A REPORT ON CRITICAL THINKING
AT THE UNIVERSITY OF VIRGINIA

Submitted by the Critical Thinking Competency Assessment Committee

Coordinated by the Office of Institutional Assessment and Studies
Report written by IAS staff (Catherine Boyd, Doug Loyd, Jonathan Schnyer)

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In summer 2005, UVa's Office of Institutional Assessment and Studies (IAS) began the assessment of undergraduate student critical thinking competence. The Critical Thinking Competency Assessment Committee convened to design assessment criteria. The committee defined a range of learning outcomes and set targets for achievement. The committee defined critical thinking competency as the *process of analyzing, evaluating, and constructing arguments based on their merits. Critical thinking has its basis in intellectual values that transcend subject matter divisions.* The committee decided to collect student papers to assess critical thinking competence and designed a scoring rubric to evaluate four critical thinking learning outcomes. Papers were scored 1-4 (not competent, minimally competent, competent, highly competent) on each learning outcome. (For more information on the assessment process, see Section I on page 4.)

Results

The committee set very high standards for overall student performance for this first University-wide critical thinking core competency assessment. Looking at all of the papers as a whole, students fell somewhat below the committee's standards. The overall mean score was 2.8 (17% "highly competent"), compared to the target of 3.1 (40% "highly competent"). However, student papers 15 pages or longer exceeded the high standard the committee set—a mean score of 3.3 (37% "highly competent").

In terms of individual outcomes, students overall demonstrated reasonably well their ability to "carefully interpret, analyze, and evaluate evidence, statements, graphics, questions, etc." The mean score was 3.0—just shy of the goal of 3.1. Less impressive were the students' abilities to construct arguments, sustain them, and draw logical conclusions (mean scores 2.7, 2.8 and 2.8, respectively). Students who wrote longer papers did very well on all of the outcomes. (For more information on the results, see Section II on page 5.)

Findings

1. The definition the Critical Thinking Competency Assessment Committee adopted for this assessment required students to verbalize their analysis and evaluation of evidence, the formulation and sustenance of an argument, and the creation and justification of a logical conclusion. While the committee strongly believes all students should be taught this type of verbalized critical thinking, we recognize that it is not the only form of critical thinking that is important.

2. On the whole, students were competent, but shorter papers (<15 pages) did not reach the level of excellence faculty expected. While the committee felt critical thinking could be demonstrated in shorter papers, even 3-5 pages, the evidence that our undergraduate students can accomplish this was not found in this assessment.

3. Committee members noted that some of the assignments did not appear to be suited for assessing all of the defined learning outcomes. While information about the assessment was shared with potential faculty contributors, it is clear that the process of communicating the expected outcomes first to faculty and then to students could and should be improved. (For more information on the committee's findings, see Section III on page 6.)

Recommendations

1. During the next assessment collect a sufficient number and representative sample of papers 15 pages or longer to determine if graduating fourth years meet the University's standards. Shorter papers should be collected too for purposes of comparison. Other data may be needed to explain differences in student performance depending upon paper length.

2. Change the assessment process by identifying in advance a sample of departments and programs to participate in the assessment. A meeting should be held with participating chairs and/or assessment coordinators to ensure that an appropriate, representative sample of student work is identified and evaluated.

3. Prior to the next assessment, develop alternative tools for assessing critical thinking in disciplines that value critical thinking that is nonverbal and/or not written. (For more information on the committee's recommendations see Section IV on page 7.

I. ASSESSMENT PROCESS AND METHODOLOGY

In the summer of 2005, IAS began the SCHEV-mandated process of assessing the competence of undergraduate students in two areas: critical thinking and oral communication. Four other competencies had been assessed in 2002 (writing and technological competence) and 2004 (mathematical reasoning and scientific reasoning). While SCHEV required assessment of only 5% of the graduating class (about 160 students), the University Assessment Coordinator recommended, and the Vice President and Provost approved, that more students be assessed so that each of the six schools with undergraduate programs could gauge its students' performance. Faculty committees to oversee and direct the assessment process convened in June and July of 2005.

