



Program Review and Assessment Committee  
October 19, 2017

# A Primer on Effective Assessment Practices

# Presenters

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# Workshop Outcomes

As a result of this workshop, participants will be able to:

1. Define assessment.
2. Explain why assessment is important.
3. Describe differences among course-, program-, and campus-level assessment.
4. Define key assessment-related terms and concepts, including “direct” and “indirect measure,” “authentic assessment,” and “signature assignment.”
5. Write a meaningful and assessable learning outcome.
6. Describe and use IUPUI assessment resources.



SECTION ONE

# Definitions

# Think-Pair-Share Question

What is assessment?

How is assessment different from  
grading?



# What is assessment?

“Assessment is the systematic collection, review, and use of information about educational programs undertaken for the purpose of improving student learning and development.”

Trudy Banta



# Assessment vs. Grading

Grading: Focus on individual students; instructors determine grades/scores; students receive feedback

Assessment: Focus on groups of students (in a course, program, out-of-class experience); assessors determine extent to which students are mastering desired outcomes, identify needed improvements to learning, and consider where (co)curricula and teaching/learning strategies need to be rethought



# Purposes of Assessment

1. Ongoing improvement of student learning and achievement
  - Traditional teaching/learning approaches are not as effective with today's students
  - New technologies offer new possibilities for improving and supporting student learning and success
  - Effective use of evidence of student learning is essential to improving student and institutional learning and success
2. Accountability
  - Document value of higher education to individuals and society



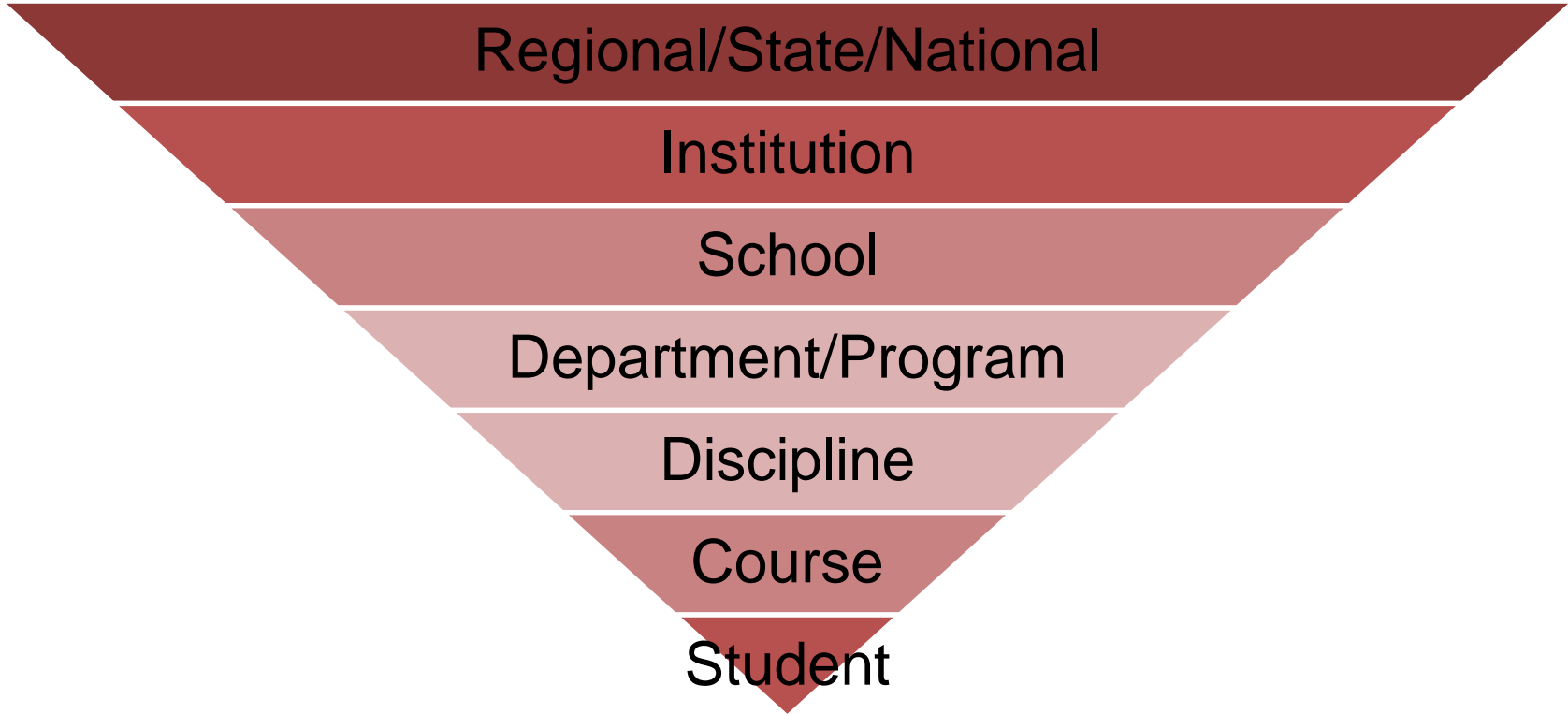


# Creating a Culture of Assessment

1. Embed assessment within courses.
2. Create learning experiences that are designed to produce key learning outcomes identified for the department's or school's graduates.
3. Learning results at the course level can flow upward to support program-level assessment and can provide evidence regarding the General Education, school, department, institutional learning outcomes.



