Assessing Critical Thinking at the Institutional Level
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Introduction

Most higher education institutions specify critical thinking as an important outcome for undergraduates (AAC&U, 2013).

Critical thinking capabilities are also highly prized by employers.

Yet, considerable diversity exists among institutions in how students’ attainment of this outcome is assessed.

Introduction

What are best practices for assessing this complex skill at the institutional level?

And, how do we even define critical thinking?

Defining Critical Thinking

Critical thinking may encompass some or all of the following steps:

A process of inquiry and hypothesis-generation

Gathering information & data of good quality

Evaluation of information’s credibility, validity, logical strength (etc.)

Analysis of quantitative and qualitative information & data

Interpretation of information’s significance & meaning

Drawing inferences from evidence, assessing alternatives, determining sufficiency of evidence, decision-making

Communication of thought-process and conclusions to others
ETS HEignten
Critical Thinking Exam

Critical thinking exam is a test of logical & deductive reasoning

- Provides students with lists of evidence and arguments
- Asks questions about whether pieces of evidence support a conclusion or not, and how strongly
- Asks students to identify underlying assumptions in an argument
- Logic word problems

Test scope: addresses evaluation, interpretation, & inference skills

Multiple choice, scored via an algorithm

Scale is 150 to 180.

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National Survey of Student Engagement

**Survey instrument** used at institutions nation-wide to assess student engagement in college:

1. Time & effort students spend on studies & educationally-purposeful activities.
2. Institutional deployment of resources, curriculum & learning opportunities to get students to participate in high-impact practices linked to student learning.
Student Engagement in Research University

Survey instrument used at high research intensive institutions nationwide to provide an environmental scan of the student experience in college:

1. Student background
2. Academic engagement, including in research & community engagement
3. Learning outcomes
4. Student satisfaction with academic & social experiences, services

Institutional Surveys

Senior survey administered to graduating seniors. Contains items relevant to learning experiences & to critical thinking.
A sea of information, but where are the insights?

How do you integrate data from different methods, samples, etc. into a coherent narrative?

Recent Paper


Holistically Assessing Critical Thinking and Written Communication Learning Outcomes with Direct and Indirect Measures

https://eric.ed.gov/?id=EJ1223384
Triangulation Approach

Triangulation: the use of 2 or more methods in the study of the same phenomenon.

- This approach helps to overcome inherent weaknesses and biases that any one method may have.
- When different methods point in the same direction, we can have greater confidence in the accuracy of the conclusion.

Critical Analysis of Methods

Embedded Assessments:
- Faculty designed course assessments
- Program learning outcomes

Direct External Assessments:
- Standardized exams

Indirect Assessments:
- Student self-reported surveys
Strategies for Assessing at Institutional-level

UNC Charlotte:
- Emphasis on freshmen vs senior comparisons
- College-level data collection & analysis
- Push into classrooms for ETS tests, students are not compensated
- Build-up of institutional picture over time

UNC Chapel Hill:
- SP2015-Critical Thinking and Written Communication → SP2016-expand to include Quantitative Literacy
- Recruit from all graduating seniors – incentives provided (cap and gown)
- Use data for program improvement and enhancing student success

Holistically Evaluating Data

Are undergraduates developing the critical thinking skills we want to see students graduate with?

Evidence-based evaluation using multiple data sources:

**Direct sources:**
- Embedded assessments & program level outcomes assessment
- ETS Heighten exam

**Indirect sources:**
- Senior Survey
- NSSE or SERU
Case Example

Walking through data for one sample college (College A for anonymity!)

Integrating data from multiple data points into a cohesive narrative

Evidence from Embedded Assessments

Core Curriculum Learning Goal 4: Students will demonstrate the ability to use analytical skills in decision making.
   - 6 subgoals

Assessed via problem sets & multiple choice questions in multiple courses

2012-2013: 5 out of 6 subgoals at or above target
2014-2015: 4 out of 6 subgoals at or above target
Participants

College A undergrads sat for HEIghten CT exam in Spring 2016.

Excluded participants >30 yrs

<table>
<thead>
<tr>
<th>Freshmen (n = 103)</th>
<th>Seniors (n = 104)</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 male</td>
<td>51 male</td>
</tr>
<tr>
<td>26 transfer students</td>
<td>1 transfer student</td>
</tr>
<tr>
<td>GPA: M: 3.03 SD: 0.57</td>
<td>GPA: M: 3.2 SD: 0.37</td>
</tr>
<tr>
<td>36 Dean’s or Chancellor’s List</td>
<td>37 Dean’s or Chancellor’s List</td>
</tr>
<tr>
<td>Age: M: 19.8 SD: 1.4</td>
<td>Age: M: 22.9 SD: 1.5</td>
</tr>
</tbody>
</table>

Evidence from HEIghten Critical Thinking Exam

Seniors score numerically, but not significantly, higher than freshmen.

t(206) = 1.07, p = 0.3
Evidence from HEighten Critical Thinking Exam

ETS HEighten Critical Thinking Exam

Limitations:

- Exam is narrow in types of abilities tested, and may not reflect what skills/abilities are (widely) taught in our courses.
Evidence from Senior Survey

All students give high ratings, ‘To what extent do you think your college education contributed to your knowledge, skills, and personal development in using critical thinking skills?’

College A seniors (green bar) rate this item lower than seniors in the other colleges (non-College A, gray bar).

