A Report on Undergraduate Critical Thinking at the University of Virginia

Submitted by

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EXECUTIVE SUMMARY

In 2010, UVa's Office of Institutional Assessment and Studies (IAS) initiated planning for an assessment of undergraduate critical thinking competence. A review of existing tests of critical thinking yielded one that appeared to be sufficiently challenging and that would yield student responses that could be analyzed in some depth. A relatively new instrument, the Critical Thinking Assessment Test, poses real world scenarios and asks students to examine underlying assumptions, solve problems, suggest alternative solutions, and communicate their thinking in short essays. Faculty score students' responses according to specific rubrics. By focusing on real world problems, the test offered the possibility that disciplinary differences in critical thinking could be bridged. The Undergraduate Critical Thinking Competency Assessment Committee agreed to employ the test to assess students' critical thinking competency and also to evaluate the test for future use.

For learning outcomes, the Critical Thinking Assessment Test (CAT) is based on the assumption that students competent in critical thinking can:

- Evaluate information (separate factual information from inferences; interpret numerical relationships in graphs; understand the limitations of correlational data; and evaluate evidence and identify inappropriate conclusions)
- Think creatively (identify alternative interpretations for data or observations; identify new information that might support or contradict a hypothesis; and explain how new information can change a problem)
- Learn and solve problems (separate relevant from irrelevant information; integrate information to solve problems; learn and apply new information; use mathematical skills to solve real-world problems)
- Communicate ideas effectively.

The test contained 15 questions for scoring: 12 short-essay questions, two yes/no questions, and one computational question. Each question mapped to more than one of the learning outcomes listed above. The test had been validated through tests of correlation with existing critical thinking instruments (CAAP, CCTST), with student self-report (NSSE), and with student test results (SAT, ACT).

In the spring of 2011, IAS staff administered the test to 264 fourth-year undergraduates. Thirteen faculty members, including eight committee members, evaluated the responses in June 2011.

Results

The test scores reflected an expected mean and distribution given the students' incoming SAT scores. Fourth-year students' test results were significantly correlated with their cumulative GPAs ($r = 0.29$) and SAT scores (for the verbal (critical reading) portion $r = 0.48$; for the mathematics component $r = 0.38$; and for the written part $r = 0.34$). UVa mean score came within 5 percent of expected mean score predicted by the CAT data base (SAT and CAT scores from 15 institutions). While comparative data (fourth-year students at peer (R1) institutions) were not available, the comparison of UVa mean

scores to the CAT data base suggest, at minimum, that UVa students performed as competently as would be predicted by their SAT scores (SAT scores for verbal and math are at the 90th percentile.)

There were no significant differences in mean test scores among the schools or the major disciplines. Students did appear to score higher on questions related to evaluation and interpretation of information and problem solving and lower on questions related to communication (writing) and creative thinking. Based on the distribution of scores, the committee considered the following standards that had been applied in past assessments (Quantitative Reasoning, Scientific Reasoning): Highly competent=students score greater than ¾ of points available (score of 28.5 or above); Competent= scores between ½ and ¾ of points available (score of 19-28.5); Minimally competent= scores between 1/3 and ½ of points available (score of 12.5-19); Not competent= scores less than 1/3 of available points (below 12.5).

Applying these standards, 25% of fourth-years were classified as highly competent; 89% competent or above; 99% minimally competent or above; and 1% not competent.

Findings

1. The test appears to provide a valid measure of students' competence in critical thinking. Validation through comparison with existing tests of student aptitude, however, assumes that the other tests also measure critical thinking. Areas of student relative strength (interpreting information) and weakness (creative thinking) make sense in light of the progressive range of skills included in the concept of critical thinking, providing additional evidence of validity. While the real life scenarios posed by the CAT revolved around environmental or health themes, the lack of differences in mean scores among the major disciplines suggests that the CAT assesses skills common to the various disciplines.
2. Fourth-year students, on the whole, are capable of a respectable level of rigor in critical thinking, consistent with their aptitude as measured by SAT scores and GPA.
3. Students appear to demonstrate stronger skills in the evaluation and interpretation of data than in communication and creative thinking.
4. As reflected in total scores, fourth-year students' ability in critical thinking does not appear to vary with field of study.
5. The CAT items that best differentiated higher-performing from lower-performing students required students to read and interpret new information carefully, to evaluate the need for additional information, or to recommend additional relevant information.
6. The small size of the sample for some schools limits the analyses available.

Recommendations

1. As peer institutions acquire CAT test results for similar samples of students, consideration should be given to comparing UVa results with those from peer institutions.
2. Subsequent assessments of critical thinking should consider the relative value of assessing within major disciplines. Such assessments, especially with a longitudinal component (that is, comparing first- and fourth-years in either a cross-section or pre/post design), could more readily assess discipline-specific development of critical thinking skills.
3. Consideration should be given to editing and improving the CAT, the purpose being to increase validity and reliability. A critique of the test, including substantive suggestions for improvement,

should be shared with test creators. The unique and advantageous features of the test should be retained. These features include: it does not require prior knowledge of facts in any specific field; it calls for written responses beyond simple choice among alternatives; and it gives an opportunity for creative responses.

4. As demonstrated in both the 2006 and 2011 assessments, measuring undergraduate competence in critical thinking at UVa is likely to be a challenge. Since critical thinking manifests differently depending on the discipline, assessment of student competence needs to either 1) address explicitly the unique differences by discipline and assess according to the distinct definitions, or 2) identify the commonalities across disciplines and design or identify an instrument that can measure the common aspects. An important criterion for weighing the two approaches should be the potential usefulness of the results for program improvement.

Follow-up Professional Development

A workshop for faculty, "Promoting and Assessing Students' Higher-Order Learning," was presented in March 2012 by visiting scholar, Linda Nilson (Founding Director, Office of Teaching Effectiveness and Innovation, Clemson University). All 11 UVa schools were represented among the registrants. The workshop was co-sponsored by the Teaching Resource Center and IAS.

CRITICAL THINKING ASSESSMENT PLANNING

Committee Charge, Prior Assessment, Definition, Outcomes, Standards

In the following sections we present details of the critical thinking assessment conducted in AY2010-2011.