# Organizational Levels for Assessment



SECTION TWO

# Planning Framework for Learning and Assessment



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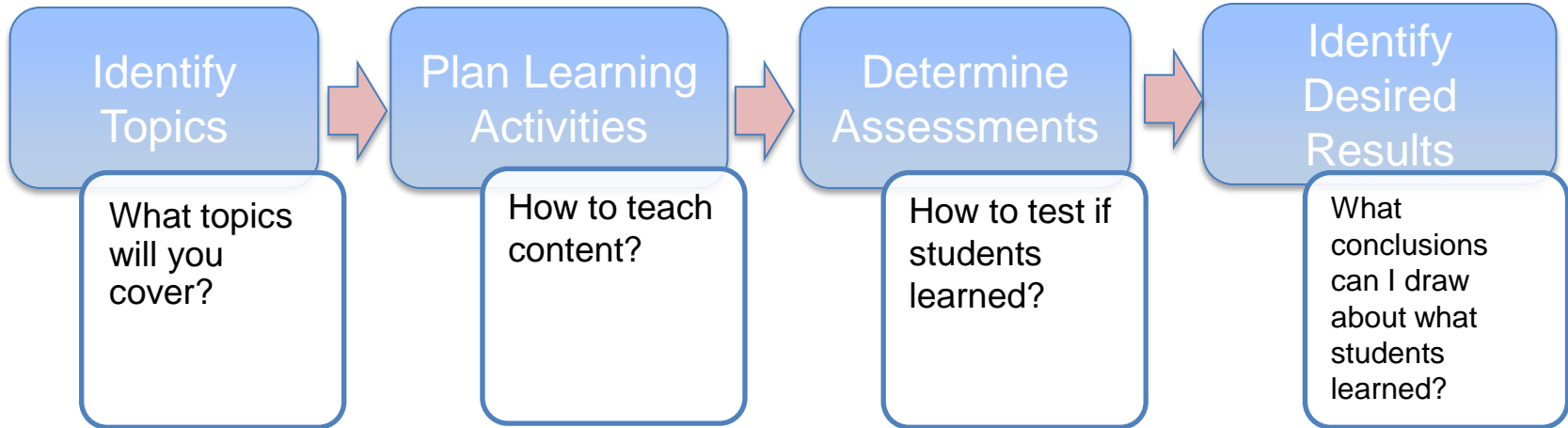
# A Primer on Effective Assessment Practices

# Planning for Learning and Assessment

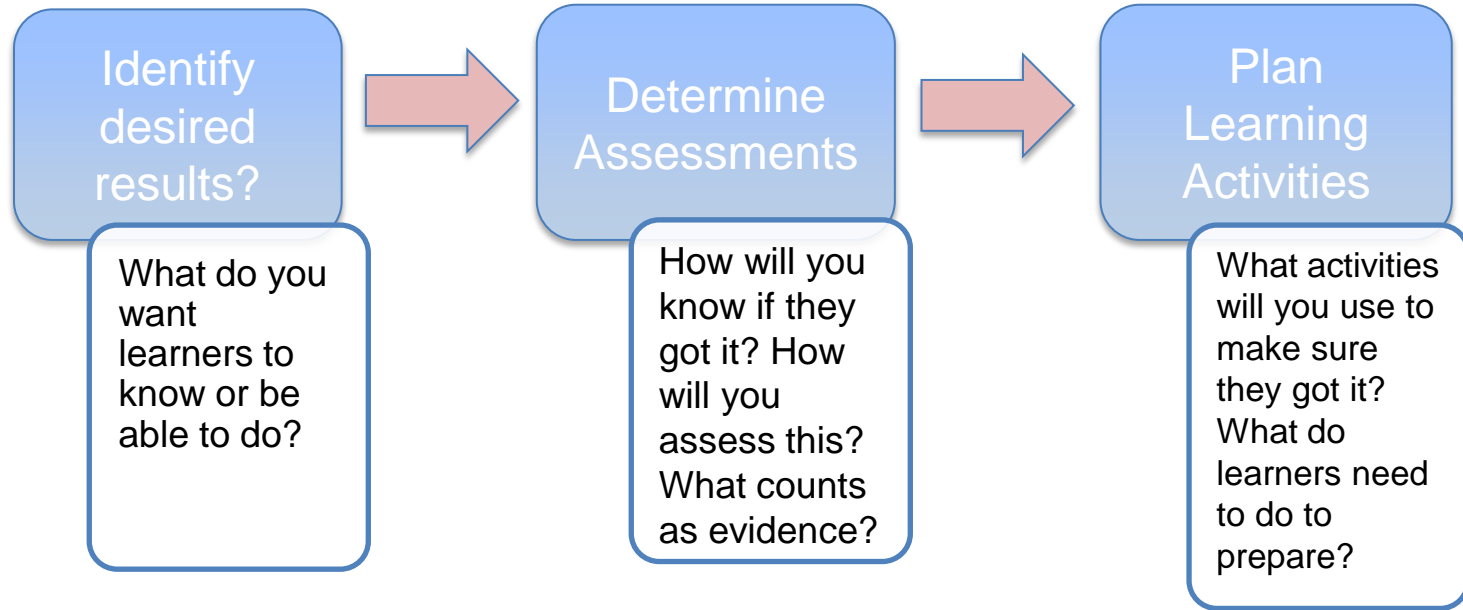
What general outcome are you seeking?	How would you know it (the outcome) if you saw it? (What will the student know or be able to do?)	How will you help students learn it? (in class or out of class)	How could you measure each of the desired behaviors listed in #2?	What are the assessment findings?	What improvements have been made based on assessment findings?



