AUBURN UNIVERSITY
OFFICE OF ACADEMIC ASSESSMENT

CRITICAL THINKING – SUMMER AND FALL 2018 SCORE RESULTS

Report prepared by Dr. Megan Good, Director of Academic Assessment

EXECUTIVE SUMMARY

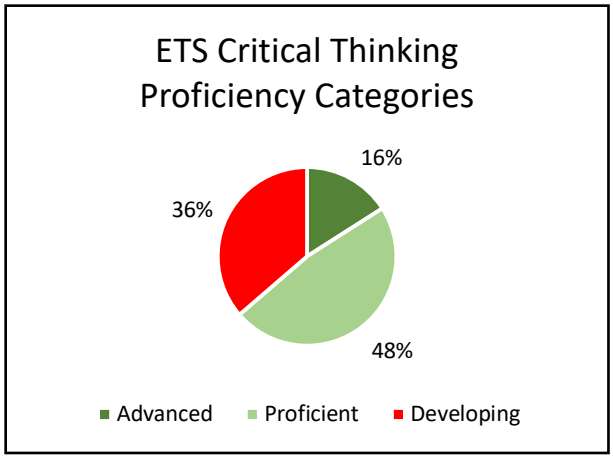
Sample

In total, 564 students took the ETS HEIghten Critical Thinking Assessment as part of the SCORE (Student Core Outcomes and Readiness Evaluation) in Summer/Fall 2018. Generally, these students were demographically similar to other seniors that graduated in Summer/Fall 2018 (though the sample had more males and a lower GPA). Students were minimally motivated to take the assessment and were neutral about the test's importance. In total, 63 students were identified as 'unmotivated' and removed from the sample, resulting in 501 usable cases.

Overall Performance

Figure 1 displays that overall, 64% of students scored a "Proficient" or "Advanced" on the assessment; our sample generally did better than the normed ETS sample group (although the normed group included data from freshmen, sophomores, juniors, and seniors). Subsequent exploratory analyses revealed statistically significant gaps in knowledge, described below.

Figure 1 – Overall Critical Thinking Scores



Gaps in Knowledge

Our hope is to create improvement initiatives where gaps in student learning are identified. For critical thinking, gaps were only identified among transfer students. Specifically:

- **Transfer:** Students who began their higher education career at Auburn as freshmen outperformed transfer students on all aspects of the critical thinking test.
- **Core Curriculum Sequence:** Students who completed their Core Curriculum Sequence requirement at Auburn (as opposed to transferring in credit or submitting AP/IB scores) scored higher on most aspects of critical thinking than students who only took one or zero parts of the sequence at Auburn.

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BACKGROUND

CHANGES TO GENERAL EDUCATION ASSESSMENT

From 2011 until 2015, general education was assessed through a "course-embedded" assessment approach. That is, faculty teaching core courses were asked to evaluate student work in their courses using a rubric developed by the Core Curriculum General Education Committee (CCGEC). There were eleven student learning outcomes and associated rubrics. In Fall 2015, the CCGEC began a year of reflection in which they met with faculty across campus to explore the effectiveness of the course-embedded assessment approach. Generally, the committee found that this approach was not working well for formative or summative assessment purposes. In 2016, the CCGEC began exploring other assessment options in an effort to centralize assessment and focus on graduating seniors. With this new focus, faculty working groups around each student learning outcome were tasked with (1) re-stating the student learning outcome with graduating seniors in mind, and (2) identifying, developing, or refining a measure aligned with the student learning outcome. All student learning outcomes were finalized by the CCGEC and approved by the University Senate in October 2017.

OUTCOME, ASSESSMENT, AND ALIGNMENT

In 2011 there were two outcomes related to critical thinking. Specifically, the original version of these outcomes written in 2011 stated: (2) Students will be able to read analytically and critically; and (3) Students will be able to critique and construct an argument effectively. The working group for this outcome was composed of faculty from the English (Dr. Miriam Clark) and Philosophy (Dr. James Shelley and Dr. Michael Watkins) departments. To meet their charge, the working group met bi-weekly during the Fall 2016 semester and again during the Spring 2017 semester and drafted a new, single outcome statement. Specifically, outcomes 2 and 3 were refined to: "Students will be able to read and think critically." The CCGEC, to create consistency, developed a preface statement for the set of outcomes; thus, new outcome reads in totality: ***"In order to become lifelong learners and use their education to solve practical problems, by the time of graduation, students will be able to effectively… read and think critically."***

The working group also determined 3 sub-outcomes:

Students will be able to:

1. identify the genre of the text, make reasonable inferences about its central purpose or argument, define its key components, and show how the writer uses these to reach a conclusion or create meaning or impact.
2. engage the text dialogically, questioning its premises, identifying its limitations, or advancing alternative perspective.
3. construct a strong, well-reasoned argument by determining which conclusion is supported by the strongest evidence.

To evaluate this outcome and the sub-outcomes, the working group decided to use the HEIghten Critical Thinking test, developed by ETS©. The HEIghten produces the following scores: Analytic, Synthetic, and an Overall score. Our Sub-outcome 1 is aligned with the HEIgthen tests' "Analytic" score. Sub-outcome 2 is aligned with the Overall Critical Thinking score, and the third sub-outcome is aligned with the "Synthetic" score.

