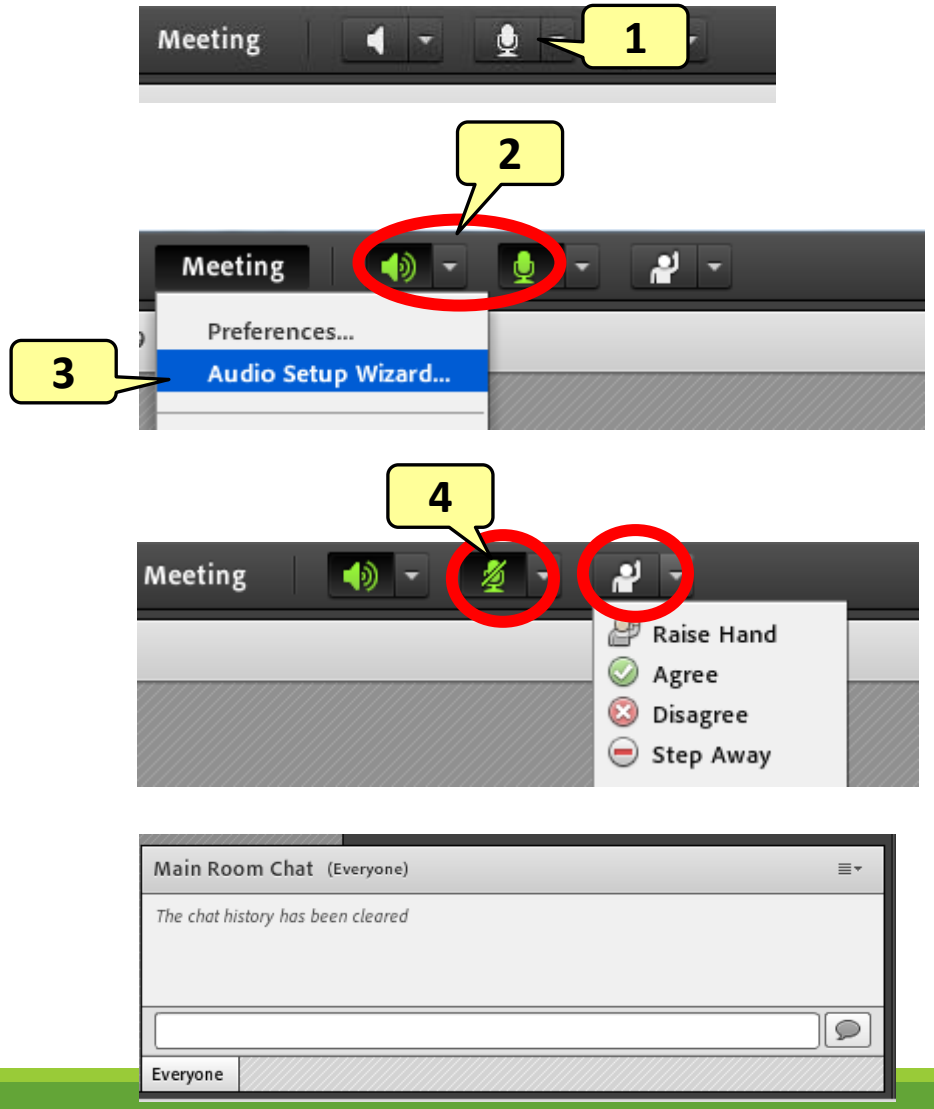
Welcome! Every time you enter the VCP…..

1. Enable your speakers and mic
2. The top bar icons should be green.
3. Run the audio setup wizard (use “Meeting” menu on top left).
4. After test your mic, mute yourself



Start Recording

Faculty Virtual Community of Practice Mechanical Engineering

Session 6: Evaluation & Available Resources

Chuck Krousgrill

Purdue

krousgri@purdue.edu

Julie Linsey

Georgia Tech

julie.linsey@me.gatech.edu

Tentative Agenda

Welcome and learning objectives (5 minutes)

Evaluation Overview (30 mins)

Group Breakouts- discuss assignment (20 mins)

Report out (20 mins)

Objectives

- To become aware of some of the options for evaluating your educational interventions.