# Typical Course Design



# Backwards Course Design



# Example Course Planner

Learning Outcomes	Assessment of Student Learning	Learning Activities	Content & Delivery Method	Assessment of the Course
<p><b>What will the student know or be able to do? Consider measurable outcomes that include performance (what will students do?), conditions (under what conditions will they do it?), &amp; criterion (how well will they do it?)</b></p>	<p>Graded and/or ungraded assessment. (How will you measure each of the desired learning outcomes?)</p>	<p>Small group work, active learning techniques, problem-based learning, lecture, student self-assessment activities. (How will you help students learn it in class and/or out of class?)</p>	<p>Readings, handouts, hands-on experience, Podcasts, streaming video, websites etc. (What materials will you use to help students learn it?)</p>	<p><b>Student tests, essays, mid-term survey, course evaluations, etc. (What evidence will you use in order to measure the effectiveness of the course? What data would you need in order to make improvements to the course?)</b></p>





# Example Course Planner

Learning Outcomes	Assessment of Student Learning	Learning Activities	Content & Delivery Method	Assessment of the Course
<p><b>What will the student know or be able to do? Consider measurable outcomes that include performance (what will students do?), conditions</b></p> <p>(under what conditions will they do it?), &amp; criterion (how well will they do it?)</p>	<p>Graded and/or ungraded assessment. (How will you measure each of the desired learning outcomes?)</p>	<p>Small group work, active learning techniques, problem-based learning, lecture, student self-assessment activities. (How will you help</p> <p>students learn it in class and/or out of class?)</p>	<p>Readings, handouts, hands-on experience, Podcasts, streaming video, websites etc. (What materials will you use to help students learn it?)</p>	<p><b>Student tests, essays, mid-term survey, course evaluations, etc. (What evidence will you use in order to measure the effectiveness of the course? What data would you need in order to make improvements to the course?)</b></p>
<p>Compute responses of linear circuits with and without initial conditions using one-sided Laplace transform techniques. [ABET a,e,k]</p> <p>Note: This is just one component – building foundations of Laplace transforms</p>	<p><b>Laplace Homework Assignment</b></p> <ul style="list-style-type: none"> <li>Part 1: Generate example problems for the two properties assigned to each student</li> <li>Part 2: Teach group members your properties and generate Laplace quiz questions</li> <li>Laplace quiz (includes one application question)</li> </ul>	<p><b>Students:</b></p> <ul style="list-style-type: none"> <li>Solve example problems individually/small groups</li> <li>Participate in Laplace Jigsaw activity</li> <li>Generate Laplace quiz questions/small group</li> </ul>	<p><b>Instructor:</b></p> <ul style="list-style-type: none"> <li>Lecture: Introduce fundamentals of Laplace transforms</li> <li>Model problem-solving: Solve example problems</li> </ul>	<ul style="list-style-type: none"> <li>Comparison of grades on Laplace from previous years</li> <li>Comparison of quality of questions</li> <li>Mid-semester student feedback</li> <li>Canvas analytics on use of Laplace resources</li> <li>Final course evaluation (one question on Laplace activity and quiz)</li> </ul>