Committee Charge

The State Council of Higher Education for Virginia mandates that all of its two- and four-year colleges and universities assess undergraduate competence in six core areas—written communication, quantitative reasoning, scientific reasoning, oral communication, critical thinking, and information literacy and technology (or an emerging area of interest can be substituted; UVa substituted undergraduate research). In 2010-2011, the University assessed undergraduates' competence in critical thinking.

In 2011, a multi-disciplinary faculty committee, coordinated by IAS, was convened and asked to:

- Adopt a definition of critical thinking and of learning outcomes.
- Design a plan to assess undergraduate students' critical thinking skills employing the Critical Thinking Assessment Test.
- Evaluate the Critical Thinking Assessment Test.
- Analyze and interpret the results of the assessment and make recommendations for future assessments.
- Facilitate program improvements, and documentation thereof, in response to assessment results.

Results of the assessment would be used to satisfy SCHEV assessment requirements and to provide information that would be useful for faculty, deans and the Provost as they make curricular and resource decisions.

The text of the committee charge and the final committee membership list is to be found in Appendix 1. The committee represents a range of disciplines, points of view, and expertise.

Consideration of Assessment Approaches in Light of Prior Assessment

The most recent prior assessment of critical thinking at the University of Virginia occurred in 2006 and employed an "in-house" rubric that was applied to student papers submitted for course credit in multiple courses across disciplines. Assessment of student work prepared for courses (papers, exams, etc.) is recommended because one can assume that students have a strong incentive (grades) to do their best. On the other hand, especially with regard to critical thinking, this approach to assessment assumes that the sampled courses taught critical thinking as reflected in the rubric and that the course assignments actually called for students to demonstrate critical thinking.

The results of the 2006 assessment were of limited use due to concerns about representativeness of the papers and applicability of the rubric to the students' papers. One particular issue was an effect of paper length – longer papers tended to be scored higher than shorter papers. Also, the sampling of papers from participating courses resulted in a less representative understanding of students' critical thinking skills on the whole.

As an alternative to assessing student work submitted for course credit, student competence can be assessed by administering a test. On the downside, students do not have an external incentive to do their best (no grades), so results may underestimate actual competence. Having observed hundreds of UVa students working industriously on assessment tests (Quantitative Reasoning in 2007-8 and Scientific Reasoning in 2009-10), we do not think that this presents a major concern at UVa. On the upside, the students all are asked the same test questions; there is no concern that some students were prompted to think critically while others were not

In the current assessment, we employed an existing instrument, the Critical Thinking Assessment Test (CAT), to assess undergraduates' critical thinking skills. While the resulting work provided by students was not course-based, it constituted an equal assignment across all participants. In addition, we were able to invite a stratified random sample of students to participate to further secure better generalizability of results over the prior assessment. We also used this assessment as an opportunity to evaluate the CAT for use at the University.

The Critical Thinking Assessment Test (CAT)

The CAT is a 15-item, 1-hour, short essay critical thinking test with questions and passages designed to simulate real-world experiences that require critical thinking. Developed by a consortium of seven universities with funding from NSF, the purpose of the test is to assess "higher-order thinking" – thinking that requires application, analysis, synthesis, evaluation, and creativity. Test responses are scored by University faculty according to scoring rubrics. The ability to involve faculty in the scoring was an important consideration in our search for a critical thinking measure. Of importance, no University that had used the test (approximately 70 institutions at the time) had encountered a "ceiling effect."

Technical information about the CAT included criterion validity: scores are significantly correlated with the SAT, ACT, California Critical Thinking Skills Test (CCTST), and the critical thinking module of the Collegiate Assessment of Academic Proficiency (CAAP), as well as student GPA. Scoring reliability was reported as moderately high (α=.82) and internal consistency as reasonably good (α=.69). Test-retest reliability was also moderately high (α=.80) providing evidence that the CAT could be useful a measure of student progress over time, if it were used again at the University.

Definition and Student Learning Outcomes

The Undergraduate Critical Thinking Competency Assessment Committee considered and agreed to try the proposed assessment instrument, the CAT.

The CAT is designed to assess critical thinking as a process involving four overall skills and multiple sub-skills:

- Evaluate information:
  - Separate factual information from inferences
  - Interpret numerical relationships in graphs
  - Understand the limitations of correlational data
  - Evaluate evidence and identify appropriate conclusions
- Think creatively:
  - Identify alternative interpretations for data or observations
  - Identify new information that might support or contradict a hypothesis
  - Explain how new information can change a problem
- Solve problems:
  - Separate relevant from irrelevant information
  - Integrate information to solve problems
  - Learn and apply new information
  - Use mathematical skills to solve real-world problems
- Communicate effectively.

Standards/Level of Performance Expected

The following expectations for competency of fourth-year students had been applied for the past two instrument-based competency assessments:

25% of students are expected to be highly competent;
75% competent or above;
90% minimally competent or above.

The committee considered the following definitions of competence as reflected in test scores. These definitions were consistent with those applied in past instrument-based assessments (Quantitative Reasoning and Scientific Reasoning):

Highly competent: students score greater than ¾ of points available (CAT score of 28.8 or above);
Competent: students score between ½ and ¾ of points available (CAT score of 19.3-28.7);
Minimally competent: students score between 1/3 and ½ of points available (CAT score of 12.5-19.2); and
Not competent: students score less than 1/3 of available points (below 12.5).

METHODOLOGY

Test Administration and Scoring: Spring 2011

Sampling

Approximately 1,900 fourth-year students were sampled from six undergraduate schools at the University (Architecture, Commerce, Education, Engineering, Nursing, and the College of Arts and

Sciences) and from the Bachelor of Interdisciplinary Studies program (BIS) using a disproportionate stratified sampling method. Sampled students were invited by email to take an assessment and, as compensation, were offered a $20 gift certificate to Amazon.com or the option to donate the $20 to a UVa student group. Students were informed that participation was voluntary and that their test responses would be kept confidential and would not affect their academic record. In the invitation, students were not informed of the topic of the assessment. Approximately 20 one-hour testing sessions were scheduled during weekdays over the period of four weeks in March and April 2011. In total, 323 students responded to the invitation and signed up to complete the assessment (17% response rate) and 264 attended a session and completed the CAT (18% no-show rate).

