Course Transformation: Measuring Improvements in Student Learning

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COURSE TRANSFORMATION: MEASURING IMPROVEMENTS IN STUDENT LEARNING

ISSOTL CONFERENCE 2017
CALGARY, CANADA

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Purdue University
Instruction Matters: Purdue Academic Course Transformation (IMPACT) Program

- Semester-long faculty learning community
- Theoretical framework based on self-determination theory (SDT)
COURSES – BY COLLEGE

- College of Agriculture
- College of Education
- College of Engineering
- College of Health & Human Sci
- College of Liberal Arts
- College of Science
- College of Technology
- Krannert School of Management
- The Graduate School
SELF-DETERMINATION THEORY

- Autonomy
- Competence
- Relatedness

Experience of

Fosters
- Volition
- Motivation
- Engagement

Result in
- Enhanced performance
- Persistence
- Creativity

Adapted from Eunbae Lee, Georgia Southern University
DATA COLLECTION

- Student Perceptions Surveys
- Instructor Surveys
- Course Evaluations
- Faculty Focus Groups
- Registrar Data
- Faculty Deliverables
SELF-DETERMINATION MODEL
How do we measure gains in student learning in an individual course?
An assessment map is a document which illustrates how an assignment (or multiple assignments) measures your learning outcomes (and possibly objectives).
WHY USE AN ASSESSMENT MAP?

COURSE PLANNING

• Provides a visual representation of the connection between your learning outcomes and your assessments

• Identifies the degree of assessment associated with each learning outcome

• Helps identify areas of misalignment
WHY USE AN ASSESSMENT MAP?

STUDENT LEARNING

• Can be used to track student progress on outcomes/objectives over the course of the semester

• Can be used to identify outcomes/objectives where students are struggling
WHY USE AN ASSESSMENT MAP?
EVALUATION/SCHOLARSHIP OF TEACHING AND LEARNING

• Are students performing better on an outcome after your course redesign?

• Are students performing better on higher order outcomes after your course redesign?
• Learning outcomes: refers to course-level goals; usually 3-5 learning per course

• Learning objectives: refers to smaller goals (unit, lesson, etc.) to help learners achieve the course-level goals
## Final Exam/Project Assessment Template

<table>
<thead>
<tr>
<th>LO</th>
<th>Bloom's #</th>
<th>Exam</th>
<th>Or Final Project</th>
<th>% of grade</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO1</td>
<td>obj 1</td>
<td></td>
<td></td>
<td></td>
<td>Bloom's Taxonomy</td>
</tr>
<tr>
<td></td>
<td>obj 2</td>
<td></td>
<td></td>
<td></td>
<td>1. Remember/recall</td>
</tr>
<tr>
<td></td>
<td>obj 3</td>
<td></td>
<td></td>
<td></td>
<td>2. Understand</td>
</tr>
<tr>
<td></td>
<td>obj 4</td>
<td></td>
<td></td>
<td></td>
<td>3. Apply</td>
</tr>
<tr>
<td></td>
<td>obj 5</td>
<td></td>
<td></td>
<td></td>
<td>4. Analyze</td>
</tr>
<tr>
<td>LO2</td>
<td>obj 1</td>
<td></td>
<td></td>
<td></td>
<td>5. Evaluate</td>
</tr>
<tr>
<td></td>
<td>obj 2</td>
<td></td>
<td></td>
<td></td>
<td>6. Create</td>
</tr>
<tr>
<td></td>
<td>obj 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>obj 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>obj 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LO3</td>
<td>obj 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>obj 2</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>obj 3</td>
<td></td>
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<tr>
<td></td>
<td>obj 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>obj 5</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
VARIETY OF COURSE MODELS

AUTONOMY IN COURSE DESIGN: EXAMPLE 1

AGRY/NRES 255 Outcomes
The overall learning outcomes of the course are:

1. To be able to **explain** fundamental soils concepts including physical properties (color, structure, texture, density, porosity), soil formation (factors, processes, parent materials, and horizon development), chemical properties (soil pH, CEC), and soil classification.

2. To be able to **apply** these concepts to **explain** erosion, water quality issues, and approaches to soil (bio)remediation.

3. To be able to **apply** these concepts, in conjunction with physical and chemical analysis [reports] of soils, to **assess** soil health and plant nutrient metrics in **making** management decisions.

Notes: bolded and colored words signify the represented domain. Specifically:

- Understand or Remember
- Apply
- Analyze
- Create
- Evaluate

Note that the above objectives are mapped to the weekly quizzes and Exams 1-3. This map does not include mapping to lab packets, iClicker questions, in-class exercises, lab hand-ins, the final exam or recitation activities which also support the objectives. Thus, where no direct linkage of an objective to an assessment mechanism is noted, it is assessed through one of these other methods.
## VARIETY OF COURSE MODELS