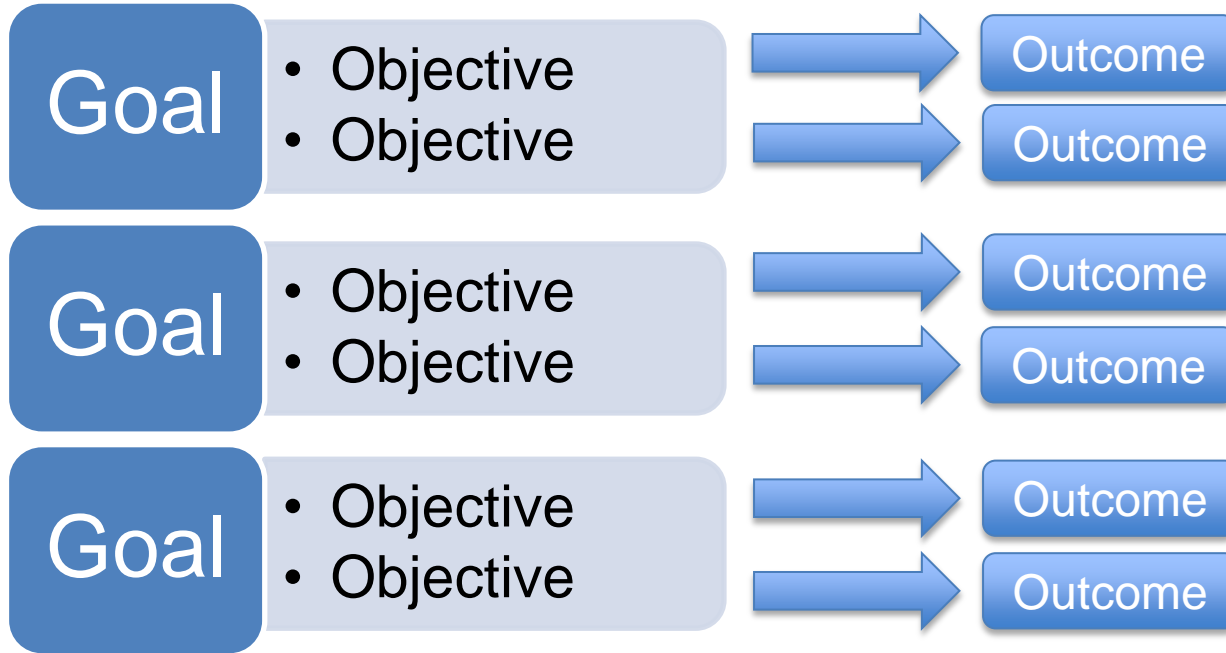


# Why are student learning outcomes (SLOs) important?

- Focus learning targets
- Guide selection of learning activities
- Define expectations (students' and the instructor's) about what is “good”
- Provide a basis for assessments
- Aid students' self-assessment, self-regulation of learning

(Nicol and Macfarlane-Dick, 2006; Dweck, 2002)





# SLO statements aren't easy to write!

Non Sequitur By Wiley Miller



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# What's the difference? Which do you prefer?

## Why?

### Art History

After taking this course, students will be able to:

- understand the key elements of visual analysis (in terms of form, color, line, style, etc.)
- appreciate the social, political, religious, and philosophical contexts of art objects

After taking this course, students will be able to:

- Organize a final oral presentation about a representative work of art, one that conducts a visual analysis of the work (in terms of form, color, line, style, etc.), and
- Situate the work within its social, political, religious, and philosophical contexts



# Characteristics of effective student learning outcomes (SLOs)

1. The learning activity is made evident
2. The intended outcome
  - is measurable
  - is useful and meaningful
  - clarifies what you plan to assess (the artifact or performance)



## ...How does this learning outcome do?

Upon completing this course, students will be able to write a scholarly research paper that synthesizes the ideas and evidence of several peer-reviewed secondary sources.

- ✓ Is the learning activity evident?
- ✓ Is the learning outcome measurable?
- ✓ Is the intended outcome useful and meaningful?
- ✓ Does this learning outcome clarify what you intend to assess?



# Writing Student Learning Outcomes

1. Describe what students should be able to **demonstrate, represent or produce** based on their learning histories.
2. Rely on **active verbs** that identify what students should be able to demonstrate, represent, or produce over time.

Maki, 2010





# Importance of Action Verbs

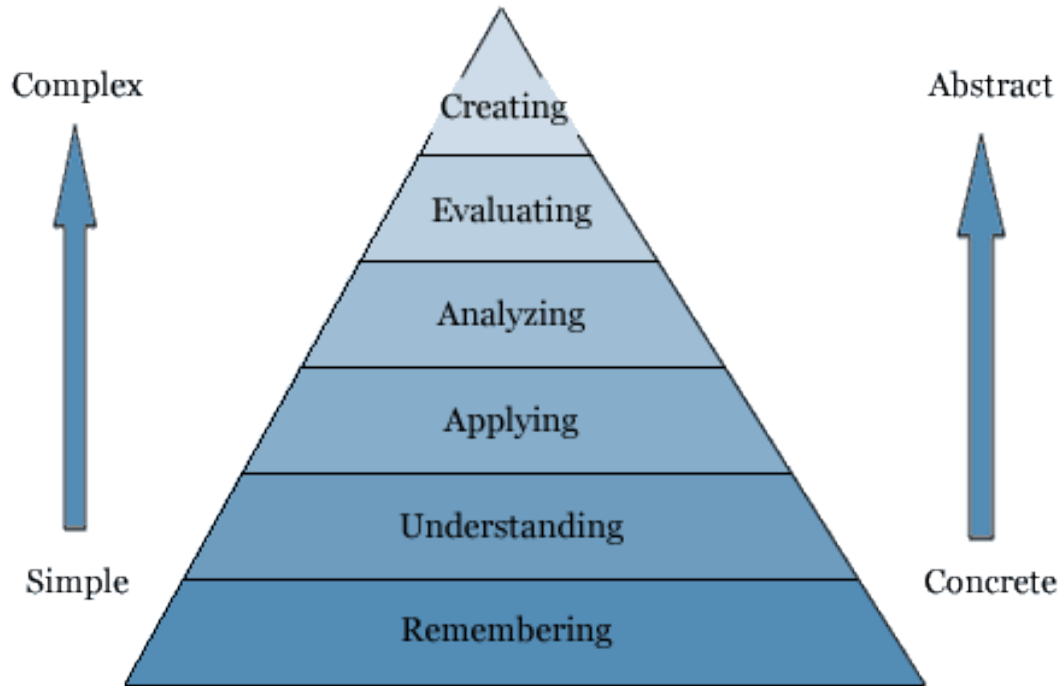
1. Action verbs result in overt behavior that can be observed and measured
2. Certain verbs are unclear or relate to covert, internal behaviors that cannot be observed or measured.