The sample of fourth-year students differed somewhat from the population of UVa fourth-year students: A detailed description of the differences between sample and population can be found in Appendix 2. In brief, the sample contained larger proportions of students who are female (69% vs. 55%) and larger proportions of students with high GPAs[1] (42% vs. 33%) and high SAT scores (Verbal 52% vs. 36%; Writing 42% vs. 34%; and Math 39% vs. 32%) than occur in the population. These differences are statistically significant, but not unexpected: it is common that the students who volunteer to participate differ from the population in these ways.

Gender was not significantly related to CAT performance so the overrepresentation of females should not impact overall scores. But GPA and SAT scores are both significantly correlated with CAT score, so it is likely that the results of this assessment are slightly higher than what would be found in the population.

		SAT I Verbal	SAT I Math	SAT I Writing	SAT I 1600 Total	SAT I 2400 Total	Cumulative GPA
Total CAT Score	Pearson Correlation	0.48***	0.38***	0.34***	0.51***	0.47***	0.29***
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	185	185	178	185	178	198

Scoring

A 14-member faculty committee representing multiple schools and disciplines was trained by IAS staff to rate the CAT papers according to the rubric. Two hundred scoring hours were needed to score the 264 papers and the committee completed the task during a two-day workshop. IAS requested feedback from the faculty committee at the end of the scoring session; feedback related to the CAT and the scoring rubrics specifically was summarized to be shared with the CAT developers.

To ensure reliability of the scoring, each test question was scored by the group at the same time. Each student's response was scored by two raters separately and by a third rater if the first two did not give the same score. At the end of the scoring session the test booklets and rubrics were returned to the CAT developers, who also scored a sample of tests to determine a margin of scoring error. UVa's

[1] High GPA is defined as the top third of the population, and corresponded to values greater than 3.5 of a maximum 4.0.

scoring error was slightly higher (7%) for several items than what CAT allows (5%) so the overall score and the scores for those several items were corrected (decreased slightly).

SUMMARY OF RESULTS

Distribution of Test Scores and Competency Levels

In total, 264 students completed the CAT. Of these, 198 tests constituted a representative sample of approximately five percent of the fourth-year population (representative by school and discipline). This sample was used to determine critical thinking competency of UVa fourth-year students. The remaining tests (68) were oversamples used to report results by school.

Fourth-year students scored an average of 25.96, SD=5.06 (corrected mean = 23.76) out of a possible 38 points. The distribution of scores for fourth-year students is shown in Figure 1.

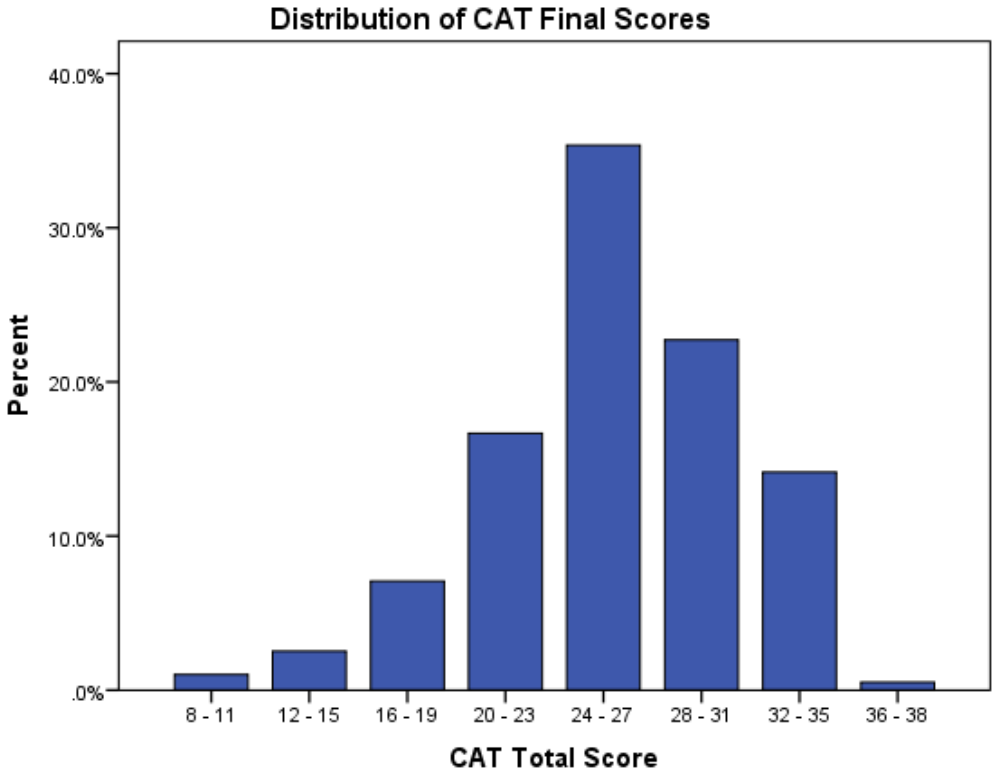

Figure 1: Distribution of Scores for Fourth-year Students

CAT user norms estimate CAT performance based on average entering ACT/SAT scores at upper division undergraduate four-year institutions. UVa's average SAT score of 1345 would predict a score of 24.56 on the test. UVa's mean score is therefore somewhat expected based on the type of student population at UVa (See Appendix 3).

In terms of critical thinking competency, fourth-year students met the standard for high competence and exceeded the standards for competence and minimal competence in critical thinking. Among the respondents, 25% were highly competent (scores above 28.7), 89% competent or better (scores above 19.2), and 99% were at least minimally competent (scores above 12.5) (See Figure 2). This is to be compared with the projection that 25% of fourth-year students should be highly competent; 75% competent or above; and 90% minimally competent or above.