- To provide guidance for evaluating your class changes.

Do you want feedback on your ideas and plans for next semester?

- Starting next week we will be providing time for you to present your ideas and receive feedback.
- Upload a set of slides showing your plans or activities you want feedback on to the “Plans for Spring 2014” by Sunday at 5 pm EST
- You will receive time during the session to present

Designing Evaluations

- Ideally work with an educational research expert
  - Where to find someone:
    - Campus center for teaching excellence
    - Education Departments
- Most of these topics encompass at least full semester long graduate classes for research quality data !!!
  - Surveys
  - Writing survey questions
  - Test and Scale Measurement
- You can gain a lot of information by leveraging existing measures, basic survey questions and through quiz/exam questions.
- You probably know how to write good quiz and exam questions for your subject area.

What hypotheses / research questions do you have?

- What impacts do you expect your intervention to have?
  - Improved learning
    - Specifically what skills, concepts or problem types
  - Students like class more
  - What else?

Has there been improvement?

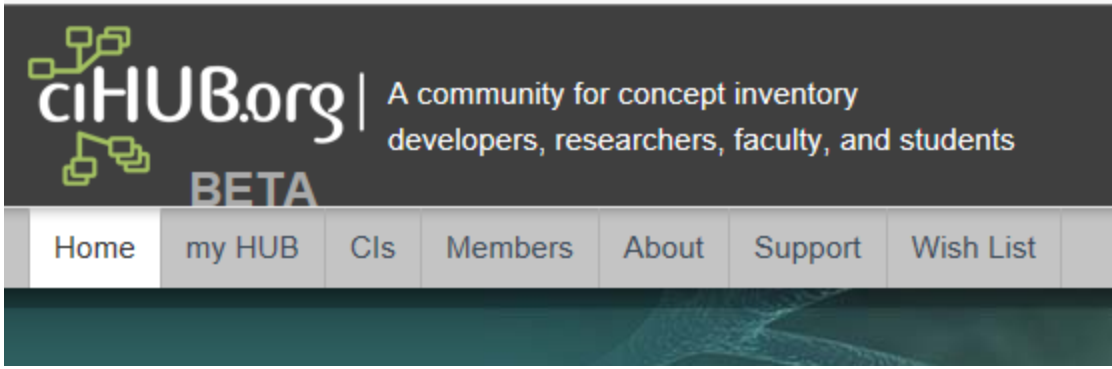
- Formative and Summative Feedback
- Student opinions and actual learning outcomes can differ particularly when it's different than what they are used to
- Small sample sizes will not detect small effect sizes
-

Example Assessments

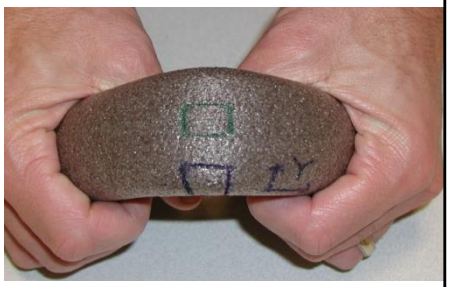
- Multiple choice questions
- Open-ended
- Quizzes/ Exams
- Surveys
- Focus Groups
- Projects
- Rubrics
- Participant observations
- Concept Maps
- Concept Inventories

