Program Learning Outcomes Analysis in Higher Education: An Introductory Tutorial

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Program learning outcome analysis:

“the systematic process of gathering evidence of the extent to which groups of students... perform in the aggregate in attaining particular levels of knowledge or skill, in order to judge the effectiveness or improve provision”

(Kuh & Ewell, 2010)
Today’s Tutorial

• Purpose of this Tutorial
• What is Learning Assessment?
  – Definitions and Purpose
  – History and Background
• Defining PLOs
• Assessment Plans
• Collecting Data
  – Direct Evidence using Analytical Rubrics
  – Indirect Evidence
• Analyzing Data
• Reporting and Applying Results
• Some Take-Home Points
Out of 439 psychology programs surveyed in 2014, 88% of Associates and 94% of Baccalaureate programs have formal PLOs.
Equipping Future Faculty

• Faculty involvement is essential
• Job market is tightening
• A growing field of applied research
• Professional development opportunities are slim
• Grads need:
  – Broad, historical and contextual information
  – Techniques and methods
  – Opportunities to practice

“Providing students . . . with such knowledge and skills relating to assessment. . . could energize a new cohort of faculty to take on their responsibilities in this evolving arena”
(Council of Graduate Schools, 2011)
Assessment as Applied Research

• Systematically collecting information about student learning
• Aggregate level analysis
• Collaborative
• Longitudinal
• Using it to inform decisions & improve learning:
  – Instructional approaches
  – Policies & practices
  – Resource allocation
  – Staffing
  – Advising
  – Assessment processes
EVIDENCE-BASED TEACHING
Assessment for/as Teaching

• To provide guidance in improving teaching
• What is and isn’t working—how will we know?
• Evaluating learning & development
• Evaluate effectiveness or impact resulting from:
  • changes to the course content,
  • pedagogy used,
  • new learning technologies, etc.
• Integrated into faculty practice
  • From the “bottom-up”
  • Collaborative, transparent

“Faculty driven, locally defined, and program specific.”
(UCSC, 2013)
History and Background

• 1980s begins, escalation since 2000

• 2006—Commission on the Future of Higher Education

• Economic Downturn

• Accreditation and “Accountability”
  – 6 regional accreditors
  – External program reviews

• International--National--Local
“what students learn, what faculty members create, and what public service postsecondary institutions render to society — these are the outcomes that matter”
## Why define & assess PLOs?

<table>
<thead>
<tr>
<th>Students</th>
<th>Faculty</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Know Expectations</td>
<td>- Articulate what students are expected to know,</td>
<td>- Evaluate achievement across programs</td>
</tr>
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<td>- Understand program as more than a set of</td>
<td>skills they will acquire</td>
<td>- Support transparency &amp; accountability</td>
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<tr>
<td>classes,</td>
<td>- Communicate those expectations to students</td>
<td>- Align teaching and learning with overall</td>
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<tr>
<td>- Identify own strengths, weakness, progress,</td>
<td>- Evaluate and improve the curriculum</td>
<td>mission</td>
</tr>
<tr>
<td>- Select a program of study</td>
<td>- Measure impact of changes</td>
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- Students:
  - Know Expectations
  - Understand program as more than a set of classes,
  - Identify own strengths, weakness, progress,
  - Select a program of study

- Faculty:
  - Articulate what students are expected to know, skills they will acquire
  - Communicate those expectations to students
  - Evaluate and improve the curriculum
  - Measure impact of changes

- Institution:
  - Evaluate achievement across programs
  - Support transparency & accountability
  - Align teaching and learning with overall mission
“Gauging accomplishments, understanding what is working, spotting weaknesses, using data to make better decisions.”

(Kuh & Ikenberry, 2009)
The *Process* of PLO Assessment
1. Articulate measurable PLOs

2. Demonstrate how curriculum supports PLOs

3. Create a multi-year plan to gather evidence for each PLO

4. Systematically collect and evaluate evidence of student learning

5. Develop recommendations for improvement

6. Improve the curriculum, pedagogy, and advising
1. Articulate measurable PLOs

Describe what they should know and be able to do . . .
Program Learning Outcomes

Are:

- Criterion-based program goals
- Fundamental knowledge, skills, abilities, competencies, attitudes that students will develop through their program of study
- Life-long skills will acquire by the time they graduate

Are NOT:

- Course grades
- Cumulative or major GPAs
- Credits earned
- Average time to degree
- Degrees or certificates granted
- Rates of grads’ employment
- Grads’ salaries
PLOs will be

