with course objectives
  • This would have been done when developing the method, but should confirm after data collection.

• Organize data for each objective being assessed
  • Test items/groups of test items (test blueprint)
  • Rubric subscores
# Testing Blueprint Example

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Items</th>
<th>Total Number of Items</th>
<th>% of Test Out of 23 Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 1a</td>
<td>1, 2, 6, 8, 9</td>
<td>5</td>
<td>22%</td>
</tr>
<tr>
<td>Objective 1b</td>
<td>3, 7, 10, 13, 17</td>
<td>5</td>
<td>22%</td>
</tr>
<tr>
<td>Objective 2a</td>
<td>4, 12, 18, 19</td>
<td>4</td>
<td>17%</td>
</tr>
<tr>
<td>Objective 3a</td>
<td>5, 14, 20</td>
<td>3</td>
<td>13%</td>
</tr>
<tr>
<td>Objective 3b</td>
<td>11, 21-25</td>
<td>6</td>
<td>26%</td>
</tr>
</tbody>
</table>

## Testing Blueprint Example

<table>
<thead>
<tr>
<th>Course objective to be assessed</th>
<th>% of period being tested devoted to obj.</th>
<th>Level of Understanding (from Bloom’s Taxonomy)</th>
<th># of questions</th>
<th>% of test devoted to obj.</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>

### Number of Questions

<table>
<thead>
<tr>
<th>% of test devoted to each level of understanding</th>
</tr>
</thead>
</table>

Example A – Quiz/Test

- Anatomy Course
- Course Objective to Assess:
  - Identify parts of the human body
- Method of Assessment:
  - Fill-in-the-blank quiz with drawing of human body
  - 100 items
    - 45 – Legs
    - 35 – Torso
    - 20 – Arms, Neck, and Head
Example A – Quiz/Test

- Gather evidence of student learning
  - Collect quizzes from all students
- Record scores in spreadsheet
  - Overall score per students
  - Score for each group of items
  - Number of correct answers for each body part
- Analyze scores
  - Overall mean for all students (Excel function)
  - % correct for each body part/group of items (Excel function)
Example B - Rubric

• English course

• Course Objectives to Assess:
  • Students will create unified, coherent, well-developed texts that demonstrate a self-critical awareness of rhetorical elements such as purpose, audience, and organization.
  • Students will appropriately employ grammatical and mechanical conventions

• Method of Assessment:
  • Essay and rubric
Example B - Rubric

- Align criteria of rubric with specific course objectives
- Holistic rubric vs. Analytical rubric
  - See examples
Writing Rubric

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Rubric Criteria</th>
</tr>
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<tbody>
<tr>
<td>Students will create unified, coherent, well-developed texts that demonstrate a self-critical awareness of rhetorical elements such as purpose, audience, and organization.</td>
<td></td>
</tr>
<tr>
<td>Students will appropriately employ grammatical and mechanical conventions</td>
<td></td>
</tr>
</tbody>
</table>
### Example B - Rubric

<table>
<thead>
<tr>
<th>Writing Rubric (CSU-LB)</th>
<th>Course Objective</th>
<th>Rubric Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Objective</strong></td>
<td><strong>Rubric Criteria</strong></td>
<td></td>
</tr>
<tr>
<td>Students will create unified, coherent, well-developed texts that demonstrate a self-critical awareness of rhetorical elements such as purpose, audience, and organization.</td>
<td>Presentation - #1, 2, 3 Content - # 6, 7 Thinking - #9, 10 Assignment Specific Criteria - # 15</td>
<td></td>
</tr>
<tr>
<td>Students will appropriately employ grammatical and mechanical conventions</td>
<td>Presentation - #4, 5 Assignment Specific Criteria - # 14</td>
<td></td>
</tr>
</tbody>
</table>
Step 5: Using Results

aka

Closing the Loop
Closing the Loop

A. In what ways did students accomplish the course objective(s)?

B. How could the course/unit be improved?

C. What did we learn from this experience?
Closing the Loop: Part A

Analyze data to determine if students accomplished course objective(s)
Setting Targets/Standards

- Common types of standards:
  - Local standards
    - Faculty determine target/standards)
  - Historical trends benchmark
    - Compare with past performance
  - Strengths-and-weaknesses perspective
    - What areas are weaker/below average

- Example categories for levels of performance:
  - Exemplary, Minimally Acceptable, Unacceptable
Setting Targets

• Helps determine if students are attaining the specified learning objectives at an acceptable level.