As its first task, the Critical Thinking Competency Assessment Committee defined critical thinking as *the process of analyzing, evaluating, and constructing arguments based on their merits. Critical thinking has its basis in intellectual values that transcend subject matter divisions.* The committee also defined the expected student learning outcomes of the assessment. Undergraduate students graduating from the University of Virginia should be able to:

- Carefully interpret, analyze, and evaluate evidence, statements, graphics, questions, etc.
- Construct well-supported, clearly articulated, and sustained arguments.
- Justify conclusions based on well-supported arguments.

The committee developed a skills-based, four-point descriptive scoring rubric for assessing undergraduate students in upper-level classes on the above learning outcomes and established the following targets:

- 40% would be highly competent (score of 4);
- 85% would be competent (score of 3 and above);
- 95% would be minimally competent (score of 2 and above).

In the fall and spring semesters of the academic year 2005-06, deans and department chairs of each undergraduate school identified upper-level courses in the major which required papers that should demonstrate critical thinking. Many, though not all, faculty teaching the identified courses volunteered to participate and received the definition of critical thinking competency along with the assessment's goals, outcomes, and scoring rubric to ensure they could identify appropriate assignments for assessment. IAS collected papers in both the fall and spring.

For the assessment 366 papers[1] were collected from upper-level courses in 26 majors, representing 64% of the graduating fourth-years at the University. Within the College, papers from 10 different majors were collected, representing 53% of the graduating fourth-years in the College. In a number of these classes from which papers were collected, students outside of the major were enrolled, adding a small sample of respondents from 3 additional majors. Outside of the College, papers from 16 majors were collected, representing 100% of the graduating fourth-years from the schools of Architecture, Commerce, Engineering, Nursing, and Continuing and Professional Studies (BIS).

During two workshops in the winter and spring, 17 faculty and four experienced graduate TA evaluators participated in norming sessions and then scored the students' work using the scoring rubric. Each skill could receive a score from 4 (highly competent) to 1 (not competent), and an average score for each student was calculated. Two evaluators scored each paper. In cases where the two evaluations differed significantly, a third evaluator scored the paper. The summary results are reported in Section II on page 4. For additional details about the methodology, see Appendix C, under "Description of Methodology Used to Gather Evidence."

In reflecting on the assessment process, the committee makes the following observations:

1. Targets for the number of papers collected were not met, preventing effective analysis of the results by each of the five schools participating in the assessment (the College and Nursing being the exceptions).

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[1] Additionally, twelve oral presentations from the School of Architecture were evaluated for critical thinking and included as part of the sample.

2. The rubric measured what the committee wanted it to (validity), and was applied in a reasonably consistent manner (reliability); however, some of the papers did not fit or satisfy the learning outcomes the committee had identified.

3. The definition adopted by the committee was specifically verbal—it did not allow for the assessment of visual representations of critical thinking, and other types of critical thinking that may take place extemporaneously. In future assessments, some schools (particularly Architecture and Nursing) may find that additional definitions and rubrics may capture other types of critical thinking that this verbal definition did not.

II. SUMMARY OF RESULTS

The committee set very high standards for overall student performance for the critical thinking assessment:

- 40% of undergraduates are expected to be highly competent (score of 4);
- 85% competent (score of 3 and above);
- 95% minimally competent (score of 2 and above).

Looking at all of the papers as a whole, students fell somewhat below the committee's standards. For example, even though 99% of the students were found to be minimally competent or better (exceeding the standards), only 17% scored "highly competent," well below the target set by the committee of 40%. Seventy-four percent scored competent or better, compared to the target of 85%. The overall mean score was 2.8, compared to 3.1, which is an estimate of the mean had the University met its targets exactly.