Senior Survey & HEIghten data

Suggests effective teaching practices may foster development of students’ critical thinking skills.
Evidence from NSSE

Compared to other UNCC students not in College A (n=1138, gray bars), College A students (n=169, green bars) self-report their courses place more emphasis on memorization and less emphasis on analyzing and forming new ideas.

NSSE likert scale:
4 = very much
3 = quite a bit
2 = some
1 = very little

* p < 0.05

Importanty, many programs in College A emphasize analytical skills, including quantitative reasoning, math, and statistics.

- These skills not assessed by ETS HEIghten exam.

Evidence from NSSE suggests students have strengths in analysis skills.

NSSE likert scale:
4 = very much
3 = quite a bit
2 = some
1 = very little

* p < 0.05
Evidence from NSSE

College A students report they engaged quantitative reasoning skills more frequently than other UNCC students.

<table>
<thead>
<tr>
<th>Items:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used numerical information to examine a real-world problem or issue.</td>
</tr>
<tr>
<td>Evaluated what others have concluded from numerical information.</td>
</tr>
<tr>
<td>Reached conclusions based on your own analysis of numerical information.</td>
</tr>
</tbody>
</table>

NSSE likert scale:
4 = very often
3 = often
2 = sometimes
1 = never

Critical Thinking in College A

Seniors show numerically, but not statistically, higher scores than freshmen on test of evaluation, interpretation, & inference skills (ETS Heighten).

Evidence students are gaining in ability & confidence with quantitative reasoning and quantitative analysis skills (NSSE, embedded assessments)

Good instructional practices may benefit students’ development of critical thinking skills (ETS & Senior Survey)
Building up an institutional picture

Similar results seen within other colleges in subsequent years of data collection.

Strategies for engaging stakeholders

- Written reports & presentations to Colleges
- For College A, suggestion to modify assignments to include more opportunities for students to practice inference & evaluation skills
- Gen-Ed critical thinking course
Example of Data Use

An example of iterative and dialogic data interpretation to support data triangulation, data use and decision making (SACSCOC 7.1; 8.2.a,b,c)

Student Learning Outcomes

Program Improvement

Measures

Data Use

Stakeholders

Data Collection

Data Analysis and Reporting

HEighten® Scores

<table>
<thead>
<tr>
<th></th>
<th>2016 (N=81)</th>
<th>2017 (N=478)</th>
<th>2018 (N=241)</th>
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</thead>
<tbody>
<tr>
<td>Female</td>
<td>61.70%</td>
<td>75.00%</td>
<td>70.30%</td>
</tr>
<tr>
<td>Male</td>
<td>38.30%</td>
<td>25.00%</td>
<td>29.70%</td>
</tr>
</tbody>
</table>

Average critical thinking score = 169.34

No significant differences observed across student demographic groups
Student Experience in the Research University (SERU)

Designed for research-intensive universities
Administered to all UNC undergraduates biennially
30% or greater response rate
CFA and SEM has been conducted on UNC data

Interpreting HEIghten® and SERU

<table>
<thead>
<tr>
<th></th>
<th>+</th>
<th>-</th>
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<tbody>
<tr>
<td>Satisfaction</td>
<td></td>
<td></td>
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<tr>
<td>Campus Climate for Diversity</td>
<td>+</td>
<td></td>
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<tr>
<td>Self-Assessment of Skills</td>
<td>+</td>
<td></td>
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<tr>
<td>Gains In Skills, Non-Quant</td>
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<tr>
<td>Quant Professions</td>
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<td>Academic Disengagement</td>
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<td>Financial Concerns</td>
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• Correlation results were inconclusive and not actionable
• Needed to use HEIghten® to support Gen Ed – Ideas in Action effective in Fall 2021
Mapping Knowledge Areas and Skills

Expert Raters (N=16)
- General Education experts
- English Composition and Rhetoric experts
- Foreign Language experts
- Quantitative Reasoning experts

<table>
<thead>
<tr>
<th>Foundations</th>
<th>Approaches</th>
<th>Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition</td>
<td>Physical and Life Sciences</td>
<td>Communication Intensive</td>
</tr>
<tr>
<td>Rhetoric</td>
<td>Social and Behavioral</td>
<td>Quantitative Intensive</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>Sciences</td>
<td>Experiential Education</td>
</tr>
<tr>
<td>Foreign Language</td>
<td>Fine Arts and Humanities</td>
<td>U.S. Diversity</td>
</tr>
<tr>
<td>Lifetime Fitness</td>
<td></td>
<td>Global Issues</td>
</tr>
</tbody>
</table>

Longitudinal Study in Collaboration with ETS

| Cohort 1 = 500 Freshman (academic year at time point 1) |
|-------------------------------|-------------------------|
| Semester | Academic Year (at test) | MFTB | HCT | SN | PGS |
| Fall 2018 | Freshman               | X   | X   | X  | X   |
| Spring 2019 | Freshman             | X   | X   | X  | X   |
| Spring 2020 | Sophomore            | X   | X   | X  | X   |
| Spring 2021 | Junior               | X*  | X   | X  | X   |
| Spring 2022 | Senior               | X*  | X   | X  | X   |
| Fall 2022 | Post-Graduate        | X   | X   | X  | X   |

HEltghten Critical Thinking (HCT; generic skills)
Success Navigator (SN; noncognitive skills)
Major Field Test in Business (MFTB; business-related skills)*
Post Graduate Survey (PGS; student can take it at a place or time convenient to them)

*Only Juniors and Seniors who are declared business majors will be asked to take MFTB
Conclusions

Examples today as case studies for how to apply the triangulation method to holistically integrate multiple measures to assess students’ learning.

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