• Can be set before gathering and reviewing data or after.

• To determine targets:
  • Do some research
  • Involve others in the process
  • Use samples of student work
Setting Targets/Standards for Tests

• Common way to set standards:
  • overall score of 90-100 is an A, overall score of 80-89 is a B, etc.

• With overall grade, how can you determine possible areas for improvement?

• If a method is addressing more than one SLO (or anything in addition to the one SLO), then the overall score cannot be used as an accurate representation of achievement of the one SLO.
Setting Targets/Standards for Tests

• Use multiple targets/standards for comparison

• Use a minimum target for each test item or group of test items
  • Based on difficulty and importance

• The expectation should be that no more than 50% of students answer the item or group of items incorrectly.
Setting Targets/Standards with Subscores

• Both tests and rubrics can have subscores.
  • Tests – individual items, groups of items
  • Rubric – evaluation criteria

Possible ways to set targets:
• The minimum standard met for each subscore
• Minimum standard for the sum or average of all subscores
• Minimum standard for certain traits met for entire work to be considered adequate
Setting Targets

- Two common types of targets:
  1. Minimum average score (or subscore)
  2. Percent of students meeting minimum acceptable standard

- Linda Suskie believes the % of students meeting minimum acceptable standard is more understandable and useful.
Setting Targets

• Consider multiple targets
  • 90% of students earn the minimally acceptable score/rating
  • And at least 30% earn the exemplary score/rating

• Be open to adjusting standards and targets
If Using Mean: Example A - Quiz/Test

• Determine target(s) for mean
  • Target: 80% average total score
    Or
  • Target: The average for correct answers should be at least 70% for each group of items
    Or
  • Target: The average for correct answers for a given group of items should be higher than the average % total score
Activity - Using Standards: Example B - Rubrics

- Using the CSU-LB rubric and the criteria aligned with our course objectives, what kind of standards and targets could be used to determine if students are meeting our expectations regarding achievement of these course objectives?

<table>
<thead>
<tr>
<th>Analytical writing rubric (CSU-LB)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Objective</strong></td>
</tr>
<tr>
<td>Students will create unified, coherent, well-developed texts that demonstrate a self-critical awareness of rhetorical elements such as purpose, audience, and organization.</td>
</tr>
<tr>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Students will appropriately employ grammatical and mechanical conventions</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Possible Questions for Setting Standards & Targets

• Which examples represent exemplary work? Why? Would it be realistic to establish these as targets we aim for in all students?

• Which examples are unacceptably inadequate? Which would embarrass you if they were from students finishing your course/graduates of program? Why?

• What kinds of student performance represent minimally acceptable work for a student finishing your course/graduating from the program?

• How do the exemplary, acceptable, and inadequate examples differ?
Activity

• If you teach, what kinds of standards or benchmarks do you use most often when you evaluate students work in your classes?
• How do you determine if work is acceptable or not?
  • Why do you use these standards or benchmark(s)?
  • If you use a local standard, how do you decide on the cut-off point for each grade?
Activity

• An instructor scored essays for a course with 30 students, with a total of 30 essays.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excellent</th>
<th>Adequate</th>
<th>Unacceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language Use</td>
<td>15 (50%)</td>
<td>8 (27%)</td>
<td>7 (23%)</td>
</tr>
<tr>
<td>Content</td>
<td>12 (40%)</td>
<td>12 (40%)</td>
<td>6 (20%)</td>
</tr>
<tr>
<td>Organization</td>
<td>4 (13%)</td>
<td>8 (27%)</td>
<td>18 (60%)</td>
</tr>
</tbody>
</table>