While these overall results appear disappointing, further analysis revealed that students who wrote longer papers were able to meet, and even exceed, the committee's standards. This analysis was the result of observations by evaluators that some of the assignments did not seem appropriate for the assessment. Very short papers or homework assignments were specifically mentioned. Further investigation revealed that student papers less than 15 pages in length received scores much lower than those students whose papers were 15 pages or longer. While the mean score for the shorter papers was 2.7 (only 13% "highly competent"), papers 15 pages or longer had a mean score of 3.3, (37% "highly competent"). While there were only 45 papers collected that were 15 pages or longer, a statistically significant correlation between length of paper and score is observed when looking at the shortest papers (8 pages or less) and medium length papers (9-14 pages). The mean scores for these groupings are 2.7 and 2.9, respectively. Thus, while not linear, the relationship between page length and performance is strong, bolstering the probability that the excellent results observed for the longest papers (15 pages or longer) are not an aberration (see Table 1 on page 6).

It is not clear why this is the case. It could be that the assignments for 15 page papers were more closely aligned with the learning outcomes. Another alternative is that better students are more likely to write longer papers. Another alternative is that undergraduate students need a longer paper to demonstrate their critical thinking skills. Further analysis in future assessments will be necessary to determine which of these explanations, or some other explanation, is most salient.

Breaking the results down by the individual items/outcomes on the rubric, it is clear that students are somewhat better at interpreting, analyzing, and evaluating evidence, statements, graphics, and questions. An overwhelming majority of students (87%) received a score of competent or higher on this outcome. This number was even higher for those students submitting papers of 15 pages or longer (91%). These are impressive figures demonstrating our undergraduates' skills in this area.

About three-quarters of all students (~90% for 15 pp or higher) were competent or better on the remaining three outcomes:

- Justifies conclusions on the basis of well-supported arguments
- Develops and sustains clearly articulated thesis supported by arguments throughout the narrative
- Constructs well-supported arguments

Thus there is a small gap (~10%) between expected performance and actual performance when all papers are taken into account, but the gap disappears when considering only the longer papers.

Table 1

Student Performance by Length of Paper				
	<15 pages		≥15 pages	
	% Highly Competent	Mean Score	% Highly Competent	Mean Score
Overall	13%	2.7	37%	3.3
Carefully interprets, analyzes, and evaluates evidence, statements, graphics, questions, etc.	24%	2.9	51%	3.3
Constructs well-supported arguments	15%	2.6	46%	3.2
Develops and sustains clearly articulated arguments throughout the narrative	20%	2.7	44%	3.2
Justifies conclusions on the basis of well-supported arguments	22%	2.7	60%	3.3

Note: Weighted by school and discipline for overall representativeness

The relative ranking of all undergraduate schools was not possible due to sample sizes that fell somewhat short of the sampling goal for most schools. Results for the schools that had sufficient sample sizes are as follows:

- The College of Arts and Sciences (mean 2.8, 19% "highly competent").
- The School of Nursing (mean 2.8, 9% "highly competent").

For further details about these results, please see Appendix D, Tables 1-3.

III. COMMITTEE FINDINGS

The definition the Critical Thinking Competency Assessment Committee adopted for this assessment required students to verbalize their analysis and evaluation of evidence, the formulation and sustenance of an argument, and the creation and justification of a logical conclusion. This type of verbalized critical thinking is common in academic discourse but not necessarily a skill that upper-level undergraduates engage explicitly, particularly when they write papers less than 15 pages in length. While the committee strongly believes all students should be taught the type of verbalized critical thinking defined and evaluated in this assessment, we recognize that it is not the only form of critical thinking that is important, and that the rubric designed for this assessment was not appropriate for evaluating other types of critical thinking that might be required. For example, in the Architecture school, oral presentations of complex visual designs were difficult to evaluate using the rubric. Much of the critical thinking that went into the architectural design was not being verbalized and thus was not reflected in the evaluation. Another example concerned the type of critical thinking nurses are most often called upon to do. Nursing students are expected to think critically "on their feet," in response to a number of external factors and using knowledge and practices that nurses are taught. These types of critical thinking could not be evaluated using the rubric designed by the committee.

