Assessment in the Major

Bachelor of Science Degree in Construction

Academic Year 2009/10

Submitted by

Michael R. Bowman, P.E.
Director, Construction Program

STOUT
UNIVERSITY OF WISCONSIN

October 2010
A. Introduction

This assessment in the major report summarizes the primary methods used to assess student learning and progress through the Construction Program. The Construction Program has fifteen stated objectives relative to student performance in areas of Business Management, Construction and Construction Science. These categories are consistent with the professional subject matter of the American Council for Construction Education (ACCE), the accrediting body of the Program. The objectives are relative to the professional studies of the students and consistent with the skills necessary to be competitive in the construction industry.

B. Method Used and Purpose of the Assessment

Since 1996, the Construction Program has utilized the level 1 Constructor Qualification Examination developed by the American Institute of Constructors (AIC) – Constructor Certification Commission as a tool for program outcome assessment. In 1998 the Construction Program created the mandatory requirement for all graduating seniors to take the examination. This examination receives the support of the American Council for Construction Education (ACCE), which is the accrediting body for the UW-Stout Construction Program, as well as other highly regarded construction education programs throughout the United States. The examination reflects the curriculum content required by the ACCE. UW-Stout has been an ACCE accredited program since 1993.

Currently, 39 universities and colleges require students to take the AIC-Constructor Certification Commission examination, level 1. During fall 2009 and spring 2010, 1,765 students nationwide sat for the exam in the US. This number reflects all students who took the exam, not just the schools that require the exam for graduating seniors.

The AIC-Constructor level 1 examination provides an evaluation of the student’s knowledge related to the content areas of construction, as identified by the AIC-Constructor Certification Commission. Question for the examination are developed by construction industry professionals and submitted to the Constructor Certification Commission for review and inclusion in the exam. The data is utilized for assessment to identify areas of strength and weakness of graduating student from the UW-Stout Construction Program. The exam consists of the following content areas:

1. Communication Skills
2. Engineering Concepts
3. Management Concepts
C. Data Collection and Analysis Techniques

The AIC level-1 exam is comprised of 300 total maximum points. The breakdown consists of approximately 260 multiple choice questions in the ten major content areas listed above. In addition, there are several writing (communication skills) portions of the exam. Students are allotted 8 total hours to complete the exam, broken up into two 4-hour sections on the same day. Validity and reliability have been established for the examination. Successful passing of the exam requires 210 points minimum.

The exam is administered at UW-Stout and other test sites twice a year (fall and spring). The exams are forwarded to the AIC Constructor Certification Commission for grading and processing. Examination results are disseminated to the testing institutions as well as the individual test takers via email or US mail.

Exam results are provided as follows:

- Percent correct in content areas for all examinees nationwide
- Percent correct in content areas for all examinees at UW-Stout
- Percent correct in content areas for each individual UW-Stout student
- Pass/fail results for all examinees nationwide
- Pass/fail results for all UW-Stout students
- Pass/fail results for each individual UW-Stout student

D. Results

A total of 47 and 56 UW-Stout senior Construction Program students sat for the examination for fall 2009 and spring 2010 respectively. The pass rate for UW-Stout students was 67.0% (69/103) for this period. This compares to a pass rate for examinees nationwide of 61.3% (1082/1765) during the same time period. Students exiting the UW-Stout Construction Program as compared to other university construction programs in the US were over 5% more successful in passing the exam.
UW-Stout scored above the national average for both exam dates in the following six content areas:

- Engineering Concepts
- Materials, Methods and Plan Reading
- Bidding and Estimating
- Budgeting, Costs and Cost Control
- Planning, Scheduling and Control
- Surveying and Project Layout

UW-Stout scored above the national average for one exam date in the following two content areas:

- Management Concepts (spring 2010)
- Construction Safety (spring 2010)

UW-Stout scored below the national average for both exam dates in the following two content areas:

- Communication Skills
- Project Administration

Comparing the average of the “Average Total Scores” for both exam dates (Table 1 and Table 2), between UW-Stout (216.6) and the national average (215.1), UW-Stout scored approximately 1.5% higher.

Caution should be exercised in interpreting the results of the examination for only one semester. The combined scores of both exam dates are used to identify the areas of possible weakness. Refer to Tables 1 and 2 for the actual scores and differences for fall 2009 and spring 2010 respectively, and Table 3 for the weighted average difference of average scores in each content area between UW-Stout and the national average.