• What are the major conclusions you would draw about these students’ writing performance? Why?
• What kinds of standards and/or targets did you use to draw your conclusions?
Analyzing Evidence

• Organize and summarize results
  • Organize by outcomes/objectives

• Ways to summarize results
  • Tallies (frequencies)
  • Percentages
  • Aggregates (overall and for subscore)
  • Averages (mean; median)
  • Qualitative
Analyzing Evidence to Review the Method

• Possible ways to review method

  • Review results for each test item/test item group/rubric criteria
    • 50% guideline

  • Discriminate between high and low scorers
    • Higher scorers should generally perform better than lower scorers
Analyzing Evidence

- Compare actual results to target(s)

  Was target exceeded?

  Was target met?

  Was target not met?
Analyzing Evidence

• Compare actual results to target(s)
  
  • If target was met, faculty can still consider ways to improve or raising their expectations (standards, target)

  • If target was not met, faculty must determine possible changes to improve student learning (examples of changes in later slide)
Example A – Test/Quiz – Was Target Met?

<table>
<thead>
<tr>
<th></th>
<th>Exemplary 85-100%</th>
<th>Acceptable 70-85%</th>
<th>Not Acceptable below 70%</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of students at level</td>
<td>% of students at level</td>
<td>% of students at level</td>
<td></td>
</tr>
<tr>
<td>Legs</td>
<td>35</td>
<td>55</td>
<td>10</td>
</tr>
<tr>
<td>Torso</td>
<td>10</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Arms, Neck, Head</td>
<td>15</td>
<td>60</td>
<td>25</td>
</tr>
<tr>
<td>Total Score</td>
<td>20</td>
<td>60</td>
<td>20</td>
</tr>
</tbody>
</table>

For total score and each subscore

- Target: At least 75% of students will perform at the Acceptable or Exemplary level.
- Target: At least 25% will perform at the Exemplary level.
Example A- Quiz/Test – Using Means

<table>
<thead>
<tr>
<th></th>
<th>Legs</th>
<th>Torso</th>
<th>Arms, Neck, Head</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Score</td>
<td>95%</td>
<td>65%</td>
<td>85%</td>
<td>82%</td>
</tr>
</tbody>
</table>

- Target: 80% average total score
- Target: The average for correct answers should be at least 70% for each group of items
- Target: The average for correct answers for a given group of items should be higher than the average % total score
Reviewing and Analyzing Evidence – Program-Level

- Set aside designated time for review
- Share results widely and transparently
- Involve those with a stake in decisions stemming from results
- Discourage others from making inappropriate interpretations or misleading statements about the data
- Don’t penalize faculty who have less-than-positive-results
- Keep faculty informed about how evidence will be or was used to support decisions
Reviewing and Analyzing Evidence – Program-Level

How/where/when can results be shared with the cluster?
Reviewing and Analyzing Evidence – Program-Level

• Have a plan for documentation and storage

• Ensure the following has been saved and is available to others:
  • Listing of the raw data
  • Notes on coding (Excellent =5, Good=4, etc.)
  • Copies of assignment (instructions), rubrics, surveys, tests, etc.

Any other suggestions?
Reviewing and Analyzing Evidence

• Track selected students’ performance on several assignments over the academic term.
• Follow selected students or student teams in their development of a single assignment over the academic term.
• Look for patterns across samples of student work.
• Keep in mind that interesting results may emerge in subgroups of your student population.
Reviewing and Analyzing Evidence – Program-Level

- For program-level – share results
  - Share only aggregated results (no information on individual students)
  - Share basic information for the group
    - But offer to make additional information available
- Consider variety of ways to present results
  - Narrative/text
  - Table
  - Graphic (pie chart, bar chart, etc.)
Closing the Loop: Part B

How could the course/program be improved?
Determining Strengths and Areas for Improvement

Based on the review and analysis of evidence, ask …

• What is working in my course, or for my students?