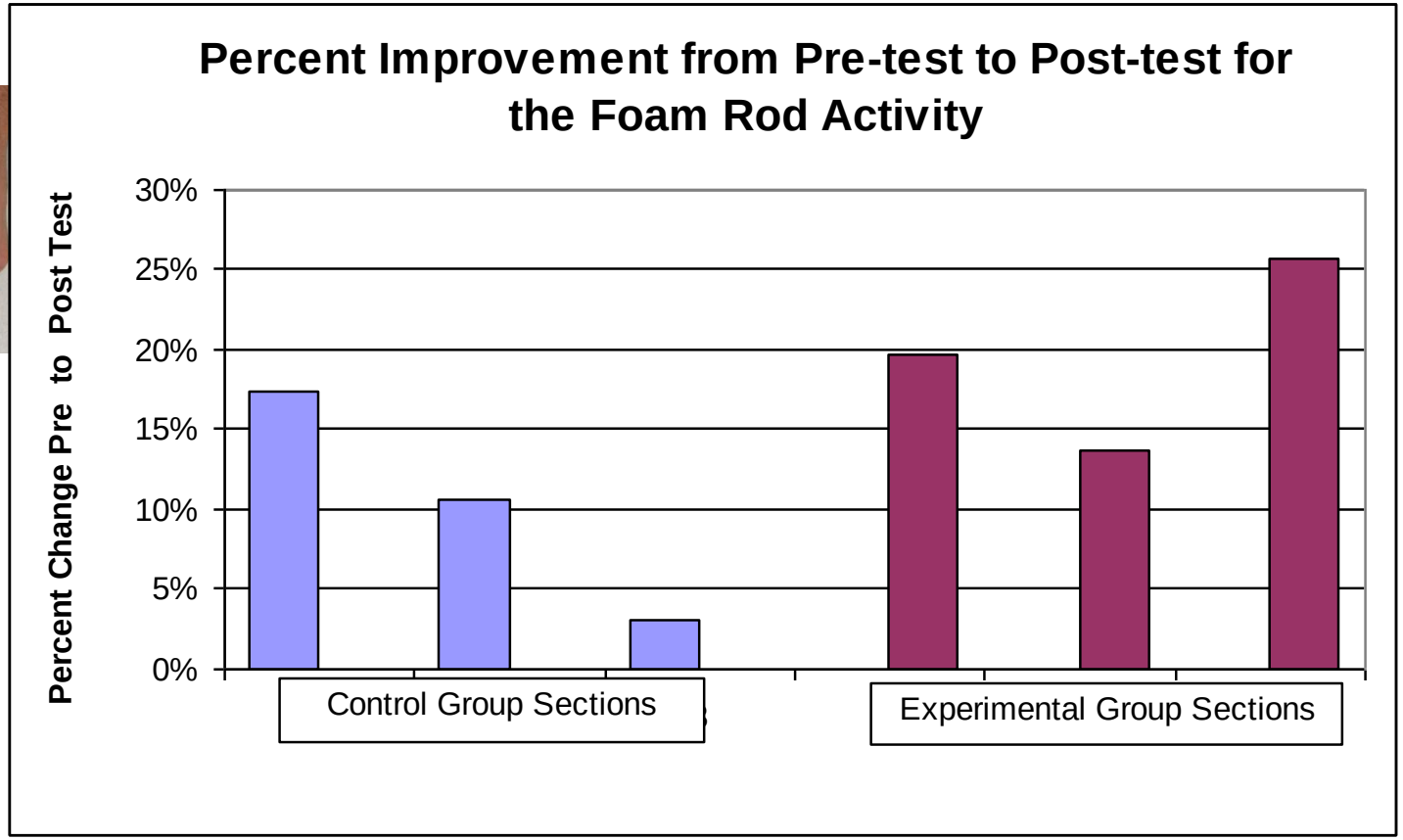
Concept Inventories

- cihub.org- excellent list of current concept inventories
- Often used pre/post
- Example areas:
  - Statics
  - Force Concept Inventory
  - Fluids
  - Statistics