Avoid:

- understand
- know
- learn
- appreciate
- become aware of
- become familiar with



# Bloom's Taxonomy – Revised by Anderson and Krathwohl



## Action Verbs

<u>Remember</u>	<u>Understand</u>	<u>Apply</u>	<u>Analyze</u>	<u>Evaluate</u>	<u>Create</u>
define	explain	solve	analyze	reframe	design
identify	describe	apply	compare	criticize	compose
describe	interpret	illustrate	classify	evaluate	create
label	paraphrase	modify	contrast	order	plan
list	summarize	use	distinguish	appraise	combine
name	classify	calculate	infer	judge	formulate
state	compare	change	separate	support	invent
match	differentiate	choose	explain	compare	hypothesize
recognize	discuss	demonstrate	select	decide	substitute
select	distinguish	discover	categorize	discriminate	write
examine	extend	experiment	connect	recommend	compile
locate	predict	relate	differentiate	summarize	construct
memorize	associate	show	discriminate	assess	develop
quote	contrast	sketch	divide	choose	generalize



# Poor, Better, Best

## Poor

- Understand the scientific method.

## Better

- Apply the scientific method in problem solving.

## Best

- Design a grounded research study using the scientific method.



# Poor, Better, Best

## Poor

- Become familiar with correct grammar and literary devices.

## Better

- Demonstrate the use of correct grammar and various literary devices.

## Best

- Demonstrate the use of correct grammar and various literary devices in creating an essay.



# Let's try some

1. Acquire an understanding of randomness and probability.
2. Use sources well.
3. Understand economic risk analysis techniques
4. Use a standard C program development environment
5. Appreciate the connection of music of the past to music of the present.



SECTION THREE

# Model for Program-level Assessment

# The Big Picture

- Program-level student learning outcomes defined by ABET (“a-k”)
- Accreditation visits every 6 years; targeted data collection every three years
- All faculty who teach required undergraduate BME courses are involved in the process
- Data collection activities are well-defined; before-and-after activities prompt broader conversations





# Assessment Schedule

Task	Frequency	Scheduled			
ABET visit	6 years	Fa 2016	n/a	Fa 2022	n/a
Assessment plan review/ a-k outcomes data collection	3 years	Su 2017/ 2017-18	Su 2020/ 2020-2021	Su 2023/ 2023-24	Su 2026/ 2026-2027
a-k Outcomes Assessment		Su 2018	Su 2021	Su 2024	Su 2027
Alumni Survey/ Focus Group/ IAB Meeting		Fa 2018	Fa 2021	Fa 2024	Fa 2027
Student Satisfaction Surveys		Sp 2019	Sp 2022	Sp 2025	Sp 2028
Self-Study	6 years	n/a	2021-2022	n/a	2027-2028



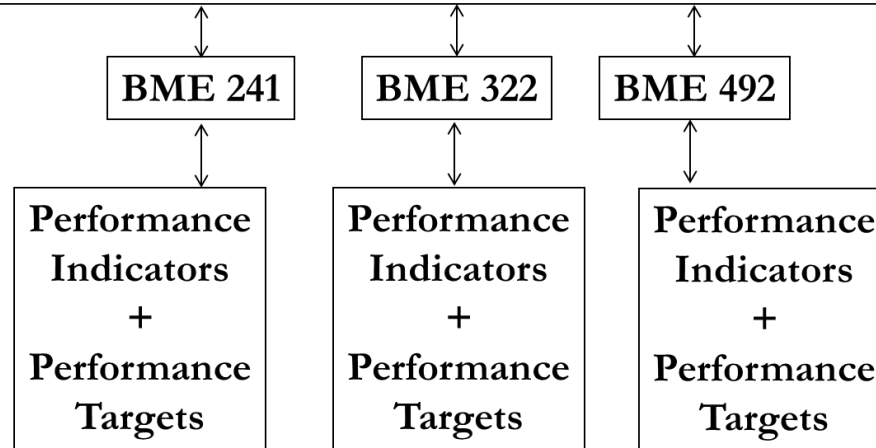
# Assessment Plan: Where to assess outcomes?

