Developing and Using Curriculum Maps for Department Decision-making

Boise State University
Tuesday, September 14, 2010

Virginia S. Lee, Ph.D.
Virginia S. Lee & Associates, LLC
Session Schedule

- Introductions
- First Case Study
- Backward Design in Curriculum Development
- Intended Student Learning Outcomes
- The Role of Curriculum Maps and Some Examples
- How to Develop a Curriculum Map
- Second Case Study
- Additional Questions and Concerns
A Case Study: The Paper Science & Engineering Program at NC State University

TEACHING & LEARNING THROUGH INQUIRY

A GUIDEBOOK FOR INSTITUTIONS & INSTRUCTORS

EDITED BY VIRGINIA S. LEE
## Abbreviated Paper Science & Engineering Program-level Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Apply critical-thinking skills &amp; knowledge</td>
<td>Define &amp; analyze a problem; identify pertinent information &amp; apply effective search procedures; apply fundamental understanding of basic sciences; synthesize &amp; critically evaluate information and generate a solution; communicate solution in way appropriate to the audience</td>
</tr>
<tr>
<td>to solve problems related to the paper science &amp; engineering field</td>
<td></td>
</tr>
<tr>
<td>2. Apply broad perspective to the paper industry &amp; its relationship to society &amp; environment</td>
<td>Accurately and objectively describe role of paper industry in society; apply a strong sense of ethics to issues associated with the industry</td>
</tr>
<tr>
<td>3. Develop skills for being a successful professional</td>
<td>Communicate effectively as professionals; capably use computer technology; articulate their worth as professionals; work effectively in teams; seek out educational opportunities for professional growth</td>
</tr>
</tbody>
</table>
WPS 415 Senior Research Problems
Course Outcomes

- Clearly define a technical problem
- Perform a literature search on a problem
- Develop an experimental design
- Collect a consistent set of experimental data
- Analyze the experimental data
- Make oral and written presentation results
WPS 415 Senior Research Problems Assignments

- **Written reports:** project proposal including literature search; progress report; final report; project logbook summary

- **Oral Presentations:** project proposal (member 1); progress report (member 2); final report (member 3).

- **Homework Assignments**
## Results of Performance on Proposal and Final Report

<table>
<thead>
<tr>
<th>Component</th>
<th>Needs Improvement</th>
<th>Competent</th>
<th>Proficient</th>
<th>Exemplary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designs &amp; conducts experiments for gathering necessary data</td>
<td>14.2%</td>
<td>42.9%</td>
<td>42.9%</td>
<td>0%</td>
</tr>
<tr>
<td>Synthesizes, analyzes, &amp; critically evaluates data to generate a solution</td>
<td>42.9%</td>
<td>42.9%</td>
<td>14.2%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Major Shortcomings in Student Performance

- Did not define variables and levels in a way that was clear to readers.
- In data analysis, did not relate findings to those obtained by other investigators.
- In data analysis, did not relate findings back to problem being addressed.
- Exhibited little effort to come up with solutions to problems, based on findings.
- Drew only cursory conclusions from data, which were not related to problem being addressed.
- Exhibited minimal effort to use findings to recommend future work.
Backward Design

Design Backward

Intended Learning Outcomes of the Lesson

Intended Learning Outcomes of the Unit

Intended Learning Outcomes of the Course

Intended Learning Outcomes of the Academic Program

Intended Learning Outcomes of the Institution

Deliver Forward

Intended Learning Outcomes

- State in specific terms what students will know, be able to do, or value at the end of a lesson, unit, course, program, or entire undergraduate experience.
Program-level Outcomes: History

- Pose an interesting research question about history.
- Locate relevant primary and secondary sources for investigating a research question.
- Critically evaluate primary and secondary sources in terms of credibility, authenticity, interpretive stance, audience, potential biases, and value for answering the research question.
- Marshall the evidence from the research to support a historical argument for an answer to a research question.
Program-level Outcomes: Art & Design