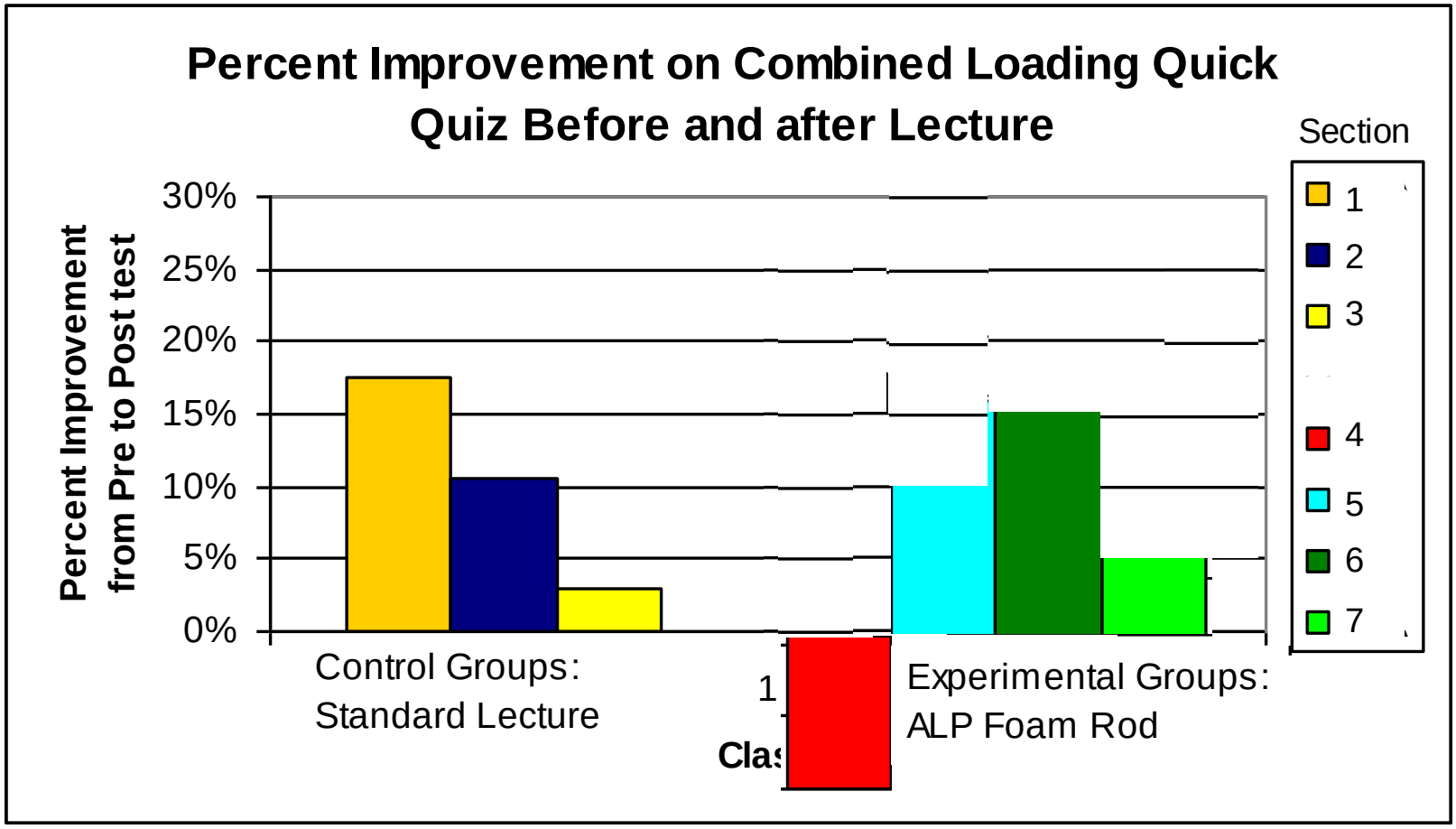


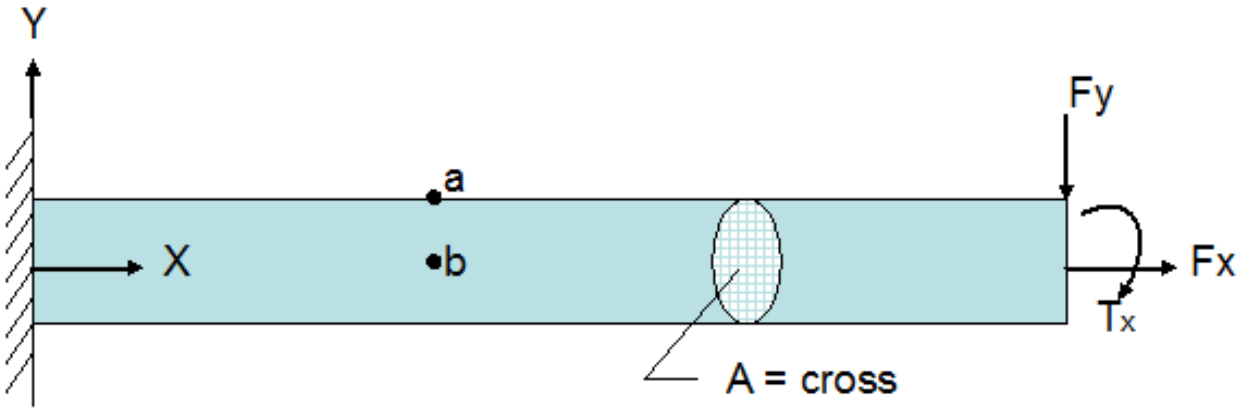
Pre/post quick quiz





Bad Questions Can Provide Erroneous Conclusions- Percent Improvement by Class Section





Note:
"F_x" is an axial force in the X-direction
"T_x" is a torque about the X-axis
"F_y" is a transverse (bending) force