SCORE TESTING & COMPLIANCE

All graduating seniors have an 'AT Hold' placed on their account when they enroll in UNIV 4AA0 – University Graduation. To remove the hold, students must take the SCORE (Student Core Outcomes and Readiness Evaluation) at Testing Services, located on the second floor of Biggin Hall. Upon arrival, students are randomly assigned to take one of three exams based on the last digit of their ID. If students are off-campus during their last semester they can access a waiver. In Summer 2018, the first time the SCORE was launched 74% of graduates took the SCORE and 26% accessed a waiver. Overall, 98.5% of summer graduates were compliant with this new graduation expectation. For Fall 2018, 99% of students were compliant (89.9% of these students took the assessment and

10.1% took a waiver). Failure to remove the AT Hold through testing or a waiver will result in the student not receiving their diploma (though the degree will still be conferred, pending successful fulfillment of other degree requirements).

PARTICIPATION

A total of 564 students took the ETS HEIghten Critical Thinking Assessment at Testing Services. Testing occurred over the Summer and Fall of 2018; 154 students took the test in the Summer and the remaining students were graduating seniors in the Fall. Of note, independent sample t-tests were conducted to determine if there were differences in critical thinking scores between students taking the test in the Summer or Fall; the results indicate no statistically significant differences (although, on average, performance was slightly lower for summer graduates).

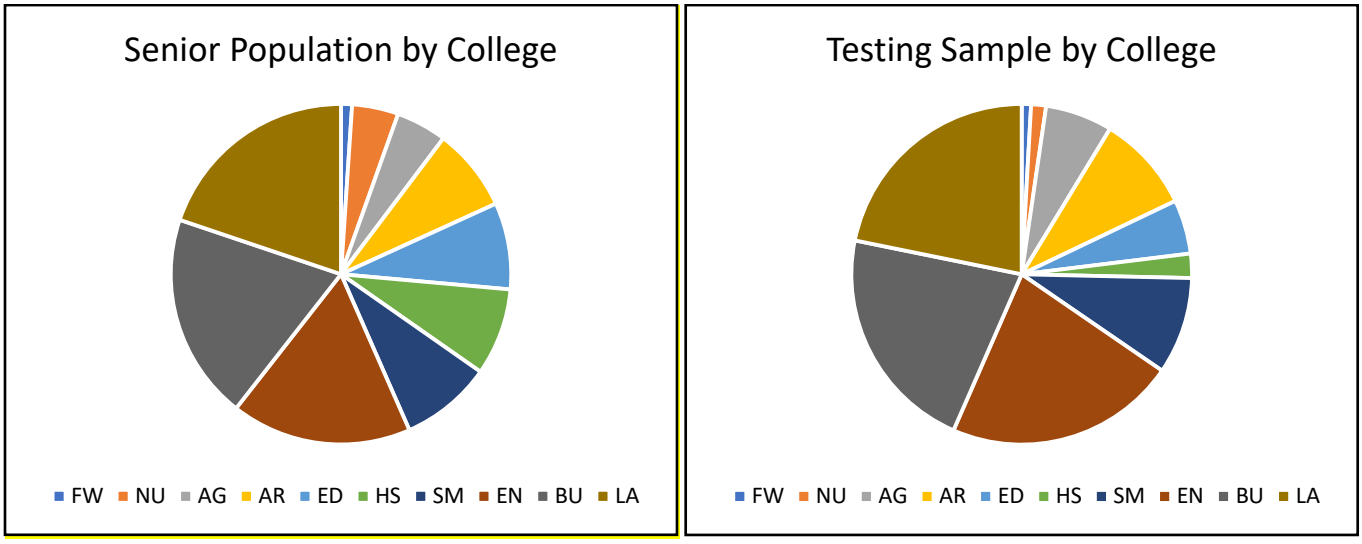
Students were randomly assigned to take this assessment based on the last digit of their Student ID. In total, 719 students graduated in the Summer and 1188 students graduated in the Fall semester for a total of 1907 students. Table 1 compares the present sample to the graduating population. Of note, the percentage of "Legacy" students includes students who had a parent, sibling, or "Other" individual attend Auburn University. Generally, the random sample of seniors that took the Critical Thinking assessment was representative of the senior population; however, the sample had more males, less Legacy students, and a lower GPA.

Figure 3 displays the proportion of test-takers by College relative to the overall population of summer and fall 2018 graduates. The present sample is similar to the population with less students from Education, Human Sciences, Nursing; many students from Education and Human Sciences were granted waivers because they were on internships off-campus.

Table 1 – Demographic Data on All Seniors and the SCORE Sample

	N	% Male	% White	%Transfer	% First Gen	% Legacy	ACT Avg (SD)	GPA Avg (SD)
Summer and Fall 2018 Graduates	1907	49.3%	82.6%	28.6%	12%	44%	25.5 (4.0)	3.04 (0.5)
Critical Thinking Test- Takers	564	59.4%	82.6%	30.3%	13%	41%	25.6 (4.1)	2.95 (0.6)

Figure 2 – Senior Population and Testing Sample by College



STUDENT MOTIVATION

When presented with a nonconsequential assessment, students may approach the task differently. Some students may put forth their best effort. Others may try, but not as hard as they would if the test impacted them personally. Others still may not try at all and rapidly respond to test items without giving them consideration (Wise & DeMars, 2005). This variability is problematic because if students do not put forth their best effort on an assessment, their score will underestimate their ability (limiting the validity of score interpretations). Thus, students' test-taking motivation was assessed to determine which responses may lack validity. Data that clearly do not reflect students' best effort on the assessment were deleted. The process used to determine the cases to be deleted is outlined below.