On the whole, students were competent, but most of the students' papers did not reach the level of excellence faculty expected. Overall, only 17% reached the level of "highly competent" (compared to a target of 40%), and the mean score, 2.8, fell short of the target of 3.1. However, when examining the longer papers (≥ 15 pages), evaluators found the high level of competence for which they were looking. The mean score for these papers was 3.3 and 37% achieved "highly competent." Unfortunately, only 45 of the submitted papers were this long. While the committee felt critical thinking could be demonstrated in shorter papers, even 3-5 pages, the evidence that our undergraduate students can accomplish this was not found in this assessment.

In terms of individual outcomes, students overall demonstrated reasonably well their ability to "carefully interpret, analyze, and evaluate evidence, statements, graphics, questions, etc." The mean score was 3.0—just shy of the goal of 3.1. Less impressive were the students' abilities to construct arguments, sustain them, and

draw logical conclusions (mean scores 2.7, 2.8 and 2.8, respectively). Scores indicate these abilities (to articulate and sustain an academic argument and to form justifiable conclusions) to be substantially lower than expectations for most of these assignments. As was the case for the overall results discussed in the preceding paragraph, however, students who wrote longer papers did very well on all of the outcomes, including constructing arguments, sustaining arguments, and drawing logical conclusions (mean scores of 3.2, 3.2 and 3.3, respectively).

Committee members noted that some of the assignments did not appear to be suited for assessing *all* of these learning outcomes. While the definition, goals and outcomes were shared with deans and department chairs, and a website was created to facilitate the dissemination of information, and the scoring rubric was shared with faculty teaching the courses along with a document to share with students, it is clear that the process of communicating the expected outcomes first to faculty and then to students could and should be improved.

A related issue to appropriateness is how long the papers need to be. While it was decided to leave it up to the faculty teaching the courses whether an assignment was appropriate to allow students to demonstrate critical thinking, the committee believed a student could achieve critical thinking excellence in a short paper of 3-5 pages. The range of papers submitted for the assessment was vast (2-164 pages), but the overwhelming majority (73%) of papers were between 8 and 20 pages. Given the significantly higher scores of the longer papers, the issue of length is one that needs to be addressed not only from a methodological point of view but a pedagogical one as well. Are students given sufficient opportunities to learn succinct, critical writing? Should undergraduate students be able to demonstrate critical thinking excellence in short papers?

The cooperation between faculty and IAS, excellent for those classes that participated, was not sufficiently broad to achieve a varied representation of disciplines and courses for the assessment, and to allow the results to be broken down by school, where curriculum decisions are made and the results could be most useful. Targets for the number of papers collected fell significantly short in all but two of the schools (the College and Nursing). Overall, only 2/3 of the papers necessary to analyze the results by each of the undergraduate schools were collected. Individual schools fell short, achieving 24, 39, 53 and 55 percent of the targets IAS set. In short, the effort to identify and collect appropriate, representative assignments for the assessment needs improvement.

IV. COMMITTEE RECOMMENDATIONS

Given the varied performance of students, depending upon the length of the paper evaluated, it is necessary to determine whether a sufficient number of UVa students can demonstrate excellent critical thinking in a 15 page paper or longer. Moreover, additional emphasis should be placed on collecting assignments for the assessment that are in alignment with the learning outcomes delineated on the scoring rubric. Lastly, participation should be elicited from a broader range of majors, particularly within the College of Arts and Sciences.

1. Recommendation: During the next assessment, collect a sufficient number and representative sample of papers 15 pages or longer to determine if graduating fourth years meet the University's standards. Shorter papers should be collected too for purposes of comparison. Other data may be needed to explain differences in student performance depending upon paper length.

2. Recommendation: Identify a sample of departments and programs to participate in the assessment and then require the identification of courses and student work appropriate for the assessment. A meeting should be held with participating chairs and/or assessment coordinators to ensure that an appropriate, representative sample of student work is identified and evaluated. Ensure the effective exchange of information between IAS, faculty teaching the courses, and students working on the assignments.