- Understand basic design principles, concepts, media, and formats in various fine arts disciplines.
- Master basic foundation techniques, particularly as related to specific fine arts fields.
- Conceive, design, and create works in one or more specific fine arts fields.
- Demonstrate a working knowledge of various production methods and their relationship to conceptualization, development, and completion of works of art.
- Understand the similarities, differences, and relationships among the various fine arts fields.
Program Learning Outcomes Rubric
Curriculum Mapping

- A method to align instruction in courses with desired program-level outcomes and to support decision making about the curriculum.
Curriculum Mapping: Benefits

- Improves program coherence.
- Increases the likelihood that students achieve program level outcomes.
- Documents what is taught and when.
- Reveals gaps and redundancies in the curriculum.
- Assists the program in making informed decisions regarding the curriculum.
- Helps design an assessment plan.
### Sample Curriculum Map: Overview

<table>
<thead>
<tr>
<th>LEARNING OUTCOMES</th>
<th>REQUIRED COURSES</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Properly documents references and citations in APA style.</em></td>
<td>101</td>
</tr>
<tr>
<td>Demonstrate oral presentation skills appropriate to the field of psychology.</td>
<td>X</td>
</tr>
<tr>
<td>Demonstrate knowledge of the historical context of the field of psychology.</td>
<td>X</td>
</tr>
<tr>
<td>Demonstrate knowledge of the biological bases of behavior and development.</td>
<td>X</td>
</tr>
<tr>
<td>Outline the major ideas behind the individual differences perspective.</td>
<td>X</td>
</tr>
<tr>
<td>Distinguish between major statistical tests and be able to choose appropriate tests for specific data sets.</td>
<td>X</td>
</tr>
<tr>
<td>Selects methodology appropriate to a particular research question generated by the student.</td>
<td>X</td>
</tr>
<tr>
<td>Demonstrates an understanding of the ethical principles of psychology as established by the APA.</td>
<td>X</td>
</tr>
<tr>
<td>Evaluates real world examples in terms of course content and knowledge, applying critical thinking skills.</td>
<td>X</td>
</tr>
</tbody>
</table>
Sample Curriculum Map: Levels

Levels Curriculum Map Example

<table>
<thead>
<tr>
<th>LEARNING OUTCOMES</th>
<th>REQUIRED COURSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(I = Introduce; D = Developing; M = Mastering)</td>
<td>101</td>
</tr>
<tr>
<td>Properly documents references and citations in APA style.</td>
<td>I</td>
</tr>
<tr>
<td>Demonstrates oral presentation skills appropriate to the field of psychology.</td>
<td>I</td>
</tr>
<tr>
<td>Demonstrate knowledge of the historical context of the field of psychology.</td>
<td>I</td>
</tr>
<tr>
<td>Demonstrate knowledge of the biological bases of behavior and development.</td>
<td>I</td>
</tr>
<tr>
<td>Outline the major ideas behind the individual differences perspective.</td>
<td>I</td>
</tr>
<tr>
<td>Distinguish between major statistical tests and be able to choose appropriate</td>
<td>I</td>
</tr>
<tr>
<td>Selects methodology appropriate to a particular research question generated by</td>
<td>I</td>
</tr>
<tr>
<td>Demonstrates an understanding of the ethical principles of psychology as</td>
<td>I</td>
</tr>
<tr>
<td>Evaluates real world examples in terms of course content and knowledge,</td>
<td>I</td>
</tr>
<tr>
<td>applying critical thinking skills.</td>
<td>I</td>
</tr>
</tbody>
</table>
Alignment of Outcomes in Paper Science & Engineering Program

Program-level Outcome: Apply critical thinking skills and knowledge to solve problems in paper science and engineering fields.