IDENTIFYING AND DELETING 'UNMOTIVATED' CASES

The sample data were carefully evaluated to flag cases where students clearly did not put forth their best effort. This section of the report outlines characteristics of the full dataset and decision points to delete students classified as 'unmotivated.'

CRITICAL THINKING SCORES

Students receiving the lowest possible value on all three scores (i.e., overall, analytic, and synthetic) were removed. This resulted in the removal of 26 cases.

STUDENT OPINION SURVEY (SOS)

At the end of each assessment, we deployed the Student Opinion Survey (SOS), a 10-item measure consisting of two subscales – Effort and Importance (Sundre & Thelk, 2007). The Effort subscale measures test-taker's reported effort put forth on a test, while the Importance subscale measures the degree to which students perceived the test to be important. Students responded to the SOS using a 5-point Likert scale where 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree at the end of the testing period. Higher scores are desirable for both subscales. Student motivation scores for this sample are presented below in Table 2.

Table 2 – Student Motivation

	N	Number of Items	Cronbach's Alpha	Average	SD	Min	Max
Motivation – Effort	517	5	0.87	3.29	0.98	1.0	5.0
Motivation – Importance	524	5	0.86	2.83	1.0	1.0	5.0

On average, students were between "Neutral" and "Agree" on the Effort subscale (M = 3.29). Likewise, students were "Neutral" on the Importance subscale (*M* = 2.83). Of note, 26 students did not complete any SOS questions (25 additional students omitted a response to at least one of the ten items). It is unclear if these 26 students omitted these items because they were rushing, did not follow instructions, or for another reason. Because of this uncertainty their data were retained, with the exception of four cases that earned the lowest score possible on all portions of the assessment *and* they did not provide motivation data (these were included in the deleted cases above). Finally, students who scored lower than a "2 – Disagree" on average for the effort total score were deleted (*N=37).*

In total, 63 cases were identified where students were very likely 'unmotivated' to do their best on this assessment (i.e., 22 students who scored the lowest possible score on all three critical thinking measures, 4 students who did not provide motivation data and earned the lowest possible score on all portions of the test, and 37 students who scored lower than a "2-Disagree" on average for the effort total score).

THE TEST

The ETS HEIghten Critical Thinking assessment provides an overall Critical Thinking score which ranges from 150-180. The HEIghten has also created three Proficiency scores: "Developing" (for those students scoring between 150-161), "Proficient" (for those students scoring between 162-172), and "Advanced" (for those students scoring between 173-180). See Appendix A for detailed information about the characteristics of students in each classification area.

Additionally, the HEIghten produces sub-scores for two areas: Analytical and Synthetic dimensions. These scores are reported on a 1-10 scale, with 10 being the highest score.

- **The Analytic Dimension** assesses a student's ability to 1) evaluate evidence and its use, and 2) analyze and evaluate arguments.
- **The Synthetic dimension** measures a student's ability to 1) understand implications and consequences and 2) develop sound and valid arguments. As a reminder, our Sub-outcome 1 is aligned with the HEIgthen tests' "Analytic" score.

TEST PERFORMANCE

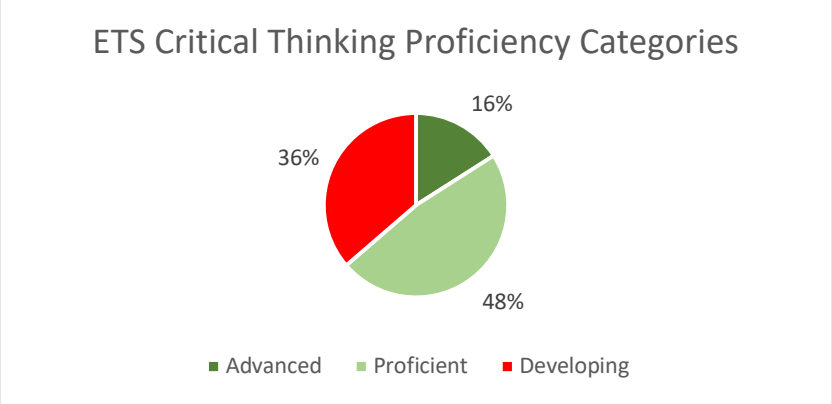
Table 3 provides a summary of student performance on the Written Communication assessment. Of note, these data do not include the 63 'unmotivated' cases. Figure 6 presents a visual representation of the number of students in each HEIghten Proficiency category. For more information on each of the Proficiency categories, see Appendix A.

Table 3 – Critical Thinking Scores

Sub-Outcome	HEIghten Area	Average	SD	Min	Max
1_Identify the genre of the text, make reasonable inferences about its central purpose or argument, define its key components, and show how the writer uses these to reach a conclusion or create meaning or impact.	Sub-score- Analytic Dimension	4.7	2.3	1.0	10
2_Engage the text dialogically, questioning its premises, identifying its limitations, or advancing alternative perspective.	Overall Critical Thinking	164.1	7.3	150	180
3_Construct a strong, well-reasoned argument by determining which conclusion is supported by the strongest evidence.	Sub-score- Synthetic Dimension	4.7	2.4	1.0	10

N = 501

Figure 3 – Critical Thinking Proficiency Scores



AUBURN SAMPLE COMPARED TO ETS SAMPLE

Of note, ETS created the scaled scores from a sample of students who were administered the test between fall 2015 and summer of 2016. A total of 2,577 students took the Critical Thinking assessment in the ETS sample. The average total score for this group of students was **162** (SD=6.9). Likewise, the average analytic and synthetic scores for these students was 4.1 (SD=2.2). Thus, it appears that the Auburn student sample performed better than the normed group on average, **164** (SD=7.3). Of note, the ETS sample included students at all academic levels (i.e., freshmen, sophomores, juniors, and seniors), and the Auburn sample was composed only of seniors.