	a	b	c	d	e	f	g	h	i	j	k
195					x	XXXXXX	x	XXXXXX	x		x
196	x	x		x	x		XXXXXX		x		x
197		x									x
222	x	x		x	XXXXXX			XXXXXX	XXXXXX		XXXXXX
241	XXXXXX	XXXXXX		XXXXXX					x		x
331	x	XXXXXX	XXXXXX	x	x						
334	x	x	x	x	XXXXXX						XXXXXX
381	XXXXXX										
383	x	x	XXXXXX	x							x
322	x	x		XXXXXX							
352	x				x	XXXXXX			x	XXXXXX	
354	x	x		x					XXXXXX		x
411		x		x	XXXXXX						
442	x	XXXXXX		x							x
461	XXXXXX	x	x								
491/492	x	x	XXXXXX	XXXXXX	x	XXXXXX	XXXXXX	x	XXXXXX	XXXXXX	XXXXXX
402					x	x	x	XXXXXX		x	
360					XXXXXX		XXXXXX				



# Assessment Plan: What to assess

**ABET Outcome B:** Students will demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.:



# Performance Indicators

- Describe the specific task students will be asked to undertake in order to demonstrate their achievement of a given outcome
- Linked to a specific assignment, exam, or other component of a particular course



# Target for Performance

“What score should an engineer who is competent in this learning outcome be expected to achieve at this stage of education?”

“If our program is on track to produce successful engineers, what percentage of students should be scoring at that level? What percentage indicates a concern to be addressed?”



# Example Assessment Plan: Outcome B

**Outcome B:** Students will demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.

Performance Indicators	Method(s) of Assessment	Where data are collected	Year(s)/Semester of Data Collection	Target for Performance
Students will successfully complete a laboratory assignment with pre-lab, data collection, and analysis	Pre-lab assignment Data pages from lab notebook Lab reports	BME 241	Every three years (next: fall 2017)	70% of students will earn a grade of 70% or higher on the lab assignment
Students will use statistical methods to analyze and interpret data	Exam problem	BME 322	Every three years (next: spring 2018)	70% of students will score at least 70% on the assessed problem
Students will determine the minimum number of samples needed to ensure the power of a statistical test	Exam problem	BME 322	Every three years (next: spring 2018)	70% of students will score at least 70% on the assessed problem
Design teams will develop, implement, and evaluate the success of a Verification and Validation plan	Final design reports	BME 491/492	Every three years (next: spring 2018)	80% of teams will score at least 60% of the points on the Verification/Validation section of the design report

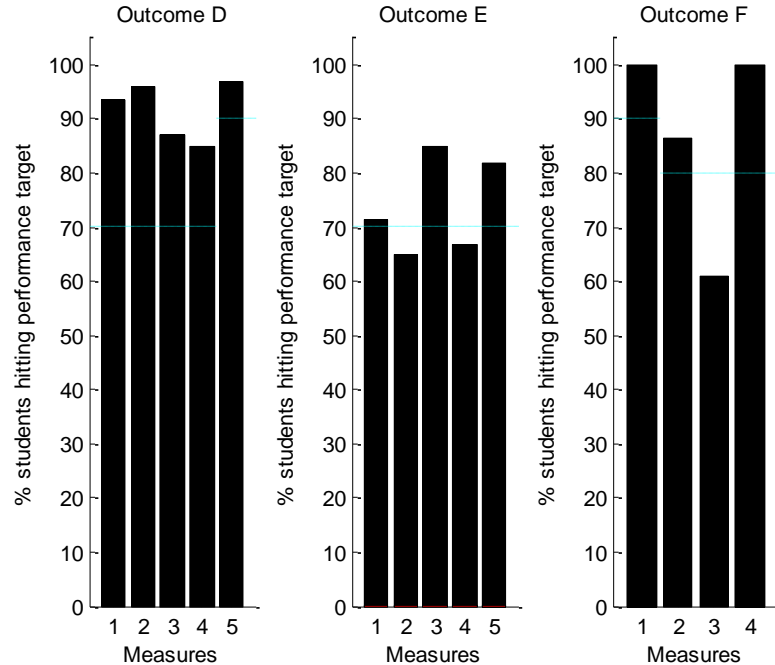


# Example Assessment Plan: Outcome D

Performance Indicators	Method(s) of Assessment	Where data are collected	Year(s)/Semester of Data Collection	Target for Performance
Students will demonstrate good citizenship when participating in team projects.	Teamwork assessment forms	BME 222 BME 354	Every three years (next: spring 2018)	70% of students will score an average of at least 2.5 (on a scale of 0-3) on a team citizenship rubric
Students will perform lab experiments as part of a 2-3 member team, with each team member taking on well-defined roles on each lab.	Laboratory reports	BME 222 BME 354	Every three years (next: spring 2018)	70% of lab groups will score at least 80% on assessed labs  100% of assessed team lab reports will clearly delineate the contributions of each team member
Students will complete a major 2-semester design project as part of a 4-5 member team	Teamwork assessment forms Sponsor assessment forms	BME 491/492	Every three years (next: spring 2018)	90% of students will score an average of at least 2.5 (on a scale of 0-3) on a team citizenship rubric



# Products of Assessment Plan: Data





# Products of Assessment Plan: Conversations About Outcomes

“In your class, what are you most concerned about in terms of subject areas or competencies where your students struggle the most?”

