Measuring Student Learning

ACADEMY FOR STUDENT CENTERED LEARNING
Student-Centered Instruction

Which definition does not fit?

A. Students are active in the learning process
B. Knowledge being transmitted from professor to student
C. Culture is cooperative, collaborative, and supportive
D. Emphasis is on using and communicating knowledge
E. Students construct knowledge through gathering and synthesizing information
Student-Learning Outcomes

- Framework for instructional decisions
- Guides students recognize a purpose for learning
- Provides an expectation for quality student achievement
- Focuses the purpose of assessment
What makes an assessment student-centered?

A. Professor and students evaluate learning together
B. Teaching and assessing are intertwined
C. Assessment is used as a teaching process as well as a means to identify learning
D. Increases student awareness of their own learning
E. Desired learning is assessed directly through papers, projects, performances, portfolios and the like
Practical Implementation of SCL Problem-based Learning (PBL)

SCL emphasis on skills and competencies to demonstrate:

- Student’s own learning
- Understanding and independent thinking
- Problem solving
- Team cooperation
Faculty Developed Practical SCL Approaches

• **Problem-based Learning**
  – Active Learning (*Bonwell & Ericson, 1991*)
  – Collaborative Learning (*Bruffee, 1984*)
  – Inquiry-based Learning
  – Cooperative Learning (*Johnson, Johnson & Smith, 1991*)
  – Peer Led Team Learning (*Tien, Roth, & Kampmeier, 2001*)
  – Team-based Learning (*Michaelson, Knight, & Fink, 2004*)
  – Project-based Learning
  – Use of case method
  – Role plays
Problem-based Learning

MET 365 Machine Design Technology Classroom Activity

CH3: Solve Pr. 3-3

Problem statement

• Individual activity (5 min.)
  Identify and write down general procedure you will use in problem solving

• Team activity 10 min. (three students per team, sit according to team)
  Share your problem solving procedure with your team
  Develop team approach to problem solving

• Class discussion 5 min. (Each team explains/asks questions)

• Solution 10 min. (Each team presents solution)

• Summarize the activity
Measuring Student Learning in PBL Approach

I use **Formative Assessment**

Known as educative assessment *used to aid learning*

It is diagnostic *providing feedback on teaching and student learning*
Teacher v. Student-Centered Assessment
Supreme Court Simulation and Role Playing

John Fliter
Associate Professor, Political Science
## Teaching versus Student (Learning)-Centered Paradigms

<table>
<thead>
<tr>
<th>Concept</th>
<th>Teacher-Centered</th>
<th>Student-Centered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teaching goals</strong></td>
<td>• Cover the discipline</td>
<td>• How to use discipline</td>
</tr>
<tr>
<td></td>
<td>• How to use discipline</td>
<td>• Core learning objectives</td>
</tr>
<tr>
<td><strong>Course structure</strong></td>
<td>• Faculty cover topics</td>
<td>• Mastery of learning objectives</td>
</tr>
<tr>
<td><strong>Pedagogy</strong></td>
<td>• Delivery of information</td>
<td>• Engagement of students</td>
</tr>
<tr>
<td><strong>Course delivery</strong></td>
<td>• Lecture</td>
<td>• Active learning</td>
</tr>
<tr>
<td></td>
<td>• Assignments and exams</td>
<td>• Assignments for formative purposes</td>
</tr>
<tr>
<td></td>
<td>• Lecture</td>
<td>• Cooperative learning</td>
</tr>
<tr>
<td></td>
<td>• Assignments and exams</td>
<td>• Problem-based learning</td>
</tr>
<tr>
<td><strong>Faculty role</strong></td>
<td>• Sage on the stage</td>
<td>• Designer of learning environment</td>
</tr>
<tr>
<td><strong>Effective teaching</strong></td>
<td>• Present information well and those who can will learn</td>
<td>• Engage students</td>
</tr>
<tr>
<td></td>
<td>• Present information well and those who can will learn</td>
<td>• Help all students master skills</td>
</tr>
<tr>
<td></td>
<td>• Present information well and those who can will learn</td>
<td>• Use assessment to improve courses</td>
</tr>
</tbody>
</table>
# Student-Centered Assessment