"A" is the cross sectional area of the rod
"I" is the 2nd moment of area for the rod

Circle the best answer

1. The normal stress at point "a" is, $\sigma_a =$

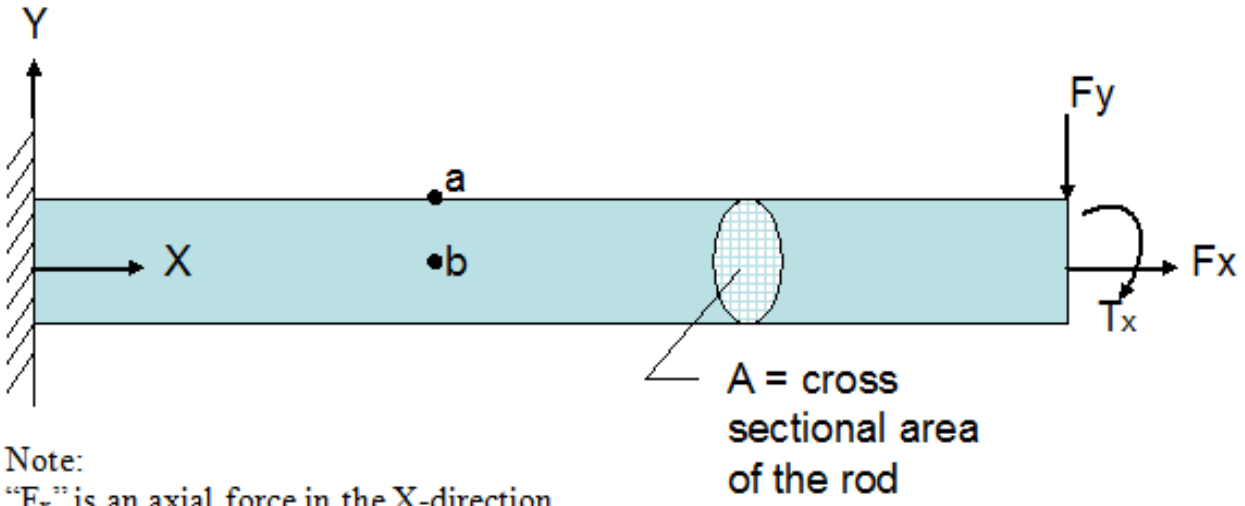
a) $\frac{My}{I} + \frac{F_X}{A} + \frac{Tr}{J}$ b) $\frac{My}{I} - \frac{F_X}{A}$ c) $\frac{My}{I} + \frac{F_X}{A}$ d) $\frac{My}{I}$ e) $\frac{P}{A}$