Using the combined scores for fall 2009 and spring 2010 for each content area, a comparison was made looking at the difference between UW-Stout and the national averages. This indicates possible areas of weakness in UW-Stout students. For this assessment, areas of possible weakness could be:

- Communication Skills ( -0.18 )
- Project Administration ( -1.54 )
E. Sharing of Results

The goal of the UW-Stout Construction Program is to score at or above the national average in all content areas. A significant drop in score may indicate a need to re-assess course content, assignments, delivery and assessment. Construction faculty and staff discuss the results of the AIC examinations twice a year in conjunction with the Industry Advisory Board meetings. This takes place in the curriculum committee and is reported back to the general board and Program faculty.

In addition, Construction Program faculty and instructional staff are required to develop a list of annual accomplishments in the spring of each academic year, as well as a list of goals in the fall of each academic year. Faculty are encouraged to work with stakeholders and the assessed AIC examination information in order to develop curriculum goals relative to the courses each faculty is the lead instructor for.

F. Plans for Improvement

Communication has been a skill set that UW-Stout Construction Program students have performed poorly on for multiple assessment cycles. Faculty have implemented additional course requirements such as developing construction proposals, presentation of the student co-op experiences, presentations in class to peers, as well as service learning activities with many of the courses. Students participate in student competitions where they develop real-world proposals and present them to industry partners. While the communication skill set according to the AIC results seems to indicate a weakness, the examination only tests on written communication skills.

Faculty have been encouraged to require students to submit all course assignments under memo or letter cover. In addition, many course instructors have now implemented a semester project in which students must submit a final professional proposal. The Program will monitor these techniques within the upcoming academic year to analyze the effectiveness of introducing new material into the courses.

Project Administration, the second cited potential weakness, has been discussed at the fall 2010 advisory board committee level. Key stakeholders for the Construction Program are willing to offer assistance to instructors by providing additional guest-lecturers on this topic. A measure is in place as of October 2010 to have Industry Advisory Board members submit a list of strengths to which their company could provide material on the topic.
G. Final Summary

The results indicate that UW-Stout students pass rates are above the national average and that UW-Stout are excelling in 8 out of 10 critical concept areas related to UW-Stout Construction Program objectives and the AIC Constructor Level 1 criteria. While Program stakeholders will continue to work on offering a quality program which meets the needs of industry, the Construction Program and students can be considered a success overall. Efforts are in place to address potential weaknesses at the source and process of continuous quality improvement is developing.
<table>
<thead>
<tr>
<th>Content Areas</th>
<th>UW-Stout (n=47)</th>
<th>National Average (n=633)</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Communication Skills</td>
<td>10.74</td>
<td>10.91</td>
<td>0.17</td>
</tr>
<tr>
<td>2. Engineering Concepts</td>
<td>20.00</td>
<td>19.29</td>
<td>0.71</td>
</tr>
<tr>
<td>3. Management Concepts</td>
<td>9.47</td>
<td>9.65</td>
<td>0.18</td>
</tr>
<tr>
<td>4. Materials, Methods, and Plan Reading</td>
<td>22.30</td>
<td>22.13</td>
<td>0.17</td>
</tr>
<tr>
<td>5. Bidding and Estimating</td>
<td>33.28</td>
<td>33.28</td>
<td>0.00</td>
</tr>
<tr>
<td>6. Budgeting, Cost and Cost Control</td>
<td>23.17</td>
<td>22.84</td>
<td>0.33</td>
</tr>
<tr>
<td>7. Planning, Scheduling and Control</td>
<td>35.53</td>
<td>34.48</td>
<td>1.05</td>
</tr>
<tr>
<td>8. Construction Safety</td>
<td>16.55</td>
<td>16.81</td>
<td>0.26</td>
</tr>
<tr>
<td>9. Surveying and Project Layout</td>
<td>4.96</td>
<td>4.86</td>
<td>0.10</td>
</tr>
<tr>
<td>10. Project Administration</td>
<td>38.00</td>
<td>40.21</td>
<td>2.21</td>
</tr>
</tbody>
</table>

Average Total Score 214.00 214.46 (0.46)

Highest Total Score 262 277 (15.00)

Lowest Total Score 140 89 51.00

Passed 61.7% 60.2% (n=29) (n=381)

Failed 38.3% 39.8% (n=18) (n=252)
### TABLE 2
CONSTRUCTOR QUALIFICATION EXAMINATION LEVEL 1
CONSTRUCTION FUNDAMENTALS
MARCH 2010