NOTEWORTHY TEST RELATIONSHIPS

The Critical Thinking test can be associated with internal data from Auburn to explore questions about the test. First, test scores were correlated with ACT scores as one may hypothesize that some students are better test-takers than others. Second, test scores were disaggregated by grades earned in the following courses: ENGL 2200/2210 (World Literature before 1600 & after 1600); ENGL 2230/2240 (British Literature before 1789 & after 1789; ENGL 2250/2260 (American Literature before 1865 & after 1865); PHIL 1020 – Introduction to Ethics; PHIL 1040 – Business Ethics. Additional philosophy courses are options in the core curriculum; however, these courses had low enrollments and thus these data were not analyzed. It is anticipated that higher grades earned in these courses would result in higher test scores, providing some validity evidence to test score interpretation.

ACT CONVERTED SCORES

Is there a relationship between Auburn students' converted ACT scores and their critical thinking scores?

Pearson correlations were conducted to determine the strength of the relationship between students' ACT scores and their critical thinking scores; results are displayed in Table 4. Of note, ACT scores are statistically significantly related to all critical thinking scores, with the strongest relationship between ACT scores and the Overall score (r = 0.56).

Table 4 – Critical Thinking and ACT Scores

	N	ACT Scores
Overall	417	0.56*
Analytic	417	0.51*
Synthetic	417	0.51*

*$p < .05$

ENGL 2200 (WORLD LITERATURE BEFORE 1600) GRADES

Are there differences among student grades earned in ENGL 2220 – World Literature before 1600 and students' critical thinking scores?

Table 5 displays descriptive statistics for students earning an A, B, or C in ENGL 2220. Grades with less than 15 students receiving them (e.g., D, F, W) were not included in the analysis. Students' critical thinking average scores were consistently higher for higher grades earned in this course.

Table 5 – ENGL 2220 Grades

	N	Overall	Analytic	Synthetic
ENGL 2220 - A	22	166.9 (5.5)	5.3 (1.9)	5.1 (2.1)
ENGL 2220 - B	39	162.4 (6.7)	4.2 (2.1)	4.3 (2.6)
ENGL 2220 - C	26	161.3 (8.2)	4.0 (2.6)	4.0 (2.6)

ENGL 2210 (WORLD LITERATURE AFTER 1600) GRADES

Are there differences among student grades earned in ENGL 2210 – World Literature after 1600 and students' critical thinking scores?

Table 6 displays descriptive statistics for students earning an A or B in ENGL 2210. Grades with less than 15 students receiving them (e.g., D, F, W) were not included in the analysis. Students' critical thinking average scores were consistently higher for higher grades earned in this course.

Table 6 – ENGL 2210 Grades

	N	Overall	Analytic	Synthetic
ENGL 2210 - A	30	165.9 (7.4)	5.0 (2.3)	5.5 (2.5)
ENGL 2210 - B	40	163.5 (7.6)	4.8 (2.5)	4.3 (2.3)

ENGL 2230 (BRITISH LITERATURE BEFORE 1789) GRADES

Are there differences among student grades earned in ENGL 2230 – British Literature before 1789 and students' critical thinking scores?

Table 7 displays descriptive statistics for students earning an A or B in ENGL 2230. Grades with less than 15 students receiving them (e.g., D, F, W) were not included in the analysis. Students' critical thinking average scores were consistently higher for higher grades earned in this course.

Table 7 – ENGL 2230 Grades

	N	Overall	Analytic	Synthetic
ENGL 2230 - A	15	168.4 (7.2)	6.2 (2.4)	5.7 (2.6)
ENGL 2230 - B	17	165.5 (6.4)	5.4 (2.1)	4.9 (2.1)

ENGL 2240 (BRITISH LITERATURE AFTER 1789) GRADES

Are there differences among student grades earned in ENGL 2240 – British Literature after 1789 and students' critical thinking scores?

Table 8 displays descriptive statistics for students earning an A or B in ENGL 2240. Grades with less than 15 students receiving them (e.g., D, F, W) were not included in the analysis. Students' critical thinking average scores were consistently higher for higher grades earned in this course.

Table 8 – ENGL 2240 Grades

	N	Overall	Analytic	Synthetic
ENGL 2240 - A	15	169.3 (7.0)	6.0 (2.4)	6.4 (2.5)
ENGL 2240 - B	21	166.5 (7.2)	5.4 (2.4)	5.4 (2.2)

ENGL 2250 (AMERICAN LITERATURE BEFORE 1865) GRADES

Are there differences among student grades earned in ENGL 2250 – American Literature before 1865 and students' critical thinking scores?

Table 9 displays descriptive statistics for students earning an A, B, or C in ENGL 2250. Grades with less than 15 students receiving them (e.g., D, F, W) were not included in the analysis. Students' critical thinking average scores were consistently higher for higher grades earned in this course.

