MOVING BACKWARD TO PUSH FORWARD: INCREASING CLASSROOM RIGOR WITH BACKWARD DESIGN PEDAGOGY

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Abstract

As educators we strive for excellence. We often seek to reach higher levels of learning by stating that we have increased rigor. Achieving rigor in the classroom is a laudable goal but as professors are we actually achieving it? Oftentimes we create more work but is creating more work really rigor? It is suggested that “Rigor is creating an environment in which each student is expected to learn at high levels, each student is supported so he or she can learn at high levels, and each student demonstrates learning at high levels” (Blackburn, 2008). In order to identify the effectiveness of classroom structure, it was determined to utilize backward pedagogy.

Backward design pedagogy typically uses three steps: identify the desired outcome, determine how that outcome will be assessed and then plan learning experiences. The backward design option was preferred because procedures were available and a high degree of accountability was required while employing a variety of teaching strategies. The use of benchmarks were required in order to achieve target competencies. Another objective was to seek an approach that could provide a template that could target varying domains of curriculum. This paper discusses the development and implementation of backward design pedagogy in a second year lecture classroom that were used in Engineering Technology and Interior Design courses. Preliminary data show that these techniques helped students see the importance of criterion-referenced assignments and students had a cumulative mastery of the concepts and greatly increased their competencies.

Keywords
Rigor, assessment, curriculum, backward design, pedagogy

INTRODUCTION

With the aim to bridge the gap between the theoretical aspects of interest about building materials and sustainable concepts and the practical aspect of creating specifications backward design pedagogy was utilized. Backward design pedagogy typically uses three steps: identify the desired outcome, determine how that outcome will be assessed and then plan learning experiences (Wiley, 2016; Blackburn, 2008; Wiggins, G. & McTighe, J. 2005). The aim of the backward design used in this second year lecture class utilized a variety of assignments within a semester long project. A desired outcome was specific competencies in material selection and specification. Based on accreditation standards student work must demonstrate understanding of concepts, principles, and theories of sustainability as they pertain to building methods, materials,
systems, and occupants. Students must also understand the implications of conducting the practice of design in a world context, how design needs may vary for different socio-economic stakeholders, be exposed to contemporary issues affecting design, exposure to a variety of business, organizational, and familial structures and opportunities for developing knowledge of other cultures. Students must select and apply materials and products on the basis of their properties and performance criteria, including environmental attributes and life cycle cost. (CIDA, 2014). Using these accreditation standards as a goal, a variety of benchmarks were used in order to achieve the desired target competencies.

**METHODOLOGY**

Students were given individual and team assignments relative to specifications, sustainability, interior and exterior building materials and cultural diversity. Other than the final project assignments were designed to be done in less than a week but with each increasing in intensity. An objective was to strengthen competencies in specifications related to industry codes and standards while broadening student knowledge of building material use in other countries. Students selected two assigned regions of the world to build / live within this home with two different levels of income. They were required to provide basic information on how to construct the house and then all the materials and finishes used. Much emphasis was placed on selection criteria for these material selections including codes, standards, and regulations. All resources had to be obtainable within a 300 radius of selected regions. Students were required to interview a family from the region using the help from the university multicultural center. Interview questions and responses as well as documentation of any communication were an important component of the assignment. Deliverables included completed selection criteria, specification pages, formal specifications and material safety data sheets and cut sheets. As part of their final presentations, students were required to provide a narrative of the region and family selected, why resources were chosen, sustainability and how the materials reflected the region and its culture.

Student assessment utilized rubrics for Bloom’s Taxonomy, university quality enhancement plan INtopFORM (INtopFORM, 2017) and College of Business and Technology (CBAT, 2016) formative assessments. Objectives for the desired outcomes were written that addressed behavior, condition and standard. Stated behavior must be observable, measurable, completely reliable and not prone to varying interpretation. Each stated condition must match the task as closely as possible, be realistic, and the application of the condition must be within manageable limits. If no condition was stated then it was generally understood that no special resources, equipment, tools etc. were necessary to complete the performance. Standards must conform as closely as possible to the proficiency required for satisfactory performance or competence in the task. The standard should be understood clearly by all evaluators. The standard should indicate clearly student achievement on either a scored, graded or pass/fail basis (Kraska, 2005).

In Table 1 for performance objectives, the condition is bold, the performance is italicized and the criteria is underlined.
Table 1: Example Performance Objectives

<table>
<thead>
<tr>
<th>Condition</th>
<th>Performance</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Given an elevation</td>
<td>Annotate</td>
<td>Using design terminology</td>
</tr>
<tr>
<td>Given two country cultures</td>
<td>Label the similarities and differences</td>
<td>In a 24x36 Arch D presentation</td>
</tr>
<tr>
<td>Given data collected in the survey</td>
<td>Represent the findings</td>
<td>With Bar Graph</td>
</tr>
<tr>
<td>Given a specification criteria template</td>
<td>Complete specification criteria template</td>
<td>With Life Cycle Cost Analysis</td>
</tr>
<tr>
<td>Given a project schedule</td>
<td>Determine the lead times</td>
<td>For a specific task</td>
</tr>
<tr>
<td>Given Project Online Template</td>
<td>Load presentation</td>
<td>With proper nomenclature and in correct team space</td>
</tr>
<tr>
<td>Given survey assignment</td>
<td>Create questions for interview</td>
<td>That are open ended and can be used for a 30 minute conversation</td>
</tr>
</tbody>
</table>

Table 2:
Table 3:

![Student Progression Chart]

RESULTS AND DISCUSSIONS

Student commented that the transparency of the assignments, structure and clear direction for each assignment provided meaning and emphasis. Students also stated that being told the importance and reason for each assignment had an impact on their attitude and approach to the assignment. They felt like they were more participatory in their education rather than observatory. Students understanding of the contributions of interior design to contemporary society and the importance of design as it pertains to health, safety, and welfare were demonstrated in answers to short answer and essay quizzes as well as final presentations.

Student used ethical and accepted standards of practice in group projects, were committed to professional development and the industry, and demonstrated a sense of giving back to the community. Students gained knowledge of project management through lectures and by completing critical paths assignments, and other methods of project scheduling. This information was applied in program booklets which included goals, objectives, process and justification for project completion in process binders. Students were able to apply the elements of the project management, communication, and delivery methods. Students used time sheets to learn personal time management early in the semester. Students’ selection criteria and specifications employed such tools as low-zero volatile organic compound finishes and materials, indoor plants, biophilic fabrics, antimicrobial materials, and HEPA filters to promote healthy air quality. One of the most significant results was the motivation, detailed nature and
complexity of student outcome even spite of the increased rigor of the assignments.
REFERENCES


College of Business and Technology (2016.) https://www.etsu.edu/cbat/economics/assessment.php

INtopFORM (2016). http://www.etsu.edu/intopform/