• Comprehensive
  – As a set
  – Key disciplinary knowledge and skills
  – Relevant general skills

• Meaningful
  – To students, professionals, faculty, community members
  – Unique to program’s aims
  – Related to institutional mission
PLOs will be

• Measurable
  – Must be able to operationalize using active language
    • Specific and simple
    • Present tense
  – Outcome, not a process
    • Not: completing a thesis
  – Clearly indicates exactly how a student will demonstrate the skill/ability
  – No double-barreled PLOs
    • “Students will be able to write and speak effectively” = two outcomes
Brainstorm:
learning outcomes for psychology undergraduates
APA Undergraduate Psychology Learning Goals

• Goal 1: Knowledge Base in Psychology
• Goal 2: Scientific Inquiry and Critical Thinking
• Goal 3: Ethical and Social Responsibility in a Diverse World
• Goal 4: Communication
• Goal 5: Professional Development
Creating PLOs

• Operational language
  – actions that can be directly observed

• Based on discipline

• NOT:
  • “Recall” “recognize” “value” “relate” “develop” “ability” “capacity” “awareness”
One does not know a student has the “ability” to do anything until the student actually does it, for which point we use verbs that indicate what the student actually did.  
(Adelman, 2015)
Verbs

• Measure
• Classify
• Design
• Select
• Extract
• Record
• Evaluate
• Gather
• Modify
• Synthesize
• Summarize
• Describe
• Determine
• Integrate
• Link

• Prove
• Model
• Formulate
• Extract
• Translate
• Infer
• Calculate
• Present
• Locate
• Retrieve
• Acquire
• Identify
• Specify
• Connect
• Coordinate
Creating PLOs

• A cognitive or psycho-motor operation *act on something*
  – Student has to know what they’re expected to produce
• Evaluate what?
• Synthesize what?
• Acquire what?
| Students will be able to | ... understand and apply basic research methods in [psychology, physics, etc.], including research design, data analysis, and interpretation. | a. **design and conduct** basic studies to address psychological questions using appropriate research methods.  
b. **take physical measurements** in an experimental laboratory setting and analyze these results to draw conclusions about the physical system under investigation |
| --- | --- | --- |
| ... communicate effectively. | a. **Write effectively** following professional writing conventions [in psychology] appropriate to purpose and context.  
b. **clearly explain** their mathematical and physical reasoning, in writing [physics]. |
Example PLOs: APA

Goal 4: Communication

Students will:

4.1 Demonstrate effective writing for different purposes

4.1A Construct arguments clearly and concisely using evidence-based psychological concepts and theories

4.1D Employ APA writing style to make precise and persuasive arguments
Example: analytic thinking

... access and analyze a complex literature addressing specific topics in psychology, and evaluate the usefulness and limitations of individual sources of information.
2. Demonstrate how curriculum supports PLOs
Aligning the Curriculum

• Have to provide opportunities for students to develop and practice the skills!
  – When will they practice them?
  – When will they demonstrate them?

• Might include field studies, internships, or extracurriculars

• Check out the tutorial paper for more info
“In a way, the writing of learning outcome statements works backwards from assignments and prods that faculty present every day.”

(Adelman, 2015)
3. Create a multi-year plan to gather evidence for each PLO
What is the research question?

▸ What are the gaps in knowledge?
▸ Specify in advance
  – Who, what, when, to what extent?
▸ Simple or complex
  – Does a new course impact learning?
  – Does course size matter?
  – Does a different sequence of courses matter?
  – Is there inequity based on transfer status?
▸ How will you know what achievement looks like?
Who will be assessed?

- “Target audience”
- All graduating seniors?
- Sample?
  - Know the whole population = random sample
  - 1 course or many?
  - Multiple instructors?
  - Over several quarters?
- Comparison groups?
What measures will be used?

- Reducing subjectivity, being consistent
  - lesson to lesson, student to student, year to year
- Likely have to create measures
  - Takes time
  - Needs careful fine-tuning (collaborative)
- Can adapt existing measures
4. Systematically collect & evaluate evidence of student learning
Data Triangulation: Two Types of PLO Data

Direct
• Tangible examples of student work or thinking
• Criterion-based
• Based on having a student demonstrate their disciplinary training in a real-life situation or task
• Challenge students to integrate and apply what they have learned over the course of their studies

Indirect
• Proxies for learning
• Not externally observed
• *Perceptions* of learning
  – Student self-assessments
• Can ask them about additional aspects of the course
Direct Evidence Examples

- Research papers (or proposals)
- Presentations/speeches
- Portfolios (ePortfolios)
- Capstone experiences
  - Senior thesis
- Exams (or set of questions within)
- Measures of specialized knowledge
- Artistic works
- Recitals or performances
- Laboratory experiments
- Game invention
- Works cited pages
- Posters
- Group projects
- Role-playing
- Standardized Tests
What assignments will be used?