“Is your assessment process doing a good job of highlighting those areas of concern?”

“What have you tried, or do you plan to try, to help students improve in those areas of concern? What should we be doing elsewhere in the program to help scaffold that learning/skill development?”



# Continuous Improvement

1. Changes in an individual course (or a particular assignment in the course)
2. Changes to other courses in the curriculum that support that learning outcome
3. Changes in the assessment process itself
4. Review of results in the next assessment cycle to see whether changes have had an effect



# Continuous Improvement Examples

- Lack of familiarity with Linear Algebra noted among engineering students in all majors
- Feedback given to Math department
- Engineering Calculus sequence revamped to include “Multidimensional Mathematics”
- Assessments after this change show stronger grounding in Linear Algebra among engineering students



# Continuous Improvement Examples

- Weak MatLAB programming skills noted in BME juniors
- In-class MatLAB exercise added to first week of BME 33400 Biomedical Computing
- Although we are still below our targets for performance for some groups of students, overall MatLAB performance improved



# Continuous Improvement Examples

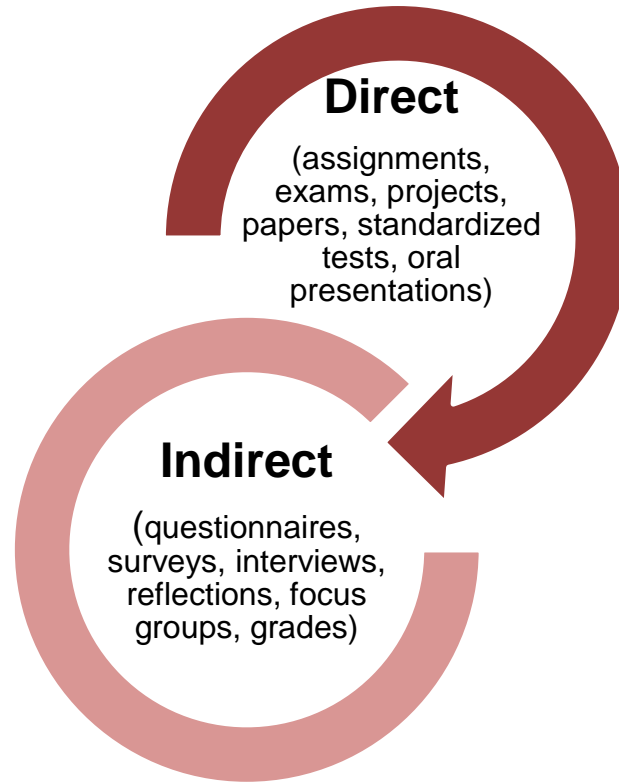
- Faculty panel of reviewers noted student reluctance to use some common design and analysis tools as part of Senior Design capstone projects
- BME faculty currently discussing changes that would give students earlier and more frequent exposure to those tools



SECTION FOUR

# Types of Assessment Measures

# Student Learning Measures (see handout)



# Assessment of Student Work

“No assessment of knowledge, conceptual understanding, or thinking or performance skills should consist of indirect evidence alone” (Linda Suskie, 2009).



# Direct Measures of Student Learning

1. Require students to demonstrate their knowledge and skills.
2. They provide tangible, visible, and self-explanatory evidence of what students have and have not learned as a result of a course, program, or activity (Suskie, 2004, 2009; Palomba and Banta, 1999).
3. **Authentic** assessment tasks are often multidimensional and require higher levels of cognitive thinking such as problem solving and critical thinking.
4. Can be integral aspect of student and faculty work.

# Indirect Measures

1. Capture students' perceptions of their knowledge and skills.
2. They supplement direct measures of learning by providing information about how and why learning is occurring (learning processes).
3. Students' perceptions of the extent to which courses, activities, or assignments have enhanced their achievement of the stated learning outcomes may be obtained by using the following methods: self-assessment, peer-feedback, end-of-course evaluations, questionnaires, focus groups, or exit interviews.

# Authentic, Embedded Assessment

- Goal of many undergraduate and graduate programs is for students to become lifelong learners by enhancing students' communication skills, critical thinking, and problem solving abilities (PULs).
- With authentic, embedded assessment tasks students are asked to demonstrate what they know and are able to do in meaningful ways.
- Authentic assessment tasks are often multidimensional and require higher levels of cognitive thinking such as problem solving and critical thinking.
- Embedded assessment means that “that opportunities to assess student progress and performance are integrated into the instructional materials and are virtually indistinguishable from the day-to-day classroom activities”(Wilson and Sloane, 2000).
- The end-of-course *Research Paper* in Biology.