• What areas need tweaking or improvement?

• What is a reasonable plan for making changes this semester?
Determining Strengths and Areas for Improvement

Based on responses, ask: …
What changes to my course(s)/ program

…could be easily accomplished?

…might be done in one or two semesters?

…should be considered as long-range goals?

…would have the greatest positive impact on students?

…would require additional departmental resources (faculty, staff, money, space, or equipment)?
Making Changes to Improve Student Learning

• Use data as evidence for changes

• Assessment results for a method alone should never dictate decisions.
  • “We should always use our professional judgment to interpret assessment results and make appropriate decisions.” (Suskie, p. 298)
  • Importance of using multiple methods

• Be as specific/concrete as possible

• Develop an action plan and assign roles
Internal Uses for Results –
at the Course-Level and Program-Level

• Revising existing courses
• Adding or modifying assignments, tests, readings, projects, etc.
• Reviewing methodology of delivering course materials
• Incorporating effective use of technologies
Internal Uses for Results – at the Course-Level and Program-Level

• Realignment between goals and teaching methods

• Modifying assessments -
  • Revising assessment method
  • Modifying course objective
  • Changing target level of achievement

• For program-level, discuss changes across program with cluster involvement
More Internal Uses for Results – at the Program-Level

• Sequencing of courses
• Adding or deleting a course
• Changing requirements/pre-requisites
• Improving educational and support programs
• Identifying training needs/professional development
• Guiding resource allocations
### Example A – Test/Quiz – Using Results

<table>
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<th>Exemplary 85-100%</th>
<th>Acceptable 70-85%</th>
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<td>10</td>
</tr>
<tr>
<td>Torso</td>
<td>10</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Arms, Neck, Head</td>
<td>15</td>
<td>60</td>
<td>25</td>
</tr>
<tr>
<td>Total Score</td>
<td>20</td>
<td>60</td>
<td>20</td>
</tr>
</tbody>
</table>

- Target was exceeded for Total Score.
- Target was exceeded for Legs.
- Target was met for Arms, Neck, Head.
- Target was not met for Torso.
Example A – Test/Quiz – Using Results

1. Target was exceeded for Legs and met Arms, Neck, Head. *Faculty reviewed the types of activities done for Legs and has adapted them for Arms, Neck, Head.*

2. Target was not met for Torso. *After reviewing the syllabus, faculty took one class meeting devoted to Legs and added it to the Torso portion of the course.*

3. Re-assessment has been scheduled for the next cycle.
Activity

• One of the course objectives/SLOs of course/program X is for students to be able to write effectively and clearly. Although X majors are asked to write papers of 3-5 pages in at least three X courses, the writing quality is still generally inadequate. Faculty often point to the poor writing skills of entering students and blame the English program for not bringing writing skills up to par in basic composition courses.
Activity

• Who should have lead responsibility for helping X majors develop their writing skills? Why?

• Brainstorm what might be done to improve students’ writing skills by the time they graduate.
Making Changes and Measuring Effectiveness of Changes

• Act on and document recommended changes

• An important component of the definitions of assessment is the “ongoing process” part >> the assessment cycle continues

• Re-assess and continue with assessment loop

Assessment is a means to continuous improvement
Closing the Loop: Part C

What did we learn from this experience?
Evaluate the Assessment

• Has the process produced the kind of data necessary for making critical decisions?

• Has the instructor/program developed a process that is useful and beneficial to all involved—the instructor/program as well as students?

• Can and will the process be practically replicated as time and circumstance require?
Activity

• Describe changes you have made based on evidence as an individual faculty member for a course.

• Describe changes your cluster has made to the program based on evidence.
Questions?

Contact: Dr. Jennifer Roberts  
Director of Academic Assessment  
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Identify Student Learning Outcomes

Use Results

Gather Evidence

Assessment at NOVA

Curriculum Mapping

Methods of Assessment