Table 9 – ENGL 2250 Grades

	N	Overall	Analytic	Synthetic
ENGL 2250 - A	22	167.7 (6.7)	5.7 (2.5)	5.8 (2.2)
ENGL 2250 – B	27	163.7 (6.4)	4.3 (2.1)	4.8 (2.3)
ENGL 2250 – C	16	162.8 (8.2)	4.5 (2.7)	4.0 (2.3)

ENGL 2260 (AMERICAN LITERATURE AFTER 1865) GRADES

Are there differences among student grades earned in ENGL 2260 – American Literature after 1865 and students' critical thinking scores?

Table 10 displays descriptive statistics for students earning an A, B, or C in ENGL 2260. Grades with less than 15 students receiving them (e.g., D, F, W) were not included in the analysis. Students' critical thinking average scores were highest for students earning a "B", though only slightly higher than those earning an "A".

Table 10 – ENGL 2260 Grades

	N	Overall	Analytic	Synthetic
ENGL 2260 - A	19	165.7 (8.4)	5.4 (2.6)	5.0 (2.6)
ENGL 2260 – B	24	166.2 (6.7)	5.3 (2.0)	5.3 (2.0)
ENGL 2260 – C	13	160.3 (7.8)	3.8 (2.4)	3.5 (2.2)

PHIL 1020 (INTRODUCTION TO ETHICS) GRADES

Are there differences among student grades earned in PHIL 1020 – Introduction to Ethics and students' critical thinking scores?

Table 11 displays descriptive statistics for students earning an A, B, or C in PHIL 1020. Grades with less than 15 students receiving them (e.g., D, F, W) were not included in the analysis. Students' critical thinking average scores were consistently higher for higher grades earned in this course.

Table 11 – PHIL 1020 Grades

	N	Overall	Analytic	Synthetic
PHIL 1020 – A	45	168.9 (7.5)	6.1 (2.5)	6.2 (2.3)
PHIL 1020 – B	57	164.0 (6.9)	4.7 (2.2)	4.7 (2.3)
PHIL 1020 – C	37	163.0 (7.6)	4.3 (2.4)	4.4 (2.5)

PHIL 1040 (BUSINESS ETHICS) GRADES

Are there differences among student grades earned in PHIL 1040 – Business Ethics and students' critical thinking scores?

Table 12 displays descriptive statistics for students earning an A, B, or C in PHIL 1040. Grades with less than 15 students receiving them (e.g., D, F, W) were not included in the analysis. Students' critical thinking average scores were consistently higher for higher grades earned in this course.

Table 12 – PHIL 1040 Grades

	N	Overall	Analytic	Synthetic
PHIL 1040 – A	45	165.1 (6.9)	4.6 (2.5)	5.3 (2.1)
PHIL 1040 – B	50	162.0 (7.0)	4.1 (2.0)	4.2 (2.5)
PHIL 1040 – C	15	161.2 (6.2)	3.8 (1.9)	3.9 (2.1)

EXPLORATORY ANALYSES

In the Summer of 2018, Dr. Good invited internal campus stakeholders to create a list of Research Questions to apply to the SCORE data. Representatives from English, Philosophy, Institutional Research, Accessibility, Student Affairs, the Library, and Academic Support were in attendance and generated the research questions below based on Banner data, which fall into two categories: Demographics and Curricular Experiences. The research questions were generated to explore areas where learning gaps may exist. Appendix B includes additional learning research questions that could be explored if analytic capacity were available.

DEMOGRAPHICS

Campus stakeholders were interested in whether or not sub-populations of students scored differently based on demographic characteristics. Below are the results related to demographic differences by gender, race, first-generation, legacy, and transfer status.

GENDER

Is there a difference in students' critical thinking scores between males and females?

Table 13 displays the average score for males and females across critical thinking scores. The two groups were not statistically significantly different from one another.

Table 613 – Gender Differences

	N	Overall	Analytic	Synthetic
Male	45	164.4 (7.8)	4.8 (2.4)	4.8 (2.5)
Female	195	163.8 (6.4)	4.5 (2.1)	4.6 (2.2)

RACE

Is there a difference in students' critical thinking scores between different racial groups?

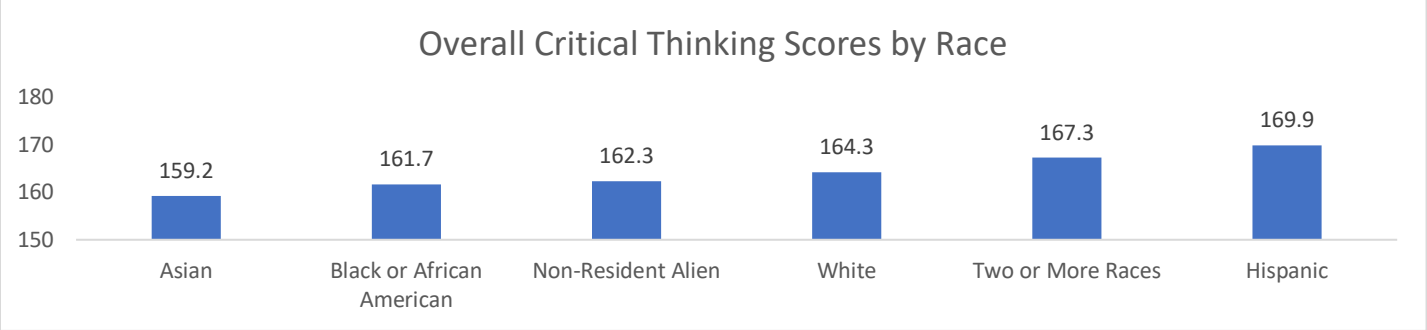
Table 14 and Figure 4 display the average scores for different races across the critical thinking scores. Of note, statistical significance was not explored given the unbalanced sample sizes.