Aside from being articulated in papers, critical thinking takes place in a variety of academic contexts. While this assessment focused primarily on written papers, one important consideration for the next critical thinking assessment cycle is to identify tools for evaluating the kind of critical thinking that is not articulated formally in a paper. Architects, artists, engineers, nurses must all think critically in order to succeed in their profes-

sions, but verbally in writing may not be the only appropriate and important focus for assessing critical thinking in those disciplines.

3. Recommendation: Prior to the next assessment, develop alternative tools for assessing critical thinking in disciplines that value critical thinking that is nonverbal and/or not written. Such tools may require developing definitions, learning outcomes and standards that are specific to certain disciplines or schools—based upon the type of critical thinking most important to faculty in those schools/disciplines.

Depending upon the results from the next assessment cycle, additional dialogue/discussion may be needed among faculty to examine important questions about critical thinking teaching: Should additional emphasis be placed in the first and second writing requirement courses on developing and sustaining arguments and drawing logical conclusions? How should critical thinking be taught within the major curriculum? Are undergraduate students being given sufficient opportunities to develop fully their ability to think critically? Should additional training be provided for faculty wishing to improve their critical thinking teaching? These questions should be answered in the context of having data from an additional assessment cycle.

APPENDICES

CRITICAL THINKING COMPETENCY ASSESSMENT PLAN²
UNIVERSITY OF VIRGINIA

Definition:

Critical thinking is the process of analyzing, evaluating, and constructing arguments based on their merits. Critical thinking has its basis in intellectual values that transcend subject matter divisions.

Goal:

One of the University of Virginia's most important goals is "fostering in students the habits of mind and character required to develop a generous receptivity to new ideas, from whatever source [and] a disposition for applying the most rigorous criticism to all ideas and institutions, whether old or new." Critical thinking is central to the University's mission, and our graduates should demonstrate excellent critical thinking skills in their communications.

Student Learning Outcomes:

Undergraduate students graduating from the University of Virginia should be able to:
* Carefully interpret, analyze, and evaluate evidence, statements, graphics, questions, etc.
* Construct well-supported, clearly articulated, and sustained arguments.
* Justify conclusions based on well-supported arguments.

Standards:

The following standards have been established:
> 40% of undergraduates are expected to be highly competent (score of 4);
> 85% competent (score of 3 and above);
> 95% minimally competent (score of 2 and above).

Description of Methodology Used to Gather Evidence:

The University will use one standard/rubric for all the undergraduate schools, but each assessment will be conducted at the school level. Sufficient sample sizes will be utilized to ensure that the results can be reported by school, and the individual assessments will be conducted by school faculty. Because each undergraduate school is responsible for designing its own curriculum, this method will allow schools to make the best use of the assessment results. School results will be aggregated to form an overall result for the University.

For each school, and for each major within a school, school deans and department chairs will identify upper-level courses in the major, such as seminars and capstone courses, which require papers *and* expect critical thinking to be demonstrated for those assignments. Within each school's list of courses, a sample of courses will be selected, from which electronic versions of papers will be collected for the assessment. The courses in the assessment sample would be chosen, and if necessary weighted by discipline, to ensure that a majority of graduating fourth-years are represented within each school.

Using a skills-based, descriptive scoring rubric, faculty evaluators from each school will score papers. The individual skills will be assigned a score from 4 (highly competent) to 1 (not competent); an overall score for each student will be calculated by summing and averaging the scores for each individual skill. Each paper will be scored twice and a third time if the first two overall scores differ by more than one point; final scores will be the average of the overall individual scores. Results will be reported and evaluated for the six undergraduate schools as well as aggregated for the University as a whole.

Summary: *(Provide analysis of results)*

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² The development of the University of Virginia's critical thinking competency assessment plan was coordinated by the Office of Institutional Assessment and Studies. A faculty committee composed of representatives of the undergraduate schools wrote the definition, goal, learning outcomes and standards.