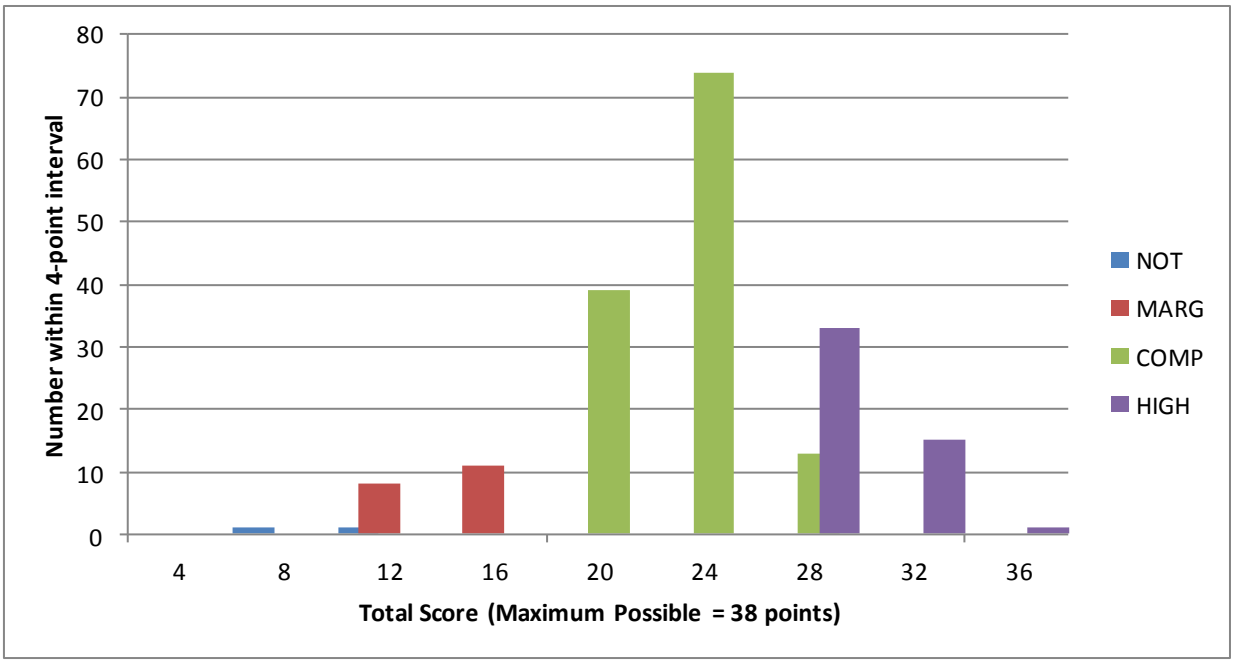

Figure 2: Distribution of Competency Standards for Fourth-year Students

Results by Question Type

In general, the sample as a whole performed well on questions that required students to evaluate and interpret information. For example, students were able to determine if a stated inference is supported by the data and were able to separate relevant from irrelevant information in order to evaluate a hypothesis or statement. For example:

Question and skill assessed:	**Average Percent of Attainable Points**
Q5: Skill: Evaluate whether spurious information strongly supports a hypothesis.	88%
Q8: Skill: Determine whether an invited inference is supported by specific information.	85%
Q10: Skill: Separate relevant from irrelevant information when solving a real-world problem.	85%

Students were more likely to struggle, however, with questions that asked them to identify *additional* information needed to evaluate a hypothesis or alternative hypotheses (i.e., "creative thinking" questions). For example:

Question and skill assessed:	Average Percent of Attainable Points
Q4: Skill: Identify additional information needed to evaluate a hypothesis.	59%
Q7: Skill: Identify additional information needed to evaluate a hypothesis.	57%
Q9: Skill: Provide relevant alternative interpretations for a specific set of results.	65%

A complete table of student performance by question can be found in Appendix 4. These results make sense—interpreting and applying information is a fundamental critical thinking skill. Being able to evaluate the need for additional information and to imagine and identify the additional information needed are higher level skills. While this assessment is not based specifically on Bloom's Taxonomy, Figure 3 illustrates the progression in thinking skills captured by the CAT questions and general UVa student responses described here.

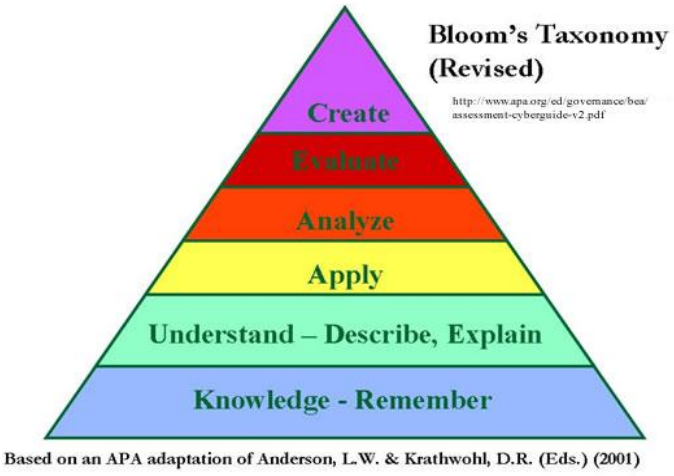

Figure 3: Bloom's Taxonomy (Revised)

High Performers vs. Low Performers

The highest performing students on the CAT (those in the top third; 31.29 average score) were compared to the lowest performing students (those in the bottom third; 20.14 average score) to determine which questions and factors most differentiated the two groups. A range of majors was represented in each group. The most differentiating questions on the CAT required students to "Identify suitable solutions for a real-world problem using relevant information" and then "explain the *best* solution for a real-world problem using relevant information" after having perused a packet of resource materials that contained the "relevant information" as well as some less relevant information. Students who did not attend closely to the materials provided (conduct a "close read") would not have performed as well on these questions. In addition, questions that required students to identify *additional* information needed to evaluate a hypothesis differentiated the groups. A table of results by question for high and low performers can be found in Appendix 5.

Comparisons

Among Schools and Disciplines

No significant differences in total mean scores were found among the schools of Architecture, Commerce, Engineering, Nursing, and the disciplines within the College: Humanities/Fine Arts, Science/Math, and Social Sciences[2]. This may provide evidence that the overall critical thinking skills assessed by the CAT apply across schools and disciplines.

When we compared the scores by school and discipline for the most differentiating items on the CAT (questions 4, 13, and 14), however, Architecture and Science/Math particularly distinguished themselves on Question 13, while Architecture is also distinguished on Question 14.

Question and skill assessed:	**SEAS n=38**	**ARCH n=11**	**COMM n=39**	**SON n=19**	**Hum/ Fine Arts n=46**	**Sci/ Math n=58**	**Soc Sci n=42**
Q4: Identify additional information needed to evaluate a hypothesis.	68%	70%	65%	70%	56%	60%	53%
Q13: Identify suitable solutions for a real-world problem using relevant information.	58%	82%*	50%	56%	65%	91%*	65%
Q14: Identify and explain the best solution for a real-world problem using relevant information.	68%	87%*	56%	76%	60%	61%	65%

* Differences are significant at $p<.05$.

