The Assessment of Writing Ability at a Science and Technology University

Norbert Elliot, PhD
Professor and Chair, NJIT Self Study

Perry Deess, PhD
Director, Institutional Research and Planning

Middle States Commission on Higher Education
2010 Annual Conference
December 10, 2010
The Contemporary Environment

“While in the past campuses were left to determine the quality of effort they would direct to assessing student learning, the time has come for a systematic analysis of what institutions of varying levels of organizational and programmatic complexity should invest to do assessment right and to ensure the results are used appropriately.”
The Contemporary Environment
Relationships: Student Learning Assessment at NJIT
The NJIT Community

- Founded in 1881, NJIT is New Jersey’s public, technological research university.
- Carnegie Classification: Doc/STEM: Doctoral, STEM dominant; RU/H: Research Universities (high research activity)
- Degree programs: 46 bachelor, 45 master, 19 doctoral
- Undergraduate enrollment: 6,103
- Graduate enrollment: 2,831
The NJIT Approach to Assessment of Student Learning

Dr. Ian Gatley, Provost

The Provost and Senior Vice President for Academic Affairs is the senior academic administrator of NJIT. The deans of five colleges at NJIT report to the provost, as does the University Librarian, the Dean of Graduate Studies, and the Associate Provost for Information Services & Technology (CIO).
The NJIT Approach: Core Values

• We hold these Core Values to be at the center of all that we do in academic affairs at NJIT:
  – We believe that education is a lifelong activity.
  – We believe in answering the call of service in a variety of community settings.
  – We believe in the exercise of leadership in both professional and citizenship activities.
  – We believe in the application of technology to improve quality of life.
  – We encourage a sense of entrepreneurial inquiry to foster creative growth.
  – We uphold a sense of civility that embraces respect and candor.
  – We celebrate diversity in all cultural contexts.
The NJIT Approach: Institutional Learning Goals

• As students seek disciplinary mastery, they will achieve skills and knowledge in these areas:
  – Research-based Inquiry: Students employ investigative methods.
  – Ethical Conduct: Students understand professional and civic responsibility.
  – Economic Opportunity: Students understand economic reasoning and demonstrate that they are able to allocate resources effectively and logically under operating constraints.
  – Collaboration: Students work effectively in teams to engage multidisciplinary perspectives.
  – Engagement: Students are active and committed learners.
The NJIT Approach: Institutional Learning Goals & The Program Assessment Process
The NJIT Approach: Documentation of Institutional Learning Goals

NJIT Programs Review Report
http://www.njit.edu/umlites/stud_learning

Date of Report Posting: October 29, 2010
Degree or Program Designation: BSEE/BSE

1. How does the program incorporate the Institutional Level Learning Goals (ILLOs) into the Program Level Learning Goals (PLLOs)?

2. How does the program incorporate the PLLOs into the Course Level Goals (CLLOs)?

3. Describe the assessment design and how it has been implemented.

4. What are the results of the assessment and to what extent do these results match student learning goals?

5. How are assessment results used to implement change?

6. How do program administrators assess the sustainability of the student learning assessment process?

NJIT
New Jersey's Science & Technology University

THE EDGE IN KNOWLEDGE
The NJIT Approach to Assessment of Student Learning: Core Competencies

- As all students experience general university requirements, we measure these Core Competencies to support the improvement of student learning:
  - Writing, Reading, and Critical Thinking
  - Quantitative Reasoning
  - Information Literacy
The NJIT Approach: National Comparison & Locally-Developed Assessment
Writing Ability: Core Competency, Unifying Construct, and Mediated Experience

Writing ability is a core competency for students in a twenty-first century global environment.

Sensitive to aim, audience, and genre, writing ability is a unifying construct in academic and non-academic settings.

Writing ability is mediated by digital environments.
Coment: Definition

- Determined within a specific institutional setting, a core competency is defined as student performance on a construct observed within a setting designed to elicit both controlled and typical application.
Construct: Definition

- A construct is some postulated attribute of people, assumed to be reflected in test performance. In test validation, the attribute about which we make statements in interpreting a test is a construct.” Cronbach & Meehl, 1955

- Additionally, contemporary science is characterized by “the ongoing, comprehensive process of critical evaluation of all phases of scientific inquiry.” Smith, 2005

The construct validity in psych is the process of establishing the correspondence of a test with the construct it is intended to measure. This involves the use of various techniques, such as correlation, regression, and factor analysis, to determine whether the test scores are associated with the theoretical construct. Cronbach & Meehl, 1955

Smith, 2005
Mediation: Definition

• Transparent digital applications seek to get to the real by bravely denying the fact of mediation; digital hypermedia seek the real by multiplying mediation so as to create a feeling of fullness, a satiety of experience, which can be taken as reality.” Bolter & Grusin, 2000.