# Signature Assignments

# Definition of a Signature Assignment

Signature assignments enable you to collect common student learning outcome data across class sections for course-level or program-level assessment and review when sections of the same course are offered by multiple faculty members with varied pedagogies.



# Signature Assignments: Key Characteristics

1. Well-aligned with course-level learning objectives.
2. Focused on emulating real world applications of course knowledge in terms of process and content.
3. Often require students to reflect on their work.
4. Collaboratively designed by faculty who teach in various sections of a given course.



# Signature Assignments: Benefits

1. Allow for the collection of uniform assessment data across different sections of a single course. (signature assignments must be used in all sections of the course)
2. Provide significant common data sets for use in documenting the achievement of learning objectives at the programmatic and institutional levels.
3. Promote faculty discussions of student learning, pedagogy, and assessment.



# Signature Assignments: Process for Faculty

1. Review the targeted course-level learning objectives to ensure similar understandings of them.
2. Brainstorm, draft, and revise an assignment (tasks, problems, etc.) that aligns with the targeted objectives.
  - The action verbs that describe student behaviors are a good place to start in constructing an effective assignment.
3. Faculty discuss their expectations for student work and design a rubric for the assignment (the AAC&U VALUE rubrics can serve as templates). <https://www.aacu.org/value/rubrics>
4. Faculty agree to collect and collaboratively review student work samples.





# Signature Assignments: In Sum

1. Building Signature Assignments Requires Substantial Levels of **Intentionality**:
  - Careful planning of course sequences and embedded assignments.
  - Assignments and grading approaches carefully created to elicit and evaluate student responses.
  - Implemented collaboratively by instructional staff.
2. However, the result is a powerful method for demonstrating student mastery of course content and for improving teaching and learning generally.



# Signature Assignments Distinguishing Features

1. Can be an assignment, task, activity, project or exam purposefully created or modified to collect evidence for a specific learning outcomes.
2. Can be designed to facilitate the assessment of learning outcomes derived from the PULs and program-level outcomes.
3. Work well when they are course-embedded.
4. Ideally, other coursework builds toward the signature assignment and the signature assignment measures the culmination of what the student learned in the course for intended learning outcomes.



# Direct Measure of Student Learning

1. Create an signature assignment (e.g., paper that requires students to integrate learning experiences).
2. Develop approaches to assess levels of learning.
3. Team grade or compare ratings.
4. Revise grading approaches as appropriate.

# Library of Signature Assignments and Resources

1. Library of Signature Assignments from Various Disciplines
  - <https://www.assignmentlibrary.org/>
2. National Institute of Learning Outcomes Assessment (NILOA)
  - <http://learningoutcomeassessment.org/>



SECTION FIVE

# Using and Reporting on Assessment Outcomes

# Uses of Assessment Outcomes

Think critically about your process, your data, and what they tell you about your program. With those results as your guide:

1. Motivate **improvement** at the course and program level
  - ...to student learning, skills, and preparation to contribute to the discipline and the community
  - ...to other aspects of the program in response to constituent feedback
2. Provide **accountability** to external stakeholders



# Reporting on Assessment Outcomes

Regardless of the type of reporting (program review, program accreditation self-study, campus PRAC report, etc.), readers want to know:

1. What did you do? (process)
2. What did you learn from it? (assessment results)
3. What changes did you make as a result of your findings? (improvement)
4. What were the results of those changes? (closing the loop)



# PRAC Assessment Reports: Purposes

1. Document ongoing assessment and improvement efforts and accomplishments for unit and campus stakeholders
  - Reports serve as source material for annual IUPUI Assessment Report
2. Demonstrate to external stakeholders that IUPUI gives sustained, systematic attention to student learning and its improvement
  - Guidelines and rubric based on assessment/improvement cycle:  
Outcomes→Measures→Findings→Improvements→Outcomes





# PRAC Assessment Reports: Considerations for Writers

- Provide context on unit(s): programs offered, assessment cycle, focus of this year's report.
- Include learning outcomes and their source (e.g, unit faculty, accrediting association, professional association).
- Distinguish learning outcomes from program outcomes. (Reports can include both, but most should focus mainly on learning.)
- Ensure alignment among outcomes, measures, findings, and improvements (may require referring to findings from previous years).



# Annual PRAC Report Review

- Carried out by PRAC Report Review Subcommittee
- Provides collegial feedback to units on strengths and areas for improvement in their PRAC reports
- Helps ensure that assessment reporting at IUPUI is accomplishing its purposes and continuously improving (internal quality assurance/“assessing assessment”)
- Has achieved high level of concurrence among reviewers
- Offers reviewers opportunity to discuss and learn about assessment across IUPUI



SECTION SIX

# Campus Resources for Assessment

# Questions



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