2. The normal stress at point "b" is, $\sigma_b =$

a) $\frac{My}{I} + \frac{F_X}{A} + \frac{Tr}{J}$ b) $\frac{My}{I} - \frac{F_X}{A}$ c) $\frac{My}{I} + \frac{F_X}{A}$ d) $\frac{My}{I}$ e) $\frac{P}{A}$

3. The shear stress at point "a" is, $\tau_a =$

a) $\frac{My}{I} + \frac{F_X}{A} + \frac{Tr}{J} + \frac{VQ}{It}$ b) $\frac{F_X}{A} + \frac{Tr}{J} + \frac{VQ}{It}$ c) $\frac{F_X}{A}$ d) $\frac{VQ}{IT}$ e) $\frac{Tr}{J} + \frac{VQ}{It}$



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How Can Rubrics Help in Active Learning?

Tools for teaching, learning, & assessment

- Targets trends in individual and group performance and understanding of concepts
- Efficient & effective way for students to self-assess
- Beneficial resource in comprehensive, semester-long assessment of progress and for portfolios
- Abundance of templates available:
  - www.rubistar.4teachers.org
  - www.teach-nology.com/web_tools/rubics/
  - www.rubrics.com

Tool for Teachers & Students in Active Learning Assessments

Communicates Clear Expectations

Aligns with Specific Learning Objectives

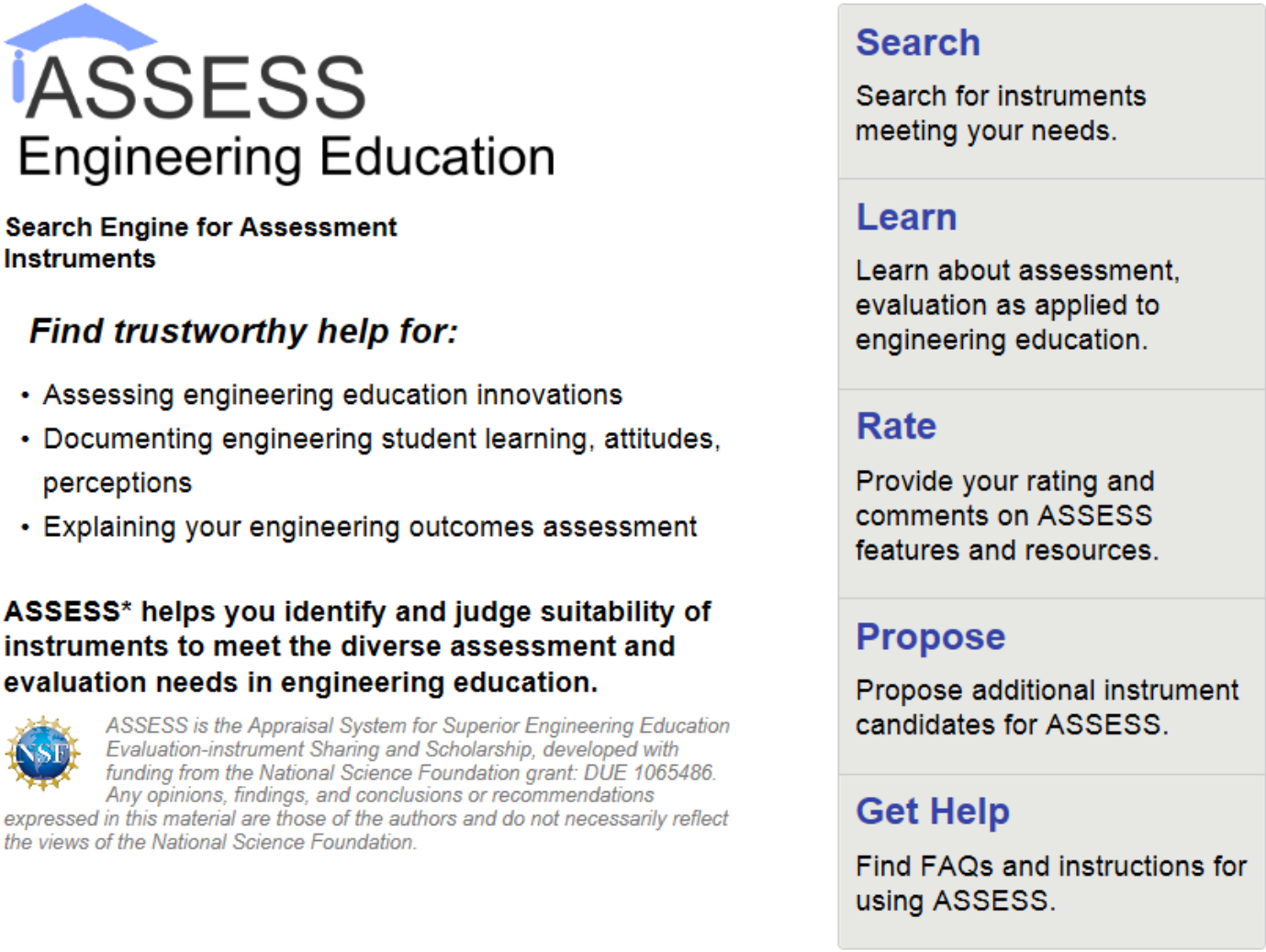
	DISTINGUISHED (4)	PROFICIENT (3)	APPRENTICE (2)	NOVICE (1)
HYPOTHESIS Student makes predictions between experiment & results	Obvious connection between the problem and predicted outcome. Provides references showing that hypothesis refutes or defends established knowledge. Variables are identified and classified as dependent and independent.	Hypothesis and problem are clearly connected. Hypothesis refutes or defends established knowledge. Variables are identified and classified as dependent and independent.	No connections between hypothesis and experiment. No clear way to prove or disprove hypothesis by performing experiment. Variables are not completely described or are incorrectly classified as dependent or independent.	Hypothesis is missing or is unrelated to the experiment. Does not mention dependent and independent variables.
DATA ANALYSIS Student analyzes data & identifies trends	Identifies and describes trends and makes appropriate conclusions based on the data. Uses statistical techniques to identify and disregard flawed data. Shows calculations.	Identifies valid trends and makes appropriate conclusions based on the data. Documents calculations made during data analysis.	Only identifies obvious trends or found trends not fully supported by the data.	Trends are missing or are not supported by the data collected. Obvious trends are overlooked.

Sources for Assessments

- Journal of Engineering Education
- Prior Quiz and Exam Questions if students do not have access to them
  - Especially if you have the data about performance
  - Professors at other universities
- ASEE papers (sometimes)

