Getting Faculty Involved in Assessing and Improving Students’ Critical Thinking

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Importance of Critical Thinking

National polls indicate over 90% of the faculty in this country think critical thinking is the most important part of undergraduate education.

Derek Bok, 2005
President Emeritus of Harvard University
Information and the Internet

75% of College Students use the Internet as Primary Method of Searching for Information

Factual Error Found On Internet

LONGMONT, CO—The Information Age was dealt a stunning blow Monday, when a factual error was discovered on the Internet. The error was found on Ted's Ultimate Brady Bunch site that incorrectly listed the show's debut year as 1969, not 1959.

Caryn Wisniewski, a Pueblo, CO, legal secretary and die-hard Brady Bunch fan, came across the mistake while searching for information about the show's first-season cast.

"When I first saw 1968 on the website, I thought, 'Wow, apparently, all those Brady Bunch books I've read listing 1969 as the show's first year were wrong.' Wisniewski told reporters at a press conference. "But even though I obviously trusted the Internet, I was still kind of puzzled. So I checked other Brady Bunch fan sites, and all of them said 1959. After a while, it slowly began to sink in that the World Wide Web might be tainted with unreliable information."

Following up on her suspicion, Wisniewski phoned her public library; the ABC television network, and the office of Brady Bunch producer Sherwood Schwartz—all of whom confirmed that "Ted's Ultimate Brady Bunch Site" was in error.

Attempts to contact the webmaster of the Internet page failed.

31% of Population Use the Internet as Primary Source of Healthcare Information
What is Critical Thinking?

Classic Emphasis

Evaluate Arguments and Conclusions

Reasoning
What is Critical Thinking?

Classical Emphasis
- Evaluate Arguments and Conclusions
  - Reasoning

Expanded Contemporary Emphasis
- Evaluate Ideas and Plans
  - Problem Solving
- Evaluate One’s Own Understanding
  - Life-Long Learning Skills
- Evaluate One’s Own Understanding
  - Communication
  - Creativity

Life-Long Learning Skills

Communication

Creativity
Bloom’s Classic Taxonomy

Evaluation
Synthesis
Analysis
Application
Comprehension

Critical Thinking

Information (rote retention)
Agreement on what is not Critical Thinking

*NSSE Question

(2a) Memorizing facts, ideas, or methods from your courses and readings so you can repeat them in pretty much the same form.

*National Survey of Student Engagement, Indiana University
NSSE: Coursework emphasizes: Memorizing facts, ideas, or methods from your courses and readings

[Bar chart showing student responses nationally]
Why Assess Critical Thinking?

- Need to Measure Success for Accountability
- Assessment Drives Improvement Efforts
History of CAT Development

- Evaluate Tests
- Begin Test Development
- Collaborate Other Institutions
- National Dissemination
Developing the CAT Instrument

Faculty & Students

CAT

Learning Sciences Experts

External Evaluators

Statistical Findings
Institutions Participating in Test Development

Over 45 Institutions Now Collaborating

Howard University
Madisonville Community College
The University of Colorado
The University of Hawaii
The University of Southern Maine
The University of Texas
The University of Washington
Skills Evaluated by CAT Instrument

**Evaluating Information**
- Separate factual information from inferences.
- Interpret numerical relationships in graphs.
- Understand the limitations of correlational data.
- Identify inappropriate conclusions.

**Creative Thinking**
- Identify & evaluate evidence for a theory.
- Identify new information that might support or contradict a hypothesis.
- Explain how new information can change a problem.

**Learning & Problem Solving**
- Separate relevant from irrelevant information.
- Integrate information to solve problems.
- Learn & apply new information.
- Use mathematical skills to solve real-world problems.