Results by school and by discipline within the College, with oversamples added to increase sample size, can be found in Appendix 6.

Other Universities

Because the CAT is a relatively new test, few peer universities have already used the test to assess critical thinking, although a number of peer institutions have signed on to use the test. While a reliable national norm for the test is not yet available, a user norm does provide comparative results. As mentioned earlier, UVa performed in the range expected for an upper division four-year university with high entering SAT scores. IAS contacted several peer universities in order to share and compare results; unfortunately, some had not yet obtained their results, and others were testing different populations (e.g., first-year students).

Two schools contacted, Texas A&M University (TAMU) and Colorado State, did share results of their fourth-year assessments: UVa performed similarly or slightly better (depending on the question) when compared to TAMU and better than Colorado State. Again, taking entering SAT scores into consideration for the UVa population, these results were expected. We plan to continue to reach out to peer universities using the CAT to compare results and to discover the ways in which universities are using results to improve students' critical thinking skills.

[2] The BIS program and School of Education were not included due to small sample sizes.

National Survey of Student Engagement (NSSE)

The CAT developers reported significant correlations between several NSSE items and CAT performance (E.g., rating of institutional emphasis on critical thinking; completing a culminating senior experience; coursework not focused on rote memorization). Our CAT sample included 160 students who had also completed both the CAT and the NSSE in spring 2011. When this sub-sample's CAT total scores were compared with NSSE responses, very few significant correlations emerged, and of those that were significant, they were not substantive. No significant correlations were found between CAT scores and any NSSE benchmarks or between CAT scores and the NSSE items with which the CAT developers found correlations. This lack of significance could be due to the lower variability of the UVa sample with respect to these questions. That is, compared to those at other institutions, UVa fourth-years are significantly less likely to report that their course work requires rote memorization, more likely to report that they plan to or have completed a senior culminating experience, and more likely to report that UVa contributed to their ability to think critically and analytically and to solve complex real-world problems.

Among individual NSSE items, the few that were significant correlated with CAT total scores described more about the type of student likely to do well on the CAT test (more likely to respond that the University did not greatly contribute to their computing skills, their understanding of themselves, or their sense of spirituality) than the type of educational experience that may have affected critical thinking skills. The strongest correlation was with self-reported GPA.

FINDINGS

1. The test appears to provide a valid measure of students' competence in critical thinking. Validation through comparison with existing tests of student aptitude, however, assumes that the other tests also measure critical thinking. Areas of student relative strength (interpreting information) and weakness (creative thinking) make sense in light of the progressive range of skills included in the concept of critical thinking, providing additional evidence of validity. While the real life scenarios posed by the CAT revolved around environmental or health themes, the lack of differences in mean scores among the major disciplines suggests that the CAT tests skills common to the various disciplines.
2. Fourth-year students, on the whole, are capable of a respectable level of rigor in critical thinking, consistent with their aptitude as measured by SAT scores and GPA. Students appear to demonstrate stronger skills in the evaluation and interpretation of data and in problem-solving than in communication and creative thinking.
3. Fourth-year students' ability in critical thinking does not appear to vary with field of study.
4. The most differentiating items on the CAT required students to read and interpret new information carefully, to evaluate the need for additional information, or to recommend additional relevant information.
5. The small size of the sample for some schools limits the analyses available.

COMMITTEE RECOMMENDATIONS

1. As peer institutions acquire CAT test results for similar samples of students, consideration should be given to comparing UVa results with those from peer institutions.
2. Subsequent assessments of critical thinking should consider the relative value of assessing within major disciplines. Such assessments, especially incorporating a longitudinal design that compares first- and fourth-year performance, could more readily assess discipline-specific development of critical thinking skills.
3. Consideration should be given to editing and improving the test, the purpose being to increase validity and reliability. A critique of the test, including substantive suggestions for improvement, should be shared with test developers. The unique and advantageous features of the test should be retained. These features include: it does not require prior knowledge of facts in any specific field; it calls for written responses beyond simple choice among alternatives; and it gives an opportunity for creative responses.
4. As demonstrated in both the 2006 and 2011 assessments, measuring undergraduate competence in critical thinking at UVa is likely to be a challenge. Since critical thinking manifests differently depending on the discipline, assessment of student competence needs to either 1) address explicitly the unique differences by discipline and assess according to the distinct definitions, or 2) attempt to identify the commonalities across disciplines and design or identify an instrument that can measure the common aspects in the UVa population. An important criterion for weighing the two approaches should be the potential usefulness of the results for program improvement.

FOLLOW-UP PROFESSIONAL DEVELOPMENT

In concert with this assessment, the Teaching Resource Center and the Office of Institutional Assessment and Studies jointly sponsored a workshop for faculty on assessment of critical thinking in the classroom (see Appendix 7). Linda Nilson, author of *Teaching at its Best: A Research-Based Resource for College Instructors* (Jossey-Bass, 2010) and founding director of the Office of Teaching Effectiveness and Innovation at Clemson University, met with faculty and conducted a workshop, "Promoting and Assessing Students' Higher-Order Learning" on March 23, 2012. The hands-on workshop was well attended (77 registered, representing all 11 schools) and well received (average rating of 4 on scale of 1-5).

Appendices

Appendix 1: Assessment Committee Charge and Schedule

Background: The State Council of Higher Education for Virginia mandates that all of its two and four year colleges and universities assess undergraduate competence in six core areas—writing, quantitative reasoning, scientific reasoning, oral communication, critical thinking, and information literacy and technology (or an emerging area of interest can be substituted; UVa chose undergraduate research). This year we will assess critical thinking. The University defines for itself the parameters of competency, establishes measurable outcomes, decides how student work will be assessed, evaluates the student work, analyzes the data, and interprets the results.

These assessments also serve to demonstrate University compliance with the Southern Association of Colleges and Schools (SACS) accreditation standard regarding general education:

> Comprehensive Standard 3.5.1: The institution identifies college-level general education competencies and the extent to which graduates have attained them.

SCHEV recently changed competency assessment requirements in two important ways: 1) assessment of "value-added" is no longer expected, but 2) documentation of program impact of the assessment is now required. This new requirement means that the assessments now need to be structured so that we can analyze results by school and/or individual programs where curricular decisions are made.