WPS 100
• Begin to synthesize, analyze and critically evaluate information in a series of introductory projects

WPS 201
• Learn how to extract information from literature
• Approach, critically evaluate, and solve complex process engineering problems

WPS 415
• Clearly define a technical problem
• Perform a literature search on a problem
• Develop an experimental design
• Collect a consistent set of experimental data
• Synthesize, analyze and critically evaluate the experimental results
## Sample Curriculum Map: Assignments

<table>
<thead>
<tr>
<th>Outcome/Course</th>
<th>Course One</th>
<th>Course Two</th>
<th>Course Three</th>
<th>Course Four</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome 1</strong></td>
<td>Test Question</td>
<td>Test Question</td>
<td>Essay Question</td>
<td>Paper</td>
</tr>
<tr>
<td><strong>Outcome 2</strong></td>
<td></td>
<td>Essay Question</td>
<td>Paper</td>
<td>Project</td>
</tr>
<tr>
<td><strong>Outcome 3</strong></td>
<td></td>
<td>Paper/Rubric</td>
<td>Project</td>
<td>Project</td>
</tr>
<tr>
<td><strong>Outcome 4</strong></td>
<td></td>
<td></td>
<td>Paper</td>
<td>Interview</td>
</tr>
</tbody>
</table>
Developing and Using a Curriculum Map

- Develop/confirm program-level student learning outcomes.
- List recommended and required courses, including Core/LFL courses.
- Create the map in the form of a table.
- Mark courses that currently address these outcomes indicating the level at which the outcomes are addressed (and how they are assessed, if you wish).
- Analyze the map, noting gaps, redundancies, and areas where additional information is needed.
- Gather additional information including evidence related to student achievement of the outcomes.
- Use the map to make decisions about the program’s curriculum and assess its effectiveness.
Program-level Outcomes: Hypothetical Department

- Become a scientifically literate citizen able to apply scientific understanding to everyday societal problems and inform fellow citizens.

- To understand post-graduate career and educational opportunities.
### Hypothetical Department Curriculum Map

<table>
<thead>
<tr>
<th>Course/Outcome</th>
<th>Com I</th>
<th>Math I</th>
<th>SCI 101</th>
<th>SCI 201</th>
<th>SCI 202</th>
<th>SCI 300</th>
<th>SCI 301</th>
<th>SCI 400</th>
<th>SCI 401</th>
<th>SCI 500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific Method</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M</td>
</tr>
<tr>
<td>Facts &amp; Theory</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M</td>
</tr>
<tr>
<td>Oral/written sks</td>
<td>XO</td>
<td></td>
<td>X</td>
<td>W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>WWO</td>
</tr>
<tr>
<td>Info Literacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
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<td>M</td>
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<tr>
<td>Prob Solv in Teams</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M</td>
</tr>
<tr>
<td>Quant &amp; Tech Skls</td>
<td>XQ</td>
<td></td>
<td>X</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>T</td>
<td>M</td>
</tr>
<tr>
<td>Orig Rsrch Projects</td>
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<td></td>
<td></td>
<td>M</td>
</tr>
<tr>
<td>Influence Com’nity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M</td>
</tr>
</tbody>
</table>
Using the curriculum map, consider these questions:

- To what extent does the curriculum appear to address the program-level outcomes?
- Are there some outcomes that are addressed more or less adequately than others?
- What additional information do you need and why do you need it?
Additional Questions or Concerns
Selected Resources

University of Hawaii Manoa Curriculum Mapping/Matrix
http://manoa.hawaii.edu/assessment/howto/mapping.htm

University of West Florida Center for Teaching, Learning and Assessment
http://uwf.edu/cutla/curriculum_map_undergraduate_ALC.cfm

National Institute for Learning Outcomes Assessment
http://www.learningoutcomeassessment.org/Mapping.htm

Please feel free to contact me:

Virginia S. Lee, Ph.D.
Principal & Senior Consultant
Virginia S. Lee & Associates, LLC
P.O. Box 51746
Durham, NC 27717-1746
(919) 493-4729
vslee@virginiaslee.com
http://www.virginiaslee.com