**Communication**
- Communicate ideas effectively.
Faculty Evaluations of Question Validity
## CAT Statistics

### General Measures of Academic Performance

<table>
<thead>
<tr>
<th>ACT</th>
<th>SAT</th>
<th>Academic Profile</th>
<th>Grade Point Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAT</td>
<td>0.560*</td>
<td>0.528*</td>
<td>0.562*</td>
</tr>
</tbody>
</table>

* correlations significant, $p < .01$

### Other Measures of Critical Thinking

<table>
<thead>
<tr>
<th>CCTST (California Critical Thinking Skills Tests)</th>
<th>CAAP Critical Thinking Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAT</td>
<td>0.645*</td>
</tr>
</tbody>
</table>

* correlations significant, $p < .01$
CAT Results with 2005 NSSE (National Survey of Student Engagement)

Multiple R = .490
(explains 24% of variability in CAT)

<table>
<thead>
<tr>
<th>NSSE Question</th>
<th>Beta Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2a) Memorizing facts, ideas, or methods from your courses and readings so you</td>
<td>-.341 **</td>
</tr>
<tr>
<td>can repeat them in pretty much the same form. (negative relationship)</td>
<td></td>
</tr>
<tr>
<td>(3b) Number of books read on your own (not assigned) for personal enjoyment</td>
<td>.277 **</td>
</tr>
<tr>
<td>or academic enrichment.</td>
<td></td>
</tr>
<tr>
<td>(11e) Thinking critically and analytically &amp; (11m) Solving complex real-world</td>
<td>.244 **</td>
</tr>
<tr>
<td>problems</td>
<td></td>
</tr>
<tr>
<td>(7h) Culminating Senior Experience (thesis, capstone course, project,</td>
<td>.231 *</td>
</tr>
<tr>
<td>comprehensive exam, etc.)</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at .01 level
** Significant at .001 level
CAT features

- One hour exam
- Simulates real-world problems
- Mostly short answer essay
- Faculty scored in workshops
- Detailed scoring guide
- Reliable (.82 - .85)
- Valid
Student Comments

• I thought the test wasn’t too difficult, but it was challenging. You have to look at things deeply to truly understand.

• I thought the assessment was interesting and made me use real life scenarios and data to decide my results.

• I thought the test was thought provoking, but not too difficult.

• It was an easy test that tests the mind. I enjoyed the stories and the questions on the test. I think I did very well on the test.
A scientist working at a government agency believes that an ingredient commonly used in bread causes criminal behavior. To support his theory the scientist notes the following evidence.

- 99.9% of the people who committed crimes consumed bread prior to committing crimes.
- Crime rates are extremely low in areas where bread is not consumed.

Do the data presented by the scientist strongly support their theory? Yes ___ No ___

Are there other explanations for the data besides the scientist’s theory? If so, describe.

________________________________________________________________________

What kind of additional information or evidence would support the scientist’s theory?

________________________________________________________________________
Various CT Assessments

CAT
Portfolios & Other Tests (CLA, CCTST, CAAP CT module)

IDEA Teaching Evaluations
NSSE/CSSE & other surveys

Alumni & Employer surveys

Student Performance

Student Perceptions

Alumni/Employer Perceptions
Effective Practices Are A Moving Target
Closing the Loop in Assessment and Quality Improvement

Closing the Loop in Assessment and Quality Improvement

Assess Student Performance

Improve Student Learning

Increase Faculty Awareness of Student Weaknesses (Faculty Participate in Test Scoring)

Increase Faculty Awareness of Effective Practices
Professional Development: Faculty Involvement in CAT Scoring

Developing a Teaching Community

Using Effective Practices

Identify Student Weaknesses

Recognize Faculty Strengths & Weaknesses
Design a task that resembles what we want students to do.

- Must Engage Students In Active Learning
- Learning Activity = Real-World Goal
- Create Numerous Opportunities to Practice In Diverse Contexts
- Use as Primary Course Assessment
Evaluate Faculty Interest
In Skills Assessed by the CAT
Motivating Faculty

- Participating in scoring session
- Establishing a faculty teaching community
- Provide small grants that provide resources for innovative practices
- Awards that include a dissemination component

“You have done so much with so little for so long that I’d like you to move on to doing everything with nothing.”
Motivating Faculty

- Provide feedback through assessment
- Help faculty understand the connection between teaching, research, external grants, and service
Teagle Foundation Grant

University Colorado

CAT

Colorado College

Assessment & Faculty Development
Target Groups

- Critical Thinking Classes
  - Civic Engagement/Service Learning Classes
    - None of the Above/Other Classes
Goals

Exploring Effects of Different Classes

Faculty Development

Curriculum Strengthening
Problems & Opportunities

Sampling - Recruiting
IRB – Funded Research

International Interest
Multiple Purposes
CAT National Dissemination Project

www.CriticalThinkingTest.org

Center for Assessment and Improvement of Learning

Tennessee Tech University