Critical thinking was last assessed five years ago, employing an "in-house" scoring rubric that was applied to student papers submitted for course credit. The results were of limited use due to difficulties encountered in the assessment process. This time, we will employ an existing instrument, the Critical Thinking Assessment Test (CAT), to assess undergraduates' critical thinking skills. We will also use this assessment as an opportunity to evaluate the CAT for use at the University.

Critical Thinking Assessment Test (CAT): This test, developed through a collaborative, NSF-funded effort by six universities[3] over a five-year period, is now being disseminated for wider use.

Our colleagues at Duke University, Louisiana State University, Texas A&M University, and Yale University, among other institutions, are also using the CAT to assess undergraduates' critical thinking abilities. The CAT, which has been tested for validity and reliability, is praised by users generally for five reasons: 1) no "ceiling effect" detected—there is room for improvement even at the best institutions; 2) faculty-scored, it is an 'eye-opening' tool for faculty regarding student abilities; 3) students relate well to the everyday scenarios presented in the test, 4) national user standards are available for comparison; and 5) the test can be used on a pre-post basis (e.g., before and after a course or learning experience).

Committee members will have hands-on experience with the test as they score students' written responses by applying a scoring rubric. Members will be compensated for their time scoring the tests.

[3] Howard University, Tennessee Technological University, University of Colorado, University of Hawaii, University of Southern Maine, University of Texas, and University of Washington

Critical Thinking Assessment Committee: Committee work will be facilitated by the Office of Institutional Assessment and Studies, including logistics, instrument administration and scoring, data analysis, and report preparation. As the modus operandi, faculty do the cognitive, evaluation, and analysis work, and IAS staff do the facilitative, logistical, support and coordination work. Below is a brief description of the structure and organization of the committee, as well as its goals, major tasks, and schedule.

Composition: Ten to fifteen faculty members with a pedagogical interest in critical thinking, from all schools with undergraduate students, representing each school and the major disciplinary groups within the College (humanities/arts, social sciences, sciences/math). The University Assessment Coordinator chairs the committee and IAS staff provides support.

Committee goals and tasks:

- Adopt a definition of critical thinking and of learning outcomes.
- Design a plan to assess undergraduate students' critical thinking skills employing the Critical Thinking Assessment Test.
- Score samples of student work.
- Evaluate the Critical Thinking Assessment Test.
- Analyze and interpret the results of the assessment and make recommendations for future assessments.
- Facilitate program improvements, and documentation thereof, in response to assessment results.

Schedule:

2011

Winter 2011—planning.
Spring Term 2011—assessments conducted.
Late spring 2011- student work scored.
Summer 2011—results analyzed, report drafted.
December 2011—report to Provost and deans.

Overload pay: $35/hour on an overload basis for evaluation work. Committee work is considered service.

UVaCollab site: Critical Thinking
To learn more about core competency assessment at UVa, please see:
http://www.web.virginia.edu/iaas/assess/data/competency.shtm
To learn more about the CAT, please see: http://www.tntech.edu/cat/home/

Critical Thinking Assessment Committee Members	
Name	**Affiliation**

John Corlett	School of Continuing and Professional Studies
Elizabeth Friberg	School of Nursing
Mark Hadley	Arts and Sciences: Department of Religious Studies
Deandra Little	Teaching Resource Center; Arts and Sciences: Department of English
Kirk Martini	School of Architecture
Ed Murphy	Arts and Sciences: Department of Astronomy
Kathryn Neeley	School of Engineering and Applied Science
Josipa Roksa	Arts and Sciences: Department of Sociology
Karen Schmidt	Arts and Sciences: Department of Psychology
Mark White	McIntire School of Commerce

Appendix 2: Demographics of the Sample

University of Virginia - Assessment of Critical Thinking
Demographics of the sample (n=198)

Gender

	Frequency	Percent	Pop. %
Male	62	31.3	45.0
Female	136	68.7	55.0
Total	198	100.0	100.0

Race/Ethnicity

	Frequency	Percent	Pop. %
African American	16	8.1	9.7
Asian	31	15.7	12.2
Hispanic	9	4.5	5.1
Multi-Race	1	.5	0.6
Non-Resident Alien	5	2.5	4.5
Race and Ethnicity Unknown	15	7.6	7.1
White	121	61.1	60.4
Total	198	100.0	100.0

English is Primary Language

	Frequency	Percent
Yes	187	94.4
No	11	5.6
Total	198	100.0

Proficiency with English Language

	Frequency	Percent
Excellent	170	85.9
Very Good	22	11.1
Good	6	3.0
Total	198	100.0

Age

	Frequency	Percent
< 21	4	2.0
21-25	184	93.0
>25	10	5.0
Total	198	100.0

Residency

	Frequency	Percent	Pop. %
In-State	139	70.2	71.7
Out-of-State	59	29.8	28.3
Total	198	100.0	100.0

US Citizenship Status

	Frequency	Percent	Pop. %
Alien Permanent	8	4.0	3.9
Alien Temporary	5	2.5	4.5
Native	182	91.9	90.4
Naturalized	3	1.5	1.1
Total	198	100.0	100.0

Class Standing

	Frequency	Percent
Junior	5	2.5
Senior	193	97.5
Total	198	100.0

Discipline within the College

	Frequency	Percent	Pop. %
Not in the College	68	34.3	31.4
Humanities/Fine Arts	44	22.2	23.6
Science	44	22.2	23.6
Social Science	42	21.2	21.4
Total	198	100.0	100.0

School

	Frequency	Percent	Pop. %
Architecture	6	3.0	2.6
Arts & Sciences	130	65.7	67.1
Commerce	19	9.6	9.2
Education	2	1.0	1.1
Engineering	31	15.7	15.4
Nursing	6	3.0	2.7
SCPS	4	2.0	1.9
Total	198	100.0	100.0

Cumulative GPA

	Frequency	Percent	Pop. %
1.94-3.095	45	22.7	33.3
3.10-3.503	69	34.9	33.3
3.504-4.00	84	42.4	33.4
Total	198	100.0	100.0
Mean		3.37	3.24