### OUTCOME 1

<table>
<thead>
<tr>
<th>Module #</th>
<th>Objective #</th>
<th>Objective</th>
<th>Quiz 1</th>
<th>Quiz 2</th>
<th>Quiz 3</th>
<th>Quiz 4</th>
<th>Exam 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Use the Munsell system to describe soil color and explain the Munsell code including the concepts of hue, value, and chroma.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Name and explain the origin of the colors in soil which are caused by iron, by organic matter, and the colors observed in the absence of iron and organic matter.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Discuss how and why surface and subsoil soil colors change as one goes from well drained to poorly drained soil.</td>
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</tr>
<tr>
<td>4</td>
<td>1</td>
<td>List the particle size limits for sand, silt, and clay.</td>
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</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Given an unlabeled textural triangle, explain its general organization and</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>Given a sample of soil, determine its texture by feel, placing it in its correct textural class.</td>
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<td></td>
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</tr>
<tr>
<td>7</td>
<td>1</td>
<td>Define &quot;texture&quot; and &quot;structure&quot;.</td>
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</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Define &quot;ped&quot;, and discuss how peds are formed.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>Identify and describe the two &quot;structureless&quot; conditions in soil: single grained and massive.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>Identify and describe granular, platy, blocky, and prismatic soil structures either when given sample peds or in a monolith.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>Define the soil horizons listed in the study guide and recognize them when obviously present in a profile (monolith).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>Distinguish and describe soil horizons in the 0-122 cm (0-4 ft.) cores provided.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>Identify, name, and discuss the visible features such as structure, color, and obvious horizon boundaries in the &quot;Soil-of-the-Week&quot;.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>Given several soil profile descriptions, select the one which matches a soil core using the characteristics of color, texture, and horizon boundaries.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Name and write the chemical formula for the oxidation states of iron in soil and identify the soil colors associated with each oxidation state.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### VARIETY OF COURSE MODELS

**AUTONOMY IN COURSE DESIGN: EXAMPLE 2**

#### Final Exam/Project Assessment Template: Landscape Architecture

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Assignment 01 Photoshop</th>
<th>Assignment 02 Ill/InDesign</th>
<th>Assignment 03 AutoCAD</th>
<th>Assignment 04 3ds Max</th>
<th>Assignment 05 Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Outcome</td>
<td>Objective</td>
<td>Bloom’s #</td>
<td>Assessment %</td>
<td>Bloom’s #</td>
<td>Assessment %</td>
</tr>
<tr>
<td>LO2</td>
<td>Develop and refine a personal graphic style along with a critical &quot;designer's eye&quot; through formal presentation and discussion</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Develop communicative skills to explain opinions on designed and presented work</td>
<td>3</td>
<td>30% Pin-up Critique</td>
<td>3</td>
<td>30% Pin-up Critique</td>
</tr>
<tr>
<td></td>
<td>Explore various graphic styles through iteration and experimentation</td>
<td>6</td>
<td>40% Graphic Style</td>
<td>6</td>
<td>40% Graphic Style</td>
</tr>
<tr>
<td></td>
<td>Create your own personal style that follows communicative norms using basic professional standards</td>
<td>6</td>
<td>40% Graphic Style</td>
<td>6</td>
<td>40% Graphic Style</td>
</tr>
</tbody>
</table>
VARIETY OF COURSE MODELS

AUTONOMY IN COURSE DESIGN: EXAMPLE 3
VARIETY OF COURSE MODELS

AUTONOMY IN COURSE DESIGN: EXAMPLE 3
• Introduction to economics course

• 300+ students

• Redesigned in Spring 2013
• You will **learn** about the causes of inflation and unemployment, why economies grow or decline, and what government policy can (and cannot) do to help.

• You’ll **learn** about the history of how we’ve tried to keep the economy stable and growing.

• You’ll **learn** about the effects of war on the economy.

• You'll **learn** how the emerging global economy affects incomes, prices and your job prospects here in the U.S.
AGEC 217: AFTER IMPACT

• **Analyze** the important economic policy issues facing the U.S. using the macroeconomic model and the main economic measurements, such as budget deficits, monetary expansion, health care costs, Social Security finance, recovery from Great Recession, or relations with Europe and China.

• **Describe** the condition of the economy using the main economic measurements: gross domestic product, inflation, unemployment, exchange rates, and interest rates.

• **Predict** the results of economic events or policy changes on the outlook for the economy, using a macroeconomic model.

• **Analyze** the important events in U.S. economic policy history using the macroeconomic model and the main economic measurements, such as bimetallism, the founding of the Fed, the Great Depression, the New Deal, World War II, the Great Inflation, or the Great Recession.

• **Predict** changes in prices and quantities in a market using demand and supply analysis.
BLOOM’S TAXONOMY

- Remember
- Understand
- Apply
- Analyze
- Evaluate
- Create
## EXAM QUESTION DISTRIBUTION

<table>
<thead>
<tr>
<th>Question Taxonomy</th>
<th>2012 Spring</th>
<th>2012 Fall</th>
<th>2013 Fall</th>
<th>2014 Spring</th>
<th>2014 Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>68%</td>
<td>68%</td>
<td>48%</td>
<td>48%</td>
<td>38%</td>
</tr>
<tr>
<td>3 and 4</td>
<td>32%</td>
<td>32%</td>
<td>52%</td>
<td>52%</td>
<td>62%</td>
</tr>
<tr>
<td>Articles (3/4)</td>
<td>2%</td>
<td>0%</td>
<td>18%</td>
<td>30%</td>
<td>34%</td>
</tr>
</tbody>
</table>
Thank you!

Questions?