UNIVERSITY OF VIRGINIA
CORE COMPETENCY ASSESSMENT
CRITICAL THINKING SCORING RUBRIC

Paper ID	_____
Rater ID	_____

SCORING GUIDE:
1 = Not Competent   2 = Minimally Competent   3 = Competent   4 = Highly Competent

Assign one whole number to each objective:

OBJECTIVE	*Not Competent*	*Minimally Competent*	*Competent*	*Highly Competent*
Carefully interprets, analyzes, and evaluates evidence, statements, graphics, questions, etc.	1	2	3	4
Constructs well-supported arguments	1	2	3	4
Develops and sustains clearly articulated arguments throughout the narrative	1	2	3	4
Justifies conclusions on the basis of well-supported arguments	1	2	3	4

Definition:

Critical thinking is the process of analyzing, evaluating, and constructing arguments based on their merits. Critical thinking has its basis in intellectual values that transcend subject matter divisions.

Goal:

One of the University of Virginia's most important goals is "fostering in students the habits of mind and character required to develop a generous receptivity to new ideas, from whatever source [and] a disposition for applying the most rigorous criticism to all ideas and institutions, whether old or new." Critical thinking is central to the University's mission, and our graduates should demonstrate excellent critical thinking skills in their communications.

Student Learning Outcomes:

Undergraduate students graduating from the University of Virginia should be able to:
- Carefully interpret, analyze, and evaluate evidence, statements, graphics, questions, etc.
- Construct well-supported, clearly articulated, and sustained arguments.
- Justify conclusions based on well-supported arguments.

Standards:

The University of Virginia expects 95% of its graduates to be minimally competent in critical thinking.

Description of Methodology Used to Gather Evidence:

The University of Virginia used one standard and rubric for all the undergraduate schools. It was hoped that sufficient sample sizes would ensure that the results could be reported for each of the undergraduate schools.[4] Because each undergraduate school is responsible for designing its own curriculum, this method allows schools to make the best use of the assessment results. Unfortunately, some of the school sample sizes were not large enough to make the results useful at the school level. School results have been aggregated to form an overall result for the University. The sampling error for the aggregated overall result was a very acceptable .06 at a 95% confidence level.

In the fall and spring semesters of the academic year 2005-06, for each undergraduate school, and for each major within a school, deans and department chairs were asked to identify upper-level courses in the major, such as seminars and capstone courses, which required papers *and* expected critical thinking to be demonstrated for those assignments. Within each school's list of courses, a sample of courses was selected, from which either electronic or printed versions of papers were collected for the assessment. The courses in the assessment sample were chosen, and if necessary weighted by discipline, to ensure that at least a majority of graduating fourth-years were represented within each school.

For the Critical Thinking competency assessment, 378 papers were collected from upper-level courses in 26 majors, representing 64% of the graduating fourth-years at the University. Within the College, papers from 10 different majors were collected, representing 53% of the graduating fourth-years in the College. In a number of these classes from which papers were collected, students outside of the major were en-

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[3] The development of the University of Virginia's critical thinking competency assessment plan was coordinated by the Office of Institutional Assessment and Studies. A faculty committee composed of representatives of the undergraduate schools wrote the definition, goal, learning outcomes, and standards, created the scoring rubric and conducted the evaluations of student work. Institutional Assessment and Studies staff coordinated the collection of papers and the evaluation workshops, conducted the data analysis, and wrote this report.
[4] Results for undergraduates in the Curry School of Education were not compiled separately because students in the five-year joint BA/MT degree in the Curry School were included in the sampling of students from the College of Arts and Sciences.

rolled, adding a small sample of respondents from 3 additional majors. Outside of the College, papers from 16 majors were collected, representing 100% of the graduating fourth-years from the schools of Architecture, Commerce, Engineering, Nursing, and Continuing and Professional Studies (BIS).

Using a skills-based, four-point descriptive scoring rubric (see Appendix), ten faculty and four experienced graduate TA evaluators scored the papers during a series of workshops in the winter and spring. Norming sessions were held at the beginning of each workshop. The four individual skills were assigned a score from 4 (highly competent) to 1 (not competent); an overall score for each student was calculated by summing and averaging the scores for each individual skill. Each paper was scored twice, and a third time if the score on two or more skills differed by more than one point. The University's final scores are the average of the overall individual scores.