## Characteristics
- Students actively involved in assessment process
- Collaborative (student-student, teacher-student)
- Allows for diverse talents and learning styles
- Synthesis of experiences
- Ongoing practice of learned skills

## Elements
- Active demonstration of learning and application of knowledge
- Clear criteria and standards for achievement
- Opportunities for self-assessment and review of learning
- Immediate, frequent, and informative feedback

## Examples
- Grading rubrics
- Problem solving exercises
- Peer tutoring and grading
- Oral presentations and demonstrations
- Portfolios and journals
- Student-developed assessment tools
- Creative writing
POLSC 615 Civil Rights and Liberties
Supreme Court Simulation and Role Playing

Foundations of Knowledge
- Methods, Process, and Cases
- Role Assignments
- Analysis Paper
- Rubric and feedback

Application of Knowledge
- Lawyer assignments
- Case descriptions
- Written briefs
- Oral arguments
- Justices ask questions
- Conference

Assessment of Learning
- Opinions due
- Discussion of the cases and roles
- Rubric and feedback
- Student survey
- Final Exam
References


### Lab Report Rubric

**Grading Criteria:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excellent</strong></td>
<td>Clear, precise, and detailed discussion indicates complete understanding of experiment. Data, calculations, and reference material used to analyze results and explain conclusion. Professional presentation with correct formatting and clear writing style. Demonstrated extra time and effort put into report.</td>
</tr>
<tr>
<td><strong>Above Average</strong></td>
<td>Followed given report guidelines and report is complete as required.</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>Experimental data is complete, but analysis of data and discussion are vague and indicate incomplete understanding of experiment. Sporadic writing style.</td>
</tr>
<tr>
<td><strong>Inadequate</strong></td>
<td>Incorrect/incomplete information. Report is unorganized. Descriptions are brief and/or unclear.</td>
</tr>
<tr>
<td><strong>Unacceptable</strong></td>
<td>Did not follow report guidelines. Missing information.</td>
</tr>
</tbody>
</table>
## Formative Assessment

<table>
<thead>
<tr>
<th>Possible Points</th>
<th>Technical content</th>
<th>Writing style</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abstract (5 points)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Summary of lab objectives and results</td>
<td></td>
</tr>
<tr>
<td><strong>Introduction (15 points)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Lab Objectives</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Description of the experiment</td>
<td></td>
</tr>
<tr>
<td><strong>Equipment and Procedure (20 points)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Description of equipment and materials</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Test setup schematics</td>
<td></td>
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<tr>
<td>10</td>
<td>Procedures used</td>
<td></td>
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<tr>
<td><strong>Results and Analysis (40 points)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Parameters required and equations used</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Discussion of errors/numerical data</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Tables and Graphs: correct units and symbols</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Discussion of results</td>
<td></td>
</tr>
<tr>
<td><strong>Discussion/Conclusion (20 points)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Summarize findings</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Comparison of results to expected values</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Recommendations, comments about results, references</td>
<td></td>
</tr>
</tbody>
</table>

### Total

**Draft Grade**

**Final Grade**
How to tie measures into outcomes?

**K-State UG SLO - Critical Thinking.**
Students will demonstrate the ability to access and interpret information, respond and adapt to changing situations, make complex decisions, **solve problems**, and evaluate actions.

**Mechanical Engineering Technology (MET) Program Educational Objective (PEO)**
Prepare graduates with skills in problem solving

**Student Outcome**
an ability to **select and apply a knowledge** of mathematics, science, engineering, and technology to **engineering technology problems** that require the application of principles and applied procedures or methodologies

**MET 365 Machine Design Technology II Course Level Outcome**
Ability to **determine internal forces** due to applied forces.

**Bloom’s Taxonomy**
Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation
Post-it Sharing

Write as many post-it notes in two minutes:

• strengths of the strategies presented
• concerns that might need to be addressed
• strategies for student-centered assessment