Value Added: Demonstrating Student Skill Development at Your Institution

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Published: 01/01/2017

Document Version:
Peer reviewed version

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Recommended citation(APA):

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This 4-year longitudinal study focused on the assessment of cognitive skills (critical thinking, problem solving), written communication, and meta-cognitive dispositions (learning efficacy). Investigation of student skill development was undertaken using standardized tests, and course artefacts (assignments) were scored independent of course grading, using meta-rubrics. A learning orientation survey was developed as a reflective tool for students and diagnostic tool for instructors. Researchers worked with course instructors to align teaching and assessment of skills and to evaluate the utility of the instruments used.

It was valuable to quantify student skill development as a comparative measure to understand how skill development at Queen’s compares to institutional averages. The data were also used to inform efforts in redeveloping assessments in courses to improve student learning. The most successful strategy was to engage students with assignments that specifically targeted the breadth of the critical thinking and problem solving dimensions. Focus groups with instructors suggested that feedback from the rubric scoring was most helpful for them, also recognized benefits in more generalizable measures.

**CRITICAL THINKING ASSESSMENT TEST (CAT)**
A short-answer essay based standardized test intended to measure problem-solving and critical-thinking by posing questions related to real-world topics.

**COLLEGIATE LEARNING ASSESSMENT (CLA+)**
An online standardized test created for the purpose of measuring scientific reasoning, critical reading and evaluation, problem-solving and critiquing arguments assessed skills in higher education.

**VALID ASSESSMENT OF LEARNING IN UNDERGRADUATE EDUCATION (VALUE) RUBRICS**
Scoring guides to be used as a comparative measure of student artifacts across institutions. Those of the VALUE rubrics were used - critical thinking, problem solving and written communication.

**TRANSFERABLE LEARNING ORIENTATIONS SURVEY (TLO)**
The survey was developed as a self-evaluation of learning orientations with the goal of developing strategies for lifelong learning.

**Learning Outcomes Assessment and Program Improvement**

- **SKILLS**
  - Critical thinking
  - Problem solving
  - Written communication

- **Assessment Instruments**
  - Motivation
  - Learning belief
  - Self-efficacy
  - Transfer
  - Organization

**Achievement on Standardized Tests from First to Final Year by Bachelor program**

- **Taxonomic Analysis of CAT scores**
  - CAT: Total score mean
  - CLA+: Total score mean

**Achievement on Rubrics by Year Group and Assignment Type**

- **VALUE rubric average**
  - Design Lab (n=30)
  - Exam Question (n=26)
  - Design Report (n=20)
  - Performance Task A (n=26)
  - Performance Task B (n=25)
  - Design Project (n=25)
  - Proposal & Exam (n=15)
  - Thesis (n=15)

**Improvements to Course Assessment**

- **First-year courses**
  - Redesigned the final lab for open-ended problem solving
  - Redesigned the final exam to include a 4th-year leadership component

- **Second-year courses**
  - Modified mini-lab with rubric review - target critical thinking
  - Redesigned the course to incorporate an “argumentation” component

- **Third-year courses**
  - Redesigned lab to include assessment rubrics
  - Modified assignment and research essay to directly assess critical thinking

- **Fourth-year courses**
  - Developed new course with an authentic multi-part group task aligned with critical thinking and problem solving
  - Converted to “design lab”
  - Redesigned project evaluation to focus specifically on critical thinking
  - Moved to specific assessment of critical thinking in the four-year field work unit

**Conclusions**

- **CLA+ and CAT scores demonstrated significant improvement from first to final year, primarily because the first-year testing was conducted in scheduled course, which was not possible for the fourth-year students. This problem has been identified in prior CLA studies, and reflects the significant disadvantage of standardized tools compared to using VALUE rubrics and-i-class artefacts.**
- **Correlations between critical thinking and communication dimensions measured on the CLA+, CAT and VALUE rubrics were low, but significant.**
- **The cost of implementing the VALUE rubric marking was approximately 9% that of the CLA+ testing and 3% of CAT testing and marking.**
- **The CLA+ results provide an ability to compare institutional performance with other schools. This is not possible with VALUE rubric scoring without common training and calibration procedures.**