• Digital design must always provide users with an experience, even as it conveys information.” Bolter & Gromala, 2005.
Example: Undergraduate Work

Blog and Podcast

ePortfolio
Example: Graduate Work

Collaborative Wiki

ePortfolio
The Empirical Test: Inter-Reader Reliability for First-Year Writing

<table>
<thead>
<tr>
<th>INDICATORS</th>
<th>Need Adj.</th>
<th>Non-Adj. r</th>
<th>Adj. r</th>
<th>Non-Adj. $\kappa$</th>
<th>Adj. $\kappa$</th>
<th>Need Adj.</th>
<th>Non-Adj. r</th>
<th>Adj. r</th>
<th>Non-Adj. $\kappa$</th>
<th>Adj. $\kappa$</th>
<th>Need Adj.</th>
<th>Non-Adj. r</th>
<th>Adj. r</th>
<th>Non-Adj. $\kappa$</th>
<th>Adj. $\kappa$</th>
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<tbody>
<tr>
<td>1. Critical Thinking</td>
<td>7 (4%)</td>
<td>.522*</td>
<td>.622*</td>
<td>.343**</td>
<td>.408**</td>
<td>4 (3%)</td>
<td>.684*</td>
<td>.76*</td>
<td>.518**</td>
<td>.583**</td>
<td>17 (11%)</td>
<td>.503*</td>
<td>.71*</td>
<td>.515**</td>
<td>.704**</td>
</tr>
<tr>
<td>2. Revising and Editing</td>
<td>26 (14%)</td>
<td>.412*</td>
<td>.711*</td>
<td>.281**</td>
<td>.494**</td>
<td>15 (14%)</td>
<td>.541*</td>
<td>.78*</td>
<td>.37**</td>
<td>.538**</td>
<td>36 (24%)</td>
<td>.498*</td>
<td>.822*</td>
<td>.393**</td>
<td>.817**</td>
</tr>
<tr>
<td>3. Content and Organization</td>
<td>9 (5%)</td>
<td>.537*</td>
<td>.651*</td>
<td>.329**</td>
<td>.407**</td>
<td>4 (4%)</td>
<td>.62*</td>
<td>.722*</td>
<td>.448**</td>
<td>.512**</td>
<td>17 (11%)</td>
<td>.548*</td>
<td>.72*</td>
<td>.566**</td>
<td>.72**</td>
</tr>
<tr>
<td>4. Sentence Construction and Mechanics</td>
<td>7 (4%)</td>
<td>.621*</td>
<td>.665*</td>
<td>.362**</td>
<td>.396**</td>
<td>10 (10%)</td>
<td>.456*</td>
<td>.661*</td>
<td>.448**</td>
<td>.512**</td>
<td>12 (8%)</td>
<td>.526*</td>
<td>.679*</td>
<td>.525**</td>
<td>.676**</td>
</tr>
<tr>
<td>5. Holistic Score</td>
<td>11 (6%)</td>
<td>.582*</td>
<td>.67*</td>
<td>.406**</td>
<td>.458**</td>
<td>5 (5%)</td>
<td>.667*</td>
<td>.764*</td>
<td>.472**</td>
<td>.531**</td>
<td>14 (9%)</td>
<td>.587*</td>
<td>.712*</td>
<td>.523**</td>
<td>.711**</td>
</tr>
</tbody>
</table>

* ($p < .01$)
** ($p < .0001$)
The Empirical Test: Internal Consistency for First Year Writing

- Fall 2008: $R^2 = .75$, $F(4, 176) = 134.364, \rho < .001$
- Spring 2009: $R^2 = .9$, $F(4, 98) = 102.623, \rho < .001$
- Fall 2009: $R^2 = .82$, $F(4, 143) = 163.07, \rho < .001$
- Spring 2010: $R^2 = .86$, $F(4, 76) = 118.92, \rho < .001$
The Empirical Test: Performance for First Year Writing

Fall 2009

<table>
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<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<td>Critical Thinking</td>
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<td>3</td>
<td>12</td>
<td>7.64</td>
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<td>11</td>
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<td>1.647</td>
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<td>Writing Holistic Score</td>
<td>152</td>
<td>2</td>
<td>12</td>
<td>7.43</td>
<td>1.861</td>
</tr>
</tbody>
</table>
The Extension of Writing Ability: Information Literacy

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The NJIT Information Literacy Campaign: Institute Plan, Course Reports, & Instructor Reports

New Jersey Institute of Technology

INSTITUTE INFORMATION LITERACY PLAN

APPROVED BY THE COMMITTEE ON ACADEMIC AFFAIRS
May 20, 2009

PREPARED BY THE INFORMATION LITERACY SUBCOMMITTEE OF THE UNDERGRADUATE CURRICULUM REVIEW COMMITTEE (UCRC)

UCRC Information Literacy Survey – March 2008

PROGRAM/SPECIALIZATION: Biomedical Engineering
Faculty contact: Tareen L. Arianzeh