- Curriculum-embedded
- Already existing – no extra requirements for students
- Authentic
- Required to demonstrate they can act like a psychologist, musician, linguist, etc.
- Faculty collectively decide
Example: analytic thinking

... access and analyze a complex literature addressing specific topics in psychology, and evaluate the usefulness and limitations of individual sources of information.
Opposing Position Paper
Write an evidence-based argument in support of the opposing position of your Position Paper. Similar to the Position Paper, make sure to have a clear position statement that justifies your position and concludes by recommending a specific policy that would best address the social issue. Also make sure to specifically address your position and policy proposals from your Position Paper.

Assignment Objective
To understand different approaches to and perspectives on a social issue while crafting a strong evidence-based policy position on a social issue based on research.
Learning Outcomes
After completing this assignment, students will be able to...

• (A) **formulate** and **articulate** a problem statement and logical argument from an opposing position on this social issue
• (B) **conclude** with a specific policy that addresses the social issue
• (C) **choose** 3-5 sources to support your position
  – including background, 2 peer reviewed and gray literature
• (D) **employ** and **integrate** sources to provide sufficient and effective evidence for your argument
• (E) **cite** using APA style
• (F) **write** in APA rhetorical style
• (G) **read** and **give critical feedback** to other students’ papers during peer review
• (H) **respond** to critical feedback to improve your own work
Opposing Position Paper
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Analytical Rubrics

- Rubrics AS measurement
- Rubrics = operationalization of an outcome
  – “specially designed scoring guides”
- Analytic v. holistic
- Shared with students so they know criteria
- Can use to grade at the same time!
# Analytical Rubrics

## Evaluation Criteria/Traits

<table>
<thead>
<tr>
<th>Assignment Outcome</th>
<th>Did not meet expectations</th>
<th>Partially met expectations</th>
<th>Met expectations</th>
<th>Exceeded expectations</th>
<th>PTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A1) formulate and articulate a problem statement</td>
<td>missing or incoherent problem statement (0)</td>
<td>clear problem statement but lacking appropriate specificity (+.5)</td>
<td>clearly defined and specific problem statement, but it oversimplifies the problem (+.75)</td>
<td>statement is clearly defined, specific, and takes into account the complexities of the problem (+1)</td>
<td>__/1</td>
</tr>
<tr>
<td>(E) cite using APA style</td>
<td>most sources are undocumented in text, major errors in reference list formatting, or no reference list (0)</td>
<td>only some sources are documented properly in text, major errors in reference list formatting (+.5)</td>
<td>most sources are documented properly in text, minor errors in reference list formatting</td>
<td>all sources are documented properly in text; reference list is appropriately formatted</td>
<td>__/1</td>
</tr>
</tbody>
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## Descriptions of Performance Levels Required for Success

**Grading (optional)**
# Analytical Rubrics

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<th>Partially met expectations</th>
<th>Met expectations</th>
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<th>PTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(A2) formulate a logical argument based on evidence on this social issue</strong></td>
<td>incoherent, or inappropriate use of evidence or absence of evidence (0)</td>
<td>argument is insufficiently backed up by logic and evidence, resulting in one-sided or overly general discussion of the problem; may have unclear topic sentences with unfocused paragraphs (+.5)</td>
<td>argument is logically constructed and supported by evidence that suggests but does not fully reflect the complexities of the problem; topic sentences are usually effective with focused paragraphs (+.75)</td>
<td>argument is persuasively constructed, compellingly backed up by evidence that reflects the complexities of the problem; effective use of topic sentences and paragraphing (+1)</td>
<td>___/1</td>
</tr>
</tbody>
</table>
Rubrics: Some Notes

- Must be specific
- Training for evaluators
- Inter-rater reliability ("norming")
- Rated by someone other than instructor
  - Names removed
- Exam questions — map conceptually to criteria
- Record data in excel or online
Indirect Evidence Examples

• Student interviews & focus-groups
• Reflection papers
• Specially designed surveys
  – Seniors
  – Alumni
  – Employers
• Campus-wide surveys
  – Allows institutional comparisons
Thinking back to the beginning of this course, please rate (or describe) your skills or abilities to...