SAT I Verbal

	Frequency	Percent	Pop. %
320-590	28	15.1%	31.0%
600-670	60	32.5%	33.2%
680-800	97	52.4%	35.8%
Total	185	100.0%	100.0%
Mean		670	647

SAT I Math

	Frequency	Percent	Pop. %
330-630	55	29.7%	32.6%
640-700	57	30.8%	35.3%
710-800	73	39.5%	32.1%
Total	185	100.0%	100.0%
Mean		675	647

SAT I Writing

	Frequency	Percent	Pop. %
340-620	48	27.0%	34.3%
630-680	55	30.9%	31.4%
690-800	75	42.1%	34.3%
Total	178	100.0%	100.0%
Mean		667	650

Appendix 3: CAT User Norms

Average College Entrance Score		Upper division
ACT (Composite)	SAT (Verbal & Quantitative)	CAT Score (Estimated)
13	620	10.79
14	680	11.93
15	740	13.07
16	780	13.83
17	830	14.78
18	870	15.54
19	910	16.30
20	950	17.06
21	990	17.82
22	1030	18.58
23	1070	19.34
24	1110	20.10
25	1140	20.67
26	1180	21.43
27	1220	22.19
28	1260	22.95
29	1300	23.71
30	**1340** (UVa = 1345)	**24.47**
31	1380	25.23
32	1420	25.99
33	1470	26.94
34	1520	27.89

Appendix 4: Performance by Question

The first four columns represent a map of skills theoretically addressed by each question. The final three columns report aggregate results for the sample by question and overall.

University of Virginia - Institutional Profile								
N=198								
Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm		Skill assessed by CAT Questions	Mean	Std. Deviation	Avg.% of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.81	0.39	81%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.61	1.16	54%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	2.07	0.98	69%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	2.37	1.15	59%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.88	0.33	88%
		X	X	Q6	Provide alternative explanations for spurious associations.	2.02	0.72	67%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	1.14	0.64	57%
X				Q8	Determine whether an invited inference is supported by specific information.	0.85	0.35	85%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.30	0.66	65%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.38	0.72	85%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.32	0.63	66%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.86	0.34	86%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.84	1.07	61%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.26	1.79	65%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	2.22	0.93	74%
13.95	16.39	11.12	17.31		CAT Total Score	25.95	5.06	68%
69.8%	68.3%	65.4%	64.1%					
0.41	0.52	0.48	0.47	0.59	α (internal consistency)[4]			

[4] α is Cronbach's alpha, a measure of internal consistency - the extent to which all of the items of a test measure the same latent variable.

Appendix 5: High Performers vs. Low Performers by Question

High Performers vs. Low Performers								
N=198								
Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm		Skill assessed by CAT Questions	Low Mean	High Mean	Effect Size[5]
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.76	0.89	0.03
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.30	2.04	0.10
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.50	2.52	0.29
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	1.73	3.19	0.35
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.79	0.95	0.06
		X	X	Q6	Provide alternative explanations for spurious associations.	1.70	2.40	0.22
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	1.05	1.38	0.07
X				Q8	Determine whether an invited inference is supported by specific information.	0.78	0.90	0.03
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.09	1.50	0.09
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.12	3.72	0.16
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.21	1.45	0.04
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.78	0.91	0.03
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.05	2.51	0.43
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	1.62	4.28	0.44
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.67	2.65	0.25
					CAT Total Score	20.14	31.29	0.79

[5] Effect size quantifies the size of the difference between the two groups. Larger effect sizes indicate more substantive differences between groups.

Appendix 6: Results by School, and Discipline within the College

University of Virginia – School of Engineering Profile								
N=37								
Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm		Skill assessed by CAT Questions	Mean	Std. Deviation	Avg.% of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.84	0.37	84%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.49	1.19	50%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	2.08	0.98	69%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	2.70	0.97	68%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.89	0.32	89%
		X	X	Q6	Provide alternative explanations for spurious associations.	2.06	0.65	69%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	1.03	0.65	52%
X				Q8	Determine whether an invited inference is supported by specific information.	0.81	0.4	81%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.36	0.71	68%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.57	0.5	89%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.57	0.5	79%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.97	0.16	97%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.73	1.15	58%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.41	1.69	68%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	2.43	0.88	81%
14.31	17.41	11.66	18.13		CAT Total Score	26.94		71%
71.6%	72.5%	68.6%	67.1%					

University of Virginia - Architecture Profile								
N=11								
Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm		Skill assessed by CAT Questions	Mean	Std. Deviation	Avg.% of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.73	0.47	73%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.18	1.25	39%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	2.09	0.94	70%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	2.81	1.08	70%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.82	0.41	82%
		X	X	Q6	Provide alternative explanations for spurious associations.	2.09	0.54	70%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	1.09	0.54	55%
X				Q8	Determine whether an invited inference is supported by specific information.	1.00	0	100%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.36	0.51	68%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.55	0.52	89%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.09	0.54	55%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.91	0.3	91%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	2.45	0.69	82%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	4.36	0.67	87%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	2.45	0.82	82%
15.18	18.71	11.89	18.52		CAT Total Score	27.98		74%
75.9%	78.0%	69.9%	68.6%					

University of Virginia - Commerce Profile								
N=39								
Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm		Skill assessed by CAT Questions	Mean	Std. Deviation	Avg.% of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.87	0.34	87%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.74	1.11	58%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	2.25	0.88	75%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	2.59	1.37	65%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.97	0.16	97%
		X	X	Q6	Provide alternative explanations for spurious associations.	1.97	0.81	66%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	1.03	0.63	52%
X				Q8	Determine whether an invited inference is supported by specific information.	0.90	0.31	90%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.41	0.68	71%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.28	0.65	82%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.33	0.7	67%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.85	0.37	85%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.51	1.09	50%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	2.79	1.87	56%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	2.13	0.95	71%
13.39	15.51	11.38	17.24		CAT Total Score	25.62		67%
67.0%	64.6%	66.9%	63.9%					

University of Virginia - Nursing Profile								
N=19								
Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm		Skill assessed by CAT Questions	Mean	Std. Deviation	Avg.% of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.84	0.38	84%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	0.95	0.91	32%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	2.05	0.71	68%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	2.79	1.08	70%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	1.00	0	100%
		X	X	Q6	Provide alternative explanations for spurious associations.	2.12	0.86	71%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	1.00	0.67	50%
X				Q8	Determine whether an invited inference is supported by specific information.	0.95	0.23	95%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.39	0.68	70%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.37	0.68	84%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.26	0.65	63%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.84	0.38	84%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.68	1.11	56%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.79	1.69	76%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.89	1.15	63%
13.84	16.62	11.24	17.24		CAT Total Score	25.92		68%
69.2%	69.3%	66.1%	63.9%					