#### Average Scores

<table>
<thead>
<tr>
<th>Content Areas</th>
<th>UW-Stout (n=56)</th>
<th>National Average (n=1132)</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Communication Skills</td>
<td>10.68</td>
<td>10.87</td>
<td>(0.19)</td>
</tr>
<tr>
<td>2. Engineering Concepts</td>
<td>20.52</td>
<td>19.13</td>
<td>1.39</td>
</tr>
<tr>
<td>3. Management Concepts</td>
<td>10.05</td>
<td>9.51</td>
<td>0.54</td>
</tr>
<tr>
<td>4. Materials, Methods, and Plan Reading</td>
<td>23.25</td>
<td>23.13</td>
<td>0.12</td>
</tr>
<tr>
<td>5. Bidding and Estimating</td>
<td>36.05</td>
<td>35.63</td>
<td>0.42</td>
</tr>
<tr>
<td>6. Budgeting, Cost and Cost Control</td>
<td>22.11</td>
<td>21.76</td>
<td>0.35</td>
</tr>
<tr>
<td>7. Planning, Scheduling and Control</td>
<td>36.38</td>
<td>35.54</td>
<td>0.84</td>
</tr>
<tr>
<td>8. Construction Safety</td>
<td>16.43</td>
<td>15.92</td>
<td>0.51</td>
</tr>
<tr>
<td>9. Surveying and Project Layout</td>
<td>4.80</td>
<td>4.55</td>
<td>0.25</td>
</tr>
<tr>
<td>10. Project Administration</td>
<td>38.96</td>
<td>39.83</td>
<td>(0.87)</td>
</tr>
</tbody>
</table>

#### Average Total Score
- **UW-Stout (n=56):** 219.23
- **National Average (n=1132):** 215.87
- **Difference:** 3.36

#### Highest Total Score
- **UW-Stout (n=56):** 271
- **National Average (n=1132):** 278
- **Difference:** (7.00)

#### Lowest Total Score
- **UW-Stout (n=56):** 166
- **National Average (n=1132):** 93
- **Difference:** 73.00

#### Passed
- **UW-Stout (n=40):** 71.4%
- **National Average (n=701):** 61.9%

#### Failed
- **UW-Stout (n=16):** 28.6%
- **National Average (n=431):** 38.1%
TABLE 3
CONSTRUCTOR QUALIFICATION EXAMINATION LEVEL 1
CONSTRUCTION FUNDAMENTALS

COMBINED DIFFERENCE OF AVERAGE SCORES BETWEEN NATIONAL AVERAGE AND UW-STOUT
FALL 2009 AND SPRING 2010

<table>
<thead>
<tr>
<th>Content Areas</th>
<th>Fall 2009</th>
<th>Spring 2010</th>
<th>Weighted Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Communication Skills</td>
<td>(0.17)</td>
<td>(0.19)</td>
<td>(0.18)</td>
</tr>
<tr>
<td>2. Engineering Concepts</td>
<td>0.71</td>
<td>1.39</td>
<td>1.05</td>
</tr>
<tr>
<td>3. Management Concepts</td>
<td>(0.18)</td>
<td>0.54</td>
<td>0.18</td>
</tr>
<tr>
<td>4. Materials, Methods, and Plan Reading</td>
<td>0.17</td>
<td>0.12</td>
<td>0.15</td>
</tr>
<tr>
<td>5. Bidding and Estimating</td>
<td>0.00</td>
<td>0.42</td>
<td>0.21</td>
</tr>
<tr>
<td>6. Budgeting, Cost and Cost Control</td>
<td>0.33</td>
<td>0.35</td>
<td>0.34</td>
</tr>
<tr>
<td>7. Planning, Scheduling and Control</td>
<td>1.05</td>
<td>0.84</td>
<td>0.95</td>
</tr>
<tr>
<td>8. Construction Safety</td>
<td>(0.26)</td>
<td>0.51</td>
<td>0.13</td>
</tr>
<tr>
<td>9. Surveying and Project Layout</td>
<td>0.10</td>
<td>0.25</td>
<td>0.18</td>
</tr>
<tr>
<td>10. Project Administration</td>
<td>(2.21)</td>
<td>(0.87)</td>
<td>(1.54)</td>
</tr>
</tbody>
</table>

The weighted average difference for both exam dates was negative for two content areas:

- Communication Skills (0.18)
- Project Administration (1.54)