Table 14 – Racial Differences

	N	Overall	Analytic	Synthetic
White	401	164.3 (7.2)	4.7 (2.3)	4.8 (2.4)
Black or African American	36	161.7 (7.2)	4.3 (2.1)	3.8 (2.4)
American Indian or Alaska Native	2*	-	-	-
Asian	9	159.2 (6.5)	3.3 (2.3)	3.4 (1.8)
Hispanic	12	169.9 (6.4)	6.6 (2.4)	6.2 (2.1)
Non-Resident Alien	15	162.3 (7.1)	4.0 (2.7)	4.5 (2.2)
Two or More Races	6	167.3 (3.8)	6.5 (1.1)	4.7 (1.4)

*Data not reported due to small sample size

Figure 4 – Overall Average Critical Thinking Scores by Race



FIRST GENERATION

Is there a difference in students' critical thinking scores between students who are first-generation college students and those who are not?

Table 15 displays the average score for students tagged as "First Generation College Students" and those who are not. Independent sample t-tests were performed for each area; however, none of the tests provided evidence of statistical significance ($p < .05$).

Table 15 – First Generation

	N	Overall	Analytic	Synthetic
NOT First Generation	410	164.3 (7.3)	4.7 (2.3)	4.8 (2.4)
First Generation	69	163.4 (7.1)	4.6 (2.3)	4.5 (2.2)

LEGACY

Is there a difference in students' written communication scores between students who define themselves as "Legacy" students (i.e., students reporting a "Parent", "Sibling," or "Other" attended Auburn) and those who do not have a prior affiliation with Auburn?

Table 16 displays the average scores for students who identify as Legacy (i.e., a parent, sibling, or "Other" person attended Auburn) and those who did not. A one-way ANOVA was conducted; however, no statistically significant results were discovered. Table 17 groups together the three Legacy categories. Independent sample t-tests determined no statistically significant differences between these groups either.

Table 16 – Legacy

	N	Overall	Analytic	Synthetic
Student reported "Other"	59	164.4 (7.1)	4.8 (2.4)	4.8 (2.3)
Student reported "Parent"	120	163.8 (7.5)	4.5 (2.3)	4.7 (2.5)
Student reported "Sibling"	21	160.5 (7.4)	3.7 (2.0)	3.6 (2.4)
No Affiliation	301	164.4 (7.2)	4.8 (2.3)	4.8 (2.3)

Table 17 – Legacy: Grouped

	N	Overall	Analytic	Synthetic
Student reported "Other", "Parent" or "Sibling"	200	163.6 (7.4)	4.5 (2.3)	4.6 (2.4)
No Affiliation	301	164.4 (7.2)	4.8 (2.3)	4.8 (2.3)

TRANSFER

Is there a difference in students' critical thinking scores between students who transferred to Auburn and those began their Auburn career as freshmen?

Table 18 displays the average score for transfer students and those who started their Auburn career as freshmen. Of note, students who began their Auburn career as freshmen performed statistically significantly higher on all critical thinking domains than students who transferred in, specifically:

- Students who started at Auburn as freshmen had greater overall critical thinking scores (M=165.1, SD = 7.4) than students who transferred in (M=162.2, SD = 6.5). This difference was statistically significantly different, t (499) = 4.2, $p < 0.001$, with a moderate effect size (Cohen's d = 0.42).
- Students who started at Auburn as freshmen had greater Analytic scores (M=5.0, SD = 2.4) than students who transferred in (M=4.2, SD = 2.1). This difference was statistically significantly different, t (499) = 3.65, $p < 0.001$, with a small to moderate effect size (Cohen's d = 0.35).
- Students who started at Auburn as freshmen had greater Synthetic scores (M=5.0, SD = 2.4) than students who transferred in (M=4.1, SD = 2.1). This difference was statistically significantly different, t (499) = 3.9, $p < 0.001$, with a moderate effect size (Cohen's d = 0.40).

Table 18 – Transfer

	N	Overall	Analytic	Synthetic
Transfer	154	162.2 (6.5)	4.2 (2.1)	4.1 (2.1)
Non-Transfer (Started as Freshmen)	319	165.1 (7.4)	5.0 (2.4)	5.0 (2.4)

CURRICULAR EXPERIENCES

Campus stakeholders were interested in how various aspects of the Auburn experience related to Critical Thinking scores. Below are the results related to student engagement with internships (as measured in Banner), College, and the Core Curriculum Sequence requirement.

INTERNSHIPS

Is there a relationship between students' critical thinking scores and experiencing an internship for credit at Auburn?

Table 19 displays descriptive statistics for these two groups. Of note, independent samples t-tests were performed; however, no statistically significant results were discovered.

