THINKING INSIDE THE BOX:
ASSESSING CRITICAL THINKING AT CHICO STATE

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There’s a time for thinking *Inside the Box!*
“Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. In its exemplary form, it is based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness.”

http://www.criticalthinking.org/pages/defining-critical-thinking/766

But, Professor, which Box should I think in???

... critical thinking is reasonable reflective thinking focused on deciding what to believe or do ... --Ennis 2002

Critical thinking is “rational evaluation of thinking” -- Moore and Parker 2012

“identifying and challenging assumptions and exploring alternative ways of thinking and acting ...” and “questioning assumptions, pursuing divergent views, unbiased inquiry” – Bean 2011

Evaluation, analysis and synthesis of evidence to draw logically sound conclusions, while acknowledging that alternative viewpoints exist – CLA website
**Let’s Think Inside the CSU Box!**

**EO 1065:**

“In critical thinking (subarea A3) courses, students will understand logic and its relation to language; elementary inductive and deductive processes, including an understanding of the formal and informal fallacies of language and thought; and the ability to distinguish matters of fact from issues of judgment or opinion. In A3 courses, students will develop the abilities to analyze, criticize, and advocate ideas; to reason inductively and deductively; and to reach well-supported factual or judgmental conclusions.”
Review: What’s in the CSU Box?

1. understand logic and its relation to language
2. inductive and deductive processes
3. formal and informal fallacies of language and thought
4. distinguish matters of fact from issues of judgment or opinion
5. analyze, criticize, and advocate ideas
6. reason inductively and deductively
7. reach well-supported factual or judgmental conclusions
Assessing CT

- Definition ... see EO 1065 ... done!
- Faculty buy-in:
  - 18 sections
    - CMST 255: 2 sections
    - GEOS 104: 1 section
    - PHIL 102: 14 sections (25-300+)
    - PSYC 100: 1 section
- Pre-, Post-test
- Focus:
  - inductive versus deductive logic;
  - logical fallacies
- Multiple choice question bank
- Selection, revision of questions
- Procedure
- Results: valid results from 1,194 students
Results

1. Analysis of Variance (ANOVA): compared mean **pre-test scores** across sections: only significant difference was mean pre-test score from Honors section (PHIL 102H) significantly higher than other sections. **There was no significant difference in pre-test scores among other sections.**

2. Matched-pairs t-test compared the **learning gain difference between pre- and post-test scores**. Post-test scores (mean = 10.65 across all sections) were significantly higher than pre-test scores (mean = 6.98).

3. ANOVA compared the mean **learning gain** by section. PHIL 102-01 was significantly higher than all other sections. PSYC 100 was significantly higher than two PHIL 102 sections
Results (cont’d)

4. ANOVA compared post-test scores across sections. PHIL 102-01 was significantly higher than all other sections. PHIL 102H significantly higher than four other PHIL 102 sections. PSYC 100 significantly higher than two other PHIL 102 sections.

5. ANOVA compared mean scores across courses (aggregating sections) for all variables mentioned: mean pre-test scores, mean difference scores and mean post-test scores. Mean difference scores and post-test scores for GEOS were significantly lower than those for PHIL and PSYC.
Conclusions

1. All sections, with the exception of the Honors section, started with students that had similar levels of understanding of the concepts measured by the pre-test.

2. Across all sections, there was a gain in student learning of the concepts measured by the test. On average, students’ scores increased by about 30% from pre- to post-test.

3. While this is a positive outcome, it is somewhat concerning that students on average only got about 50% of the post-test questions right.
4. PHIL 102-01 stands out as particularly effective in teaching CT as measured by student performance on this exam. Instructors might benefit from learning the pedagogical approaches of that instructor.

5. A variety of courses outside Philosophy are capable of teaching CT concepts, as evidenced by the performance in PSYC 100. The Geosciences course might benefit from revision given its significantly lower learning gains and post-test scores.

6. The widely varying results across the PHIL102 sections indicate that the approach taken by individual instructors outweigh the disciplinary basis of the course in affecting positive learning outcomes.
Thinking *Inside* the Box helped break a definitional impasse and answer some important, if narrow questions.

EO 1065 provides a useful, consensus definition of CT and should be used creatively for assessment purposes.

Moving forward, we are committed to assessing other dimensions of the EO 1065 definition of CT on our campus.

We have another, broader definition of CT we also must address that will draw on more of a variety of disciplines.

Thinking *Outside* the Box will present both challenges and opportunities for improving learning on our campus.
Thanks to:

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- CSU, Chico Institutional Research for preliminary analysis of data

- All errors of fact or interpretation are mine alone.