University of Virginia - Humanities and Fine Arts (within CLAS) Profile								
N=46								
Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm		Skill assessed by CAT Questions	Mean	Std. Deviation	Avg.% of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.91	0.29	91%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.70	1.17	57%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	2.19	0.98	73%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	2.24	1.1	56%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.78	0.42	78%
		X	X	Q6	Provide alternative explanations for spurious associations.	1.91	0.81	64%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	1.20	0.54	60%
X				Q8	Determine whether an invited inference is supported by specific information.	0.72	0.46	72%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.30	0.63	65%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.30	0.87	83%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.33	0.63	67%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.80	0.4	80%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.96	1.11	65%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.02	1.04	60%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	2.39	0.83	80%
13.72	16.24	11.23	17.28		CAT Total Score	25.75		68%
68.6%	67.7%	66.1%	64.0%					

University of Virginia - Science (within CLAS) Profile								
N=58								
Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm		Skill assessed by CAT Questions	Mean	Std. Deviation	Avg.% of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.83	0.38	83%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.79	1.18	60%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.97	1.04	66%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	2.41	1.23	60%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.90	0.31	90%
		X	X	Q6	Provide alternative explanations for spurious associations.	2.02	0.69	67%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	1.30	0.7	65%
X				Q8	Determine whether an invited inference is supported by specific information.	0.86	0.35	86%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.38	0.7	69%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.60	0.62	90%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.28	0.67	64%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.91	0.28	91%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.83	1.05	61%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.16	1.95	63%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	2.26	0.81	75%
14.25	16.75	11.34	17.57		CAT Total Score	26.50		70%
71.3%	69.8%	66.7%	65.1%					

University of Virginia - Social Science (within CLAS) Profile								
N=42								
Evaluate and Interpret Info	Problem Solving	Creative Thinking	Effective Comm		Skill assessed by CAT Questions	Mean	Std. Deviation	Avg.% of Attainable Points
X				Q1	Summarize the pattern of results in a graph without making inappropriate inferences.	0.71	0.46	71%
X			X	Q2	Evaluate how strongly correlational-type data supports a hypothesis.	1.51	1.19	50%
		X	X	Q3	Provide alternative explanations for a pattern of results that has many possible causes.	1.97	0.81	66%
	X	X	X	Q4	Identify additional information needed to evaluate a hypothesis.	2.13	1.29	53%
X				Q5	Evaluate whether spurious information strongly supports a hypothesis.	0.88	0.33	88%
		X	X	Q6	Provide alternative explanations for spurious associations.	2.10	0.66	70%
	X	X	X	Q7	Identify additional information needed to evaluate a hypothesis.	1.10	0.62	55%
X				Q8	Determine whether an invited inference is supported by specific information.	0.88	0.33	88%
		X	X	Q9	Provide relevant alternative interpretations for a specific set of results.	1.20	0.63	60%
X	X			Q10	Separate relevant from irrelevant information when solving a real-world problem.	3.29	0.77	82%
X	X		X	Q11	Use and apply relevant information to evaluate a problem.	1.40	0.67	70%
	X			Q12	Use basic mathematical skills to help solve a real-world problem.	0.86	0.35	86%
X	X			Q13	Identify suitable solutions for a real-world problem using relevant information.	1.95	0.99	65%
X	X		X	Q14	Identify and explain the best solution for a real-world problem using relevant information.	3.26	1.69	65%
	X	X	X	Q15	Explain how changes in a real-world problem situation might affect the solution.	1.98	1.02	66%
13.88	15.97	10.48	16.65		CAT Total Score	25.22		66%
69.4%	66.5%	61.6%	61.7%					

Appendix 7: Faculty Professional Development re: Teaching Higher Order Learning

Teaching Resource Center

Workshops ~

Programs
Workshops
Consultations
Publications
Teaching Tips
Awards
Resources
TRC Library

Recent & Upcoming Workshops

Promoting and Assessing Students' Higher-Order Learning
Linda B. Nilson, *Director, Office of Teaching Effectiveness and Innovation*

Date: Friday, March 23
Time: 3:00 - 5:00 pm
Location: Rouss & Robertson Hall, Room 403
Register now!

Measuring students' facility in higher-order thinking demands thoughtful and well-designed assessment instruments, particularly since even defining these higher-order learning goals can be challenging. This workshop will simplify and systematize the assessment process by enabling you to measure, with good accuracy, your students' progress toward achieving higher-order thinking/learning outcomes by means of both written work—really any form of work students construct—and multiple choice items. You will also be able to measure your students' overall learning in your course and produce results that are suitable to submit for your faculty reviews. We will focus primarily on solid pre-/post-test measures but will give some attention to three weaker methods that are sometimes used.

Sponsored by the Teaching Resource Center's Tomorrow's Professor Today Program and the Office of Institutional Assessment and Studies

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Linda B. Nilson is founding director of the Office of Teaching Effectiveness and Innovation (OTEI) at Clemson University and author of *Teaching at Its Best: A Research-Based Resource for College Instructors*, now in its third edition (Jossey-Bass, 2010) and *The Graphic Syllabus and the Outcomes Map: Communicating Your Course* (Jossey-Bass, 2007). She also co-edited *Enhancing Learning with Laptops in the Classroom* (Jossey-Bass, 2005) and Volumes 25 and 26 of the major publication of the Professional and Organizational Development Network in Higher Education, *To Improve the Academy: Resources for Faculty, Instructional, and Organizational Development*, as associate editor (Anker, 2007, 2008), and Volumes 27 and 28 as head editor (Jossey-Bass, 2009, 2010). Her most recent article, which addresses the instability of faculty development careers, just came out in Volume 30 of this publication.

Dr. Nilson has also published many articles and book chapters and has presented conference sessions and faculty workshops at colleges and universities both nationally and internationally on dozens of topics related to teaching effectiveness, assessment, scholarly productivity, and academic career matters.

Before coming to Clemson University, she directed teaching centers at Vanderbilt