Reliability analysis was used to evaluate the reliability of the rubric and evaluators. The results indicate that the four items on the Critical Thinking rubric form a reliable scale (Cronbach's alpha was .92). In terms of inter-rater reliability, the percentage of exact agreement among item ratings (first two reviewers) was 48.2%. The percentage of disagreement by more than one point among item ratings was 3.2%. The need for third raters thus was very low.

Summary:

For assessment of the critical thinking core competency, the Office of Institutional Assessment and Studies coordinated the collection of 378 student papers in third- and fourth-year classes in the major. The University was required to assess 5% of the graduating fourth-year class (approximately 170 students); more than twice this number were assessed in the hope that the results could be broken down by each undergraduate school. Papers were evaluated by a faculty committee which developed a descriptive scoring rubric for that purpose. Application of the rubric resulted in the following results for the University as a whole:

Overall Scores - Weighted by School and Discipline			
Score*	Count	%	
4	64	16.9	(17% Highly Competent)
3	215	62.1	(74% Competent)
2	95	25.3	(99% Minimally Competent)
1	3	0.8	(1% Not Competent)

*4 = Highly Competent (3.5-4.0), 3 = Competent (2.5-3.499), 2 = Minimally Competent (1.5-2.499), 1= Not Competent (<1.5)
The data in this table are weighted. The total n of 377 is caused by the need for rounding weighted results.

These overall scores are weighted by school, and scores from the College of Arts and Sciences are weighted by discipline, to ensure that the results are representative of the University's graduating fourth-year class.[5] Sampling error for the University score is 0.06 at a 95% confidence level.

As stated in the standards section above, the University expected 95% of its undergraduates to be minimally competent in critical thinking. Overall the University exceeded this goal for minimal competence with 99% of the papers rated minimally competent. Moreover, the mean and median scores of 2.8 and 2.9, respectively, indicate that the majority of UVa students substantially exceeded minimal competence on the critical thinking assessment. Nevertheless, the University's Critical Thinking Core Competency Assessment Committee will review the overall results, as well as the results of specific outcomes within the rubric, to determine if there are areas for improvement. The committee will also examine the appropriateness of the rubric and the efficacy of the process. Next steps and recommendations will be made to the Provost over summer 2006. In addition, meetings will be held with school representatives to examine the results for each school.

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[5] In calculating the weights by discipline within the College of Arts and Sciences, the Office of Institutional Assessment and Studies relied on the proportions of 2005 fourth-year graduates in the disciplines (arts and humanities, sciences, social sciences). The original sampling plan did not break the college down by discipline but relied instead on the total number of third- and fourth-year students in academic year 2004-2005. To weight the data, it was assumed that the proportion of third- and fourth-year students in the various majors within the College would be close to the proportion of 4th-year graduates.

Table 1
DETAILED RESULTS, UNIVERSITY-WIDE AND BY SCHOOL

University-Wide (Weighted by School, CLAS Weighted by Discipline)

Score*	Count	%	*Sampling error = ±4.9%, Mean = 2.81*
4	64	16.9	(17% Highly Competent)
3	215	57.0	(74% at least Competent)
2	95	25.3	(99% at least Minimally Competent)
1	3	0.8	

Architecture (ARCH) – Unweighted

Score*	Count	%	*Sampling error = ±12.6%, Mean = 2.8*
4	2	4.4	(4% Highly Competent)
3	34	75.6	(80% at least Competent)
2	8	17.8	(98% at least Minimally Competent)
1	1	2.2	

Continuing & Professional Studies (BIS) – Unweighted

Score*	Count	%	*Sampling error = ±26.6%, Mean = 2.7*
4	1	9.1	(9% Highly Competent)
3	7	63.6	(73% at least Competent)
2	3	27.3	(100% at least Minimally Competent)
1	0	0.0	