For each program (or specialization), list required (core elective) course number and title in order of the information literacy competencies in course mapping. For each course listed, give:
1. A copy of the UCRC approved coursework with the relevant portions highlighted and notes to which outcomes are linked
2. Select one sample syllabus showing relevant assignments
3. A description of course assessments used
4. Graded, sample course where an information literacy component could be learned

<table>
<thead>
<tr>
<th>OUTCOMES</th>
<th>REQUIRED COURSES MEETING OUTCOME (course # &amp; title)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Evaluate information</td>
<td>BIHE 201 – Electrical Fundamentals of Home Engineering, BIHE 430 – Biomedical Computing, BIHE 450 – Mechnomaterials and Biocomposites, BIHE 470 – Biomechanics I</td>
</tr>
</tbody>
</table>

1. University objectives
2. Programmatic Course Objectives
3. Course Descriptions
4. Evaluation of Learning Outcomes Assessment
5. Data on location of the site
6. Results and Discussion
7. Follow-up

NJIT
New Jersey’s Science & Technology University

THE EDGE IN KNOWLEDGE
The NJIT Information Literacy Campaign: Experimental Studies

The Assessment of Information Literacy: A Case Study

Irvin R. Katz
Norbert Elliot
Yigal Attali
Davida Scharf
Donald Powers
Heather Huey
Kamal Joshi
Vladimir Briller

June 2008
ETS RR-08-33

Direct Assessment of Information Literacy using Writing Portfolios

by Davida Scharf, Norbert Elliot, Heather A. Huey, Vladimir Briller, and Kamal Joshi

In the American Library Association, an important part of the nation's higher education agenda, faculty, librarians, and administrators need to evaluate the information literacy skills of students. This paper examines the need.

An investigation into the effectiveness of information literacy instruction for undergraduates at a technological university suggested some deficiencies in students' information literacy skills. Also shown is that a careful and rigorous approach to assessment can provide the basis for improvement.

Direct Assessment of Information Literacy using Writing Portfolios

Davida Scharf is Director of Reference and Instruction, New Jersey Institute of Technology, USA.

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While academic librarians have always been defining and characterizing information literacy, academic assessment methods have evolved. The need for an assessment tool that is a statistically valid and reliable instrument is increasingly important as part of the nation's higher education agenda. Faculty, librarians, and administrators need to evaluate the information literacy skills of students. This paper examines the need.

An investigation into the effectiveness of information literacy instruction for undergraduates at a technological university suggested some deficiencies in students' information literacy skills. Also shown is that a careful and rigorous approach to assessment can provide the basis for improvement.
Experimental Studies: Score Improvement

Spring 2005

<table>
<thead>
<tr>
<th>Means, Standard Deviations, and Range for the Two Assessment Models</th>
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<tbody>
<tr>
<td><strong>The information literacy variables</strong></td>
</tr>
<tr>
<td>Independent variables</td>
</tr>
<tr>
<td>1. Citation</td>
</tr>
<tr>
<td>2. Evidence of independent research</td>
</tr>
<tr>
<td>3. Appropriateness</td>
</tr>
<tr>
<td>4. Integration</td>
</tr>
<tr>
<td>Dependent variable</td>
</tr>
<tr>
<td>5. Overall information literacy portfolio score</td>
</tr>
</tbody>
</table>

| **The writing portfolio variables**                          |
| Independent variables                                        |
| 1. Critical thinking                                         | 8.94 | 1.46 | 4,12 |
| 2. Drafting                                                  | 7.73 | 2.65 | 2,12 |
| 3. Citation                                                  | 7.45 | 2.61 | 2,12 |
| Dependent variable                                           |
| 4. Overall writing score                                     | 8.89 | 1.50 | 4,11 |

Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
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<tr>
<td>Citation</td>
<td>79</td>
<td>2</td>
<td>12</td>
<td>7.82</td>
<td>2.117</td>
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<tr>
<td>Independent Research</td>
<td>79</td>
<td>2</td>
<td>12</td>
<td>7.92</td>
<td>1.966</td>
</tr>
<tr>
<td>Appropriateness</td>
<td>80</td>
<td>2</td>
<td>11</td>
<td>7.35</td>
<td>2.075</td>
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<tr>
<td>Integration</td>
<td>79</td>
<td>2</td>
<td>11</td>
<td>7.19</td>
<td>1.888</td>
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<tr>
<td>Overall IL Score</td>
<td>79</td>
<td>2</td>
<td>11</td>
<td>7.43</td>
<td>1.919</td>
</tr>
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</table>

\[ R^2 = .77, \quad F(4, 74) = 60.3, \quad \rho < .001 \]
At Day’s End: The NJIT Approach

- Community
- Research-based effort
- Measurement emphasis
- Evidence-centered design
- Construct inquiry