Please describe your current (at the end of this course) skills or abilities to...

cite your sources in the paper using APA style (6-point scale from very poor to excellent)

Close-ended and open-ended questions about teaching activities

Please specify whether the following in-class activities and other features of this course helped you learn research and writing skills.

A short survey asking students to evaluate their learning experiences in this course, focusing on analytical and critical thinking as well as writing skills.
carefully examine and discuss the results with colleagues . . .
How will the data be analyzed?

- Tallies, percentages, ranges
  - NOT averages
- Data Triangulation
  - Indirect & Direct
- Group differences
  - $t$-tests v. Chi-Square
- Qualitative summaries
- Benchmarking?
## Rubric Results

<table>
<thead>
<tr>
<th>Assignment Outcome</th>
<th>Unacceptable</th>
<th>Beginning</th>
<th>Developing</th>
<th>Proficient</th>
<th>Developing or Proficient (combined)</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>%</td>
<td>Count</td>
<td>%</td>
<td>Count</td>
<td>%</td>
</tr>
<tr>
<td>(E) cite using APA style</td>
<td>1</td>
<td>1%</td>
<td>34</td>
<td>23%</td>
<td>55</td>
<td>38%</td>
</tr>
<tr>
<td></td>
<td>most sources are undocumented in text, major errors in reference list formatting, or no reference list (0)</td>
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</table>
## Self-Assessment Results

Please rate (or describe) your skills or abilities to...

<table>
<thead>
<tr>
<th></th>
<th>Very poor</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very good</th>
<th>Excellent</th>
<th>Very good or Excellent</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cite your sources in the paper using APA style <strong>at the beginning of the course</strong></td>
<td>19%</td>
<td>27%</td>
<td>22%</td>
<td>17%</td>
<td>8%</td>
<td>8%</td>
<td>15%</td>
<td>132</td>
</tr>
<tr>
<td>… currently</td>
<td>0%</td>
<td>0%</td>
<td>6%</td>
<td>23%</td>
<td>50%</td>
<td>21%</td>
<td>71%</td>
<td>131</td>
</tr>
</tbody>
</table>

Please rate (or describe) your skills or abilities to...

<table>
<thead>
<tr>
<th></th>
<th>Improved</th>
<th>No change</th>
<th>Decreased</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cite your sources in the paper using APA style</td>
<td>82%</td>
<td>16%</td>
<td>2%</td>
<td>130</td>
</tr>
</tbody>
</table>
Direct and Indirect

- 76% met faculty expectations
- 71% rated themselves as very good/excellent
- Data triangulation/correspondence
Suggestions for Improvement:

- Improve clarity of instructions for paper assignments,
- Spend more time in class explaining how to do assignment,
- Review the main project, consider making the paper an individual, graded project but still asking them to work on a group presentation;
- Review the deadlines for papers, give more time to review feedback before turning in the paper, and consider assigning one less paper;
- Make explicit the connections between the lectures, assignments, and labs.
Analysis of Equity

- Analyze student performance by gender, transfer status, first generation status, race/ethnicity, GPA
- Determine statistically significant differences (Chi-Square for met/exceeded versus did not meet/almost met)
- Explore possible explanations of the findings (student performance by race/ethnicity and GPA)
- Identify disparities and necessary actions at the program level
5. Develop recommendations for improvement
Reporting Results

• Audience?
  – Program self-study
  – University
  – Accreditors

• Recommendations based on research questions
  – Could be to maintain high standard

• Resources needed?
"Immediate action is the goal"
6. Improve the curriculum, pedagogy, and advising
Assessment for Improvement

• Systematically collecting information about student learning
• Strengths, weaknesses, trends
• Longitudinal
• Using it to inform decisions & improve learning:
  – Instructional approaches
  – Course sequences and requirements
  – Resource allocation
  – Staffing
  – Advising and academic support
  – New interventions to address disparities
  – Assessment processes
  – Revise learning goals
Some Take-Home Points

- ONGOING
- Evidence-driven
- Policy-oriented
- Teaching as an object of research
- Faculty-drive, relevant
- Collaborative
- Skills applicable outside of academia
“Ultimately the most critical step of the assessment process is to use the findings to regularly evaluate programs, to make programmatic changes, and to demonstrate to students and other stakeholders the meaning and value of the degree.”