Table 19 – Internships

	N	Overall	Analytic	Synthetic
Internship for credit	156	164.1 (7.2)	4.7 (2.3)	4.8 (2.3)
No Internship for credit	323	164.2 (7.3)	4.7 (2.3)	4.7 (2.4)

COLLEGE

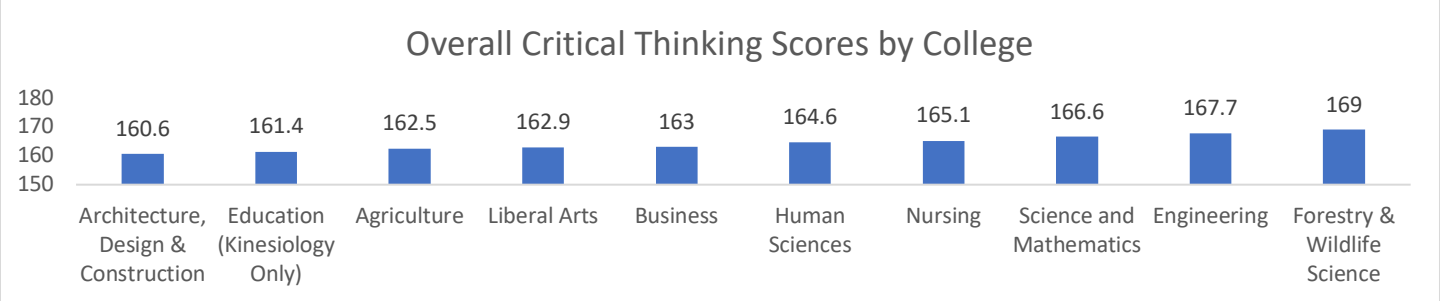
Are there differences among colleges on students' critical thinking scores?

Table 20 and Figure 5 displays descriptive statistics for each College. Of note, students from the School of Forestry and Wildlife Sciences had the highest, average overall critical thinking scores (*M* = 169.0, *SD* = 5.9) and students from the College of Architecture, Design, and Construction had the lowest, average overall critical thinking scores (*M* = 160.6, *SD* = 6.9).

Table 20 – College Differences

	N	Overall	Analytic	Synthetic
Agriculture	32	162.5 (6.4)	4.2 (2.0)	4.3 (2.0)
Architecture, Design & Construction	43	160.6 (6.9)	3.8 (2.0)	3.7 (2.3)
Business	103	163.0 (6.9)	4.4 (2.2)	4.3 (2.2)
Education (Kinesiology Only)	26	161.4 (6.7)	3.8 (1.9)	4.0 (2.1)
Engineering	105	167.7 (7.4)	5.6 (2.5)	6.0 (2.3)
Forestry & Wildlife Science	5	169.0 (5.9)	7.0 (1.6)	5.3 (2.1)
Human Sciences	11	164.6 (4.7)	4.5 (1.9)	5.0 (1.5)
Liberal Arts	101	162.9 (6.6)	4.3 (2.1)	4.4 (2.2)
Nursing	8	165.1 (5.2)	6.1 (1.8)	4.0 (1.5)
Science and Mathematics	45	166.6 (7.7)	5.4 (2.5)	5.5 (2.5)

Figure 5 – Critical Thinking Scores by College



CORE CURRICULUM SEQUENCE – AUBURN ONLY OR NOT

Is there a difference on students' critical thinking scores based on whether or not students took both Core Curriculum Sequence classes at Auburn or transferred in credit(s)?

Table 21 displays descriptive statistics for students earning credits for **both** parts of a sequence in either literature or history from Auburn University and for students who took part of the sequence or whole sequence elsewhere (e.g., AP credit, transfer credit). Independent sample t-tests were conducted for each comparison group; statistically significant results were identified for the Critical Thinking total score and synthetic sub-scores. Specifically:

- Students who took both Core Curriculum Sequence classes at Auburn had greater Overall Critical Thinking scores (M=164.8, SD = 7.4) than students who transferred in some credit for the Core Curriculum Sequence (M=163.4, SD = 7.1). This difference was statistically significantly different, t (499) = 2.1, p = 0.04, with a small effect size (Cohen's d = 0.19).
- Students who took both Core Curriculum Sequence classes at Auburn had greater Synthetic scores (M=4.9, SD = 2.4) than students who transferred in some credit for the Core Curriculum Sequence (M=4.5, SD = 2.4). This difference was statistically significantly different, t (499) = 1.99, p = 0.047, with a small effect size (Cohen's d = 0.17).

Table 21 – Core Sequence Credit Earned at Auburn or Not

	N	Overall	Analytic	Synthetic
Both Sequence Courses Taken at Auburn	246	164.8 (7.4)	4.9 (2.4)	4.9 (2.4)
Both Sequence Courses **NOT** Taken at AU	255	163.4 (7.1)	4.5 (2.3)	4.5 (2.3)