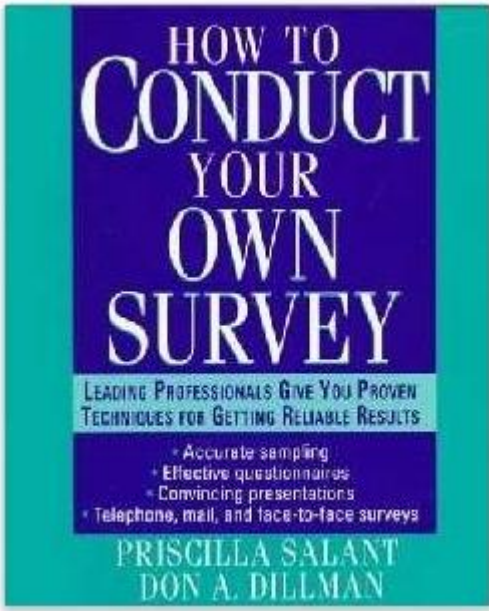
ASSESS Engineering- Source for Assessments

- http://assess.tidee.org/

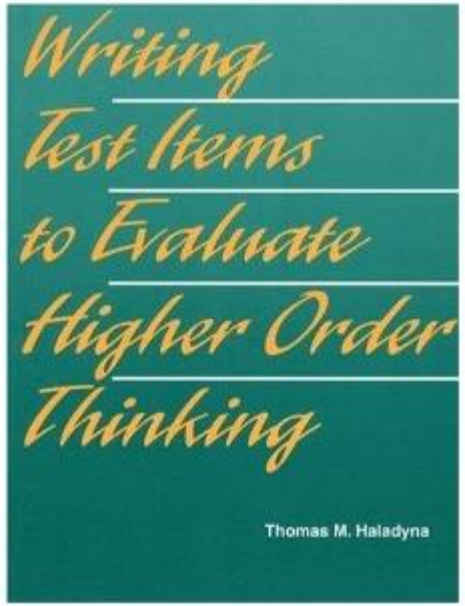


Resources-

- Surveys
  - *How to Conduct Your Own Survey* by Salant & Dillman
- SurveyMonkey, GoogleDocs



- Writing Test Questions (Especially Multiple Choice)
  - *Writing Test Item to Evaluate Higher Order Thinking by Haladyna*



NSF Common Guidelines for Education Research and Development

- August 2013, being mentioned in NSF webinars
- http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13126
- 6 types of projects are described
- Most projects here likely fit the Design and Development Research

Design and Development

- Develops solutions to achieve a goal, such as improving student engagement or mastery of a set of skills.
- Research projects of this type draw on existing theory and evidence to design and iteratively develop interventions or strategies

Design and Development

(1) Development of a solution (for example, an instructional approach; design and learning objects, such as museum exhibits or media; or education policy) based on a well-specified theory of action appropriate to a well-defined end user;

(2) Creation of measures to assess the implementation of the solution(s);

(3) Collection of data on the feasibility of implementing the solution(s) in typical delivery settings by intended users; and

(4) Conducting a pilot study to examine the promise of generating the intended outcomes.

Design and Development

- At the conclusion of the project
  - generated a theory of action
  - a set of intervention components
  - and preliminary evidence regarding promise for improving education outcomes
  - make the case that an efficacy trial of a strategy or intervention is warranted, assuming positive and substantively important impacts

Survey and Meeting time for next Semester

- You should have received a link to a survey. This provides feedback for us to improve the VCP.
- Link for scheduling time next semester

Group Activity

Discuss your plan for evaluation.

Time: 15 minutes

Assigned scribe and reporter

Assignment for Next Week

TOPIC: Teamwork and planning for next semester

As the spring term approaches, we need to be making plans for the new directions in the way that we teach our course. In the next session we will, among other things, begin discussions on what aspects that you plan to change in your course. What new ideas from this FVCP will you incorporate: engagement, a clear focus on defining course objectives, creation of a positive and inclusive learning environment, teamwork, tools for evaluation/assessment, … ?

1. Activities:
   - Prepare an outline of how your course will change in the coming spring term.
   - Choose one aspect of this change. In one or two paragraphs, flesh out the details on how you plan to bring about this change.
   - Be prepared to present and discuss at next week's FVCP.
2. Post your activities to the Mechanical VCP Folder by 5:00 PM Sunday Dec. 8th