Arts and Sciences (CLAS) – Weighted by Discipline

Score*	Count	%	*Sampling error = ±8.1%, Mean = 2.8*
4	27	19.0	(19% Highly Competent)
3	79	55.8	(76% at least Competent)
2	36	25.2	(100% at least Minimally Competent)
1	0	0.0	

Commerce (COMM) – Unweighted

Score*	Count	%	*Sampling error =±11.5%, Mean = 2.9*
4	12	18.5	(19% Highly Competent)
3	43	66.2	(85% at least Competent)
2	10	15.4	(100% at least Minimally Competent)
1	0	0.0	

Nursing (NURS) – Unweighted

Score*	Count	%	*Sampling error = ±8.8%, Mean = 2.8*
4	7	9.0	(9% Highly Competent)
3	53	67.9	(68% at least Competent)
2	18	23.1	(100% at least Minimally Competent)
1	0	0.0	

Engineering (SEAS) – Unweighted

Score*	Count	%	*Sampling error = ±15.6%, Mean = 2.6*
4	4	10.5	(11% Highly Competent)
3	19	50.0	(61% at least Competent)
2	13	34.2	(95% at least Minimally Competent)
1	2	5.3	

* 4=Highly Competent, 3=Competent, 2=Minimally Competent, 1=Not Competent

Table 2
UNIVERSITY-WIDE PERFORMANCE BY OUTCOME

RATING	Not Competent (1)	Minimally Competent (2)	Competent (3)	Highly Competent (4)
OUTCOME	% of valid (non-missing) individual rater scores (Totals do not always equal 100% due to rounding effects)			
Carefully interprets, analyzes, and evaluates evidence, statements, graphics, questions, etc.	1%	15%	56%	29%
Constructs well-supported arguments	3%	21%	56%	20%
Develops and sustains clearly articulated thesis supported by arguments throughout the narrative	1%	24%	51%	24%
Justifies conclusions on the basis of well-supported arguments	2%	25%	44%	28%
OVERALL PERCENTS*	**2%**	**21%**	**52%**	**25%**

*The final score for each paper was the average of all competencies across two or more raters. This table reports raw scores, weighted for representativeness, before results were averaged. Thus it is not surprising that 25% of the raw scores for individual competencies could be "4" (highly competent), while only 17% of the papers achieved this level of "highly competent" in their overall ratings. At the other end of the scale, while only 1% of the papers were rated overall as "incompetent," 4% of the individual competency scores reported in this table were "1" (incompetent).

Table 3
SCHOOL PERFORMANCE BY OUTCOME

In the table below, the mean scores for the College of Arts and Sciences and the School of Nursing were tested for statistical significance against the theoretical score of 3.1, which would be the approximate mean score if the University had met its goals of 40% highly competent, 45% competent, and 10% minimally competent. Statistically significant differences are highlighted in gray. The other schools were not tested due to an insufficient number of cases.

OUTCOME	ARCH (N=45)	SCPS-BIS (N=11)	CLAS[1] (N=141)	COMM (N=65)	NURS (N=78)	SEAS (N=38)	OVERALL (N=378)
Carefully interprets, analyzes, and evaluates evidence, statements, graphics, questions, etc.	2.92	2.86	3.03	3.05	2.94**	2.58	2.96***
Constructs well-supported arguments	2.63	2.53*	2.76***	2.82	2.66***	2.60	2.73***
Develops and sustains clearly articulated thesis supported by arguments throughout the narrative	2.70	2.76	2.80***	2.88	2.68***	2.63	2.77***
Justifies conclusions on the basis of well-supported arguments	2.76	2.76	2.78***	2.92	2.79***	2.68	2.78***
Overall Scores	2.77	2.73	2.84***	2.92	2.77***	2.62	2.80***
Sampling Error[2]	±12.6%	±26.6%	±8.1%	±11.5%	±8.8%	±15.6%	±4.9%

***$p < .001$, **$p < .01$, *$p < .05$.

[1] Data from CLAS (College of Arts & Sciences) is weighted by discipline.

[2] The sampling error for each school is calculated at a 95% confidence level. The sampling error would be larger for any individual competency, or for any other "breakdown" of the data.