CORE CURRICULUM SEQUENCE – CHOICE

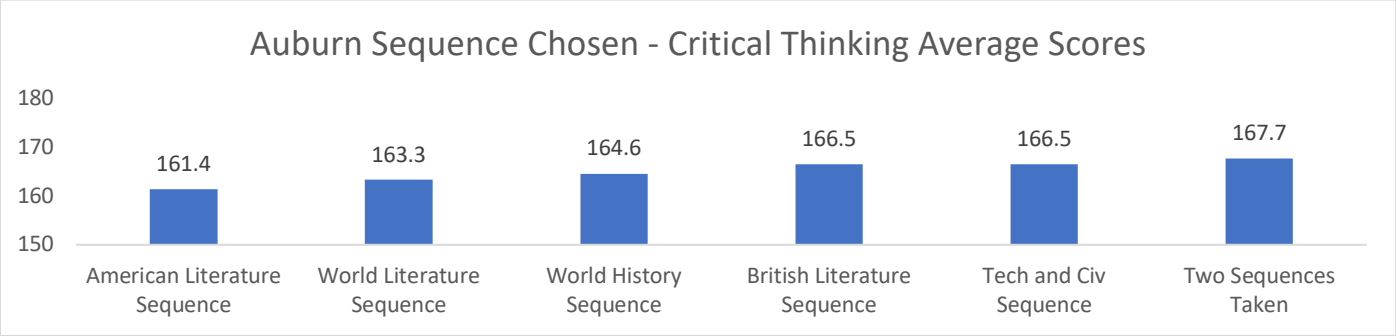
For the 246 students who took their Core Curriculum sequence at Auburn, is there a difference on students' critical thinking scores based on students' choice of sequence in the Core Curriculum (i.e., history or literature)?

Table 22 and Figure 6 display descriptive statistics for students' choice of sequence of the 246 students who took both sequence courses at Auburn. Of note, 17 students took two sequences (e.g., American Literature and World History). Statistical significance testing was not conducted given the unbalanced sample sizes with most students taking the World History sequence.

Table 22 – Core Sequence Choice

	N	Overall	Analytic	Synthetic
Two Sequences Taken	18	167.7 (5.8)	5.9 (1.7)	5.6 (2.4)
British Literature Sequence	10	166.5 (5.1)	4.8 (2.2)	5.7 (1.8)
World Literature Sequence	17	163.3 (7.3)	4.6 (2.3)	4.4 (2.3)
American Literature Sequence	11	161.4 (9.9)	4.0 (2.9)	4.0 (3.2)
World History Sequence	174	164.6 (7.4)	4.8 (2.4)	4.9 (2.3)
Tech and Civ Sequence	16	166.5 (8.6)	5.8 (2.2)	5.3 (3.0)

Figure 6 – Auburn Sequence Chosen – Critical Thinking



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APPENDIX A – ETS PROFICIENCY CATEGORIES

Table 6. Critical Thinking

Advanced	Proficient	Developing
A typical student at the advanced level has demonstrated the ability to:	*A typical student at the proficient level has demonstrated the ability to:*	*A typical student at the developing level may sometimes:*
extrapolate implications from multiple pieces of information and argumentation	make inferential connections between points whose relationship is not explicitly given	make inferential connections between two explicitly related points
accurately recognize descriptions of the logic of complexly structured arguments	follow the logic of an argument whose structure is not fully explicit	follow the logic of an explicitly structured argument
employ multi-step reasoning to identify hidden assumptions	identify implicit assumptions	identify explicit assumptions
employ multi-step reasoning to identify evidence that directly or indirectly supports or undermines a claim, or specify additional information needed in order to resolve a point	identify evidence that directly or indirectly supports or undermines a claim or specify additional information needed in order to resolve a point	identify evidence that directly supports or undermines a claim
identify subtle appeals to emotion and revisions to an argument that would reduce such appeals	identify appeals to emotion and revisions to an argument that would reduce such appeals	identify clear appeals to emotion
distinguish information that may be peripherally or generally relevant to assertions/arguments from information that is directly on-point	distinguish information that is relevant to assertions or arguments from irrelevant information	mistake evidence that is broadly related to a topic for evidence that is relevant to a specific assertion about the topic
employ multi-step reasoning to distinguish causation from correlation, and identify possible alternative causes or explanations	distinguish causation from correlation, and identify possible alternative causes or explanations	have difficulty distinguishing causation from correlation or identifying alternative explanations
engage in reasoning that involves complex interactions among multiple claims, arguments or pieces of information	engage in reasoning that involves interactions among multiple claims, arguments or pieces of information	have difficulty understanding or evaluating interactions among multiple claims,

APPENDIX B – RESEARCH QUESTIONS FOR FUTURE CONSIDERATION

Below are learning research questions that expand beyond Banner data that could be answered if additional analytic capacity were available. Of note, this list is not exhaustive; SCORE data can be connected to any dataset that includes student IDs or GIDs.

- Co-Curricular
    - Is there a relationship between critical thinking skills and the number of Service Hours students expend (Data Source: AU Involve)?
    - Is there a relationship between critical thinking skills and the number of active memberships students have with student organizations (Data Source: AU Involve)?
    - Is there a relationship between critical thinking skills and student involvement in Greek life (Data Source: AU Involve)?
        - Does the above relationship change if gender is considered?
    - Do students' whose parents are involved with Parent Portal have higher critical thinking scores than those who are not? (Data Source: Parent Services)
    - Do students who have engaged with the Career Center have higher critical thinking scores than those who have not? (Data Source: Career Center)
- Academic
    - Do students graduating from the Honors College have higher critical thinking scores than those who are not? (Data Source: Honors College)
        - If a differentiation is present, does it persist when controlling for demographic factors (e.g., ACT score)?
            - Technique required: Propensity Score Matching
    - Do students who attended a Library Information Session by an Instructional Librarian have higher critical thinking scores than those who did not? Does the frequency of engagement matter? (Data Source: Instructional Librarians)
    - Do students who are heavier users of Canvas have higher written communication outcomes (Data Source: Canvas)?
- Note – similar questions can be asked of First Destination Survey data. Likewise, the FDS data can be connected to this dataset (e.g., do students with higher critical thinking skills earn higher initial salaries?)