9/26/2018

CLEMSON UNIVERSITY GENERAL EDUCATION

General Education Assessment Summer 2018

A. Rene' Schmauder, Ph.D.
Bob Brackett, M.Ed.

Table of Contents

This report provides data from assessment of student learning in fall 2017 and spring 2018 general education courses generated during the 2018 Eleventh Annual Summer General Education Assessment Session. During the summer assessment session, faculty assesses the quality of student artifacts generated in response to assignments designed by faculty teaching general education courses. The results of faculty assessment of students' general education artifacts are presented. The report also includes faculty recommendations on how to help students demonstrate their achievement of general education competencies at Clemson University. The assessment process also includes evaluation of the clarity of the scoring rubrics currently in use for assessing general education competency achievement. Finally, we include a brief status report on Clemson Unviversity's current re-envisioning process for general education.

2017-2018 general edcuation competencies:

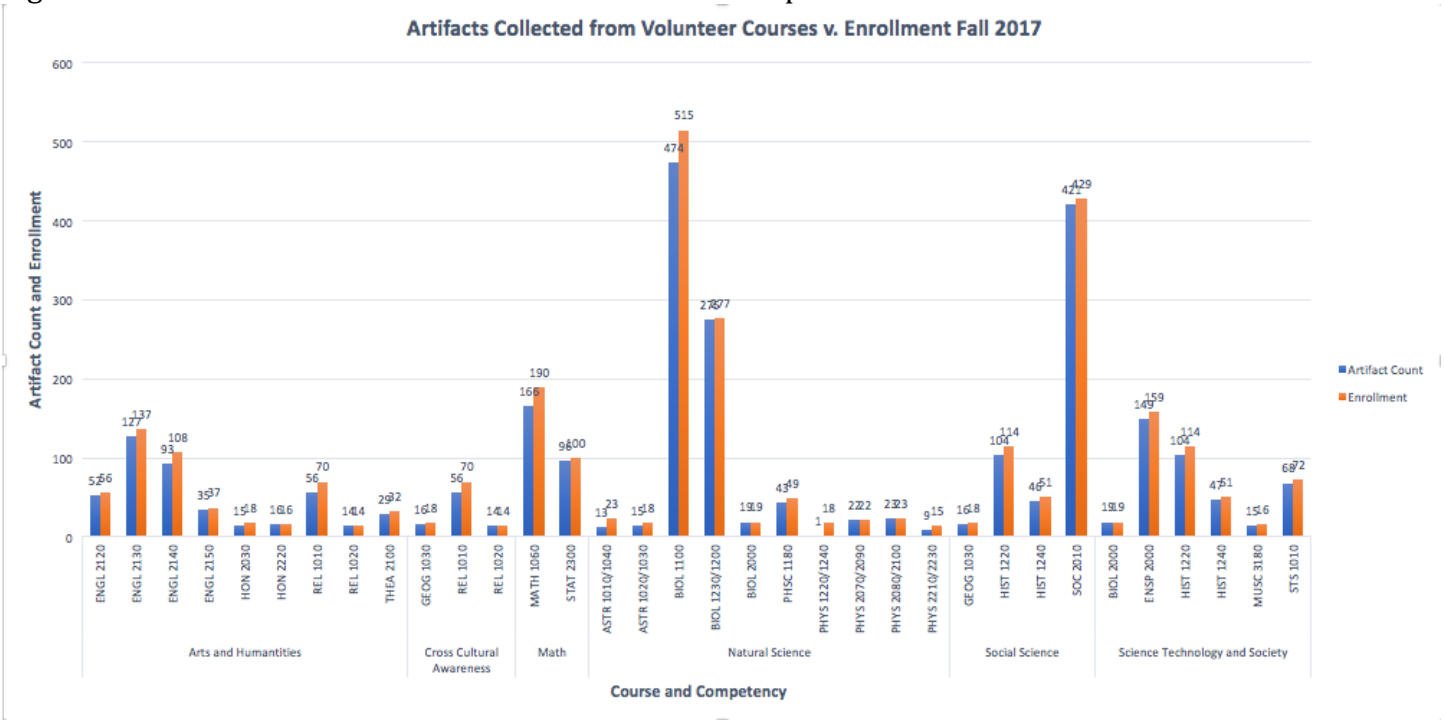
- Arts and Humanities(AH): Demonstrate an ability to analyze and/or interpret the Arts and Humanities.
- Cross Cultural Awareness(CC): Explain how aspects of culture are integrated into a comprehensive worldview; and then demonstrate how culture influences human behavior.
- Mathematics(MA): Demonstrate mathematical literacy through solving problems, communicating concepts, reasoning mathematically, and applying mathematical or statistical methods, using multiple representations where applicable.
- Natural Sciences(NS): Demonstrate the process of scientific reasoning by performing an experiment and thoroughly discussing the results with reference to the scientific literature, or by studying a question through critical analysis of the evidence in the scientific literature.
- Social Sciences(SS): Describe and explain human actions using social science concepts and evidence.
- Science and Technology in Society(STS): Demonstrate and understanding of issues created by the complex interactions among science, technology and society.

Fall 2017 General Education Assessment

In fall 2017 we gathered artifacts for review in the summer assessment session. We also reviewed collection processes and technology used to gather student evidence illustrating achievement of general education competencies. Faculty who participated were encouraged take part in the 2018 Summer General Education Assessment session.

Twenty-six faculty members participated in submission of artifacts in fall 2017: 12 from the College of Architecture, Arts, and Humanities (AAH), 3 from Behavioral, Social, and Health Sciences (BSHS), 9 from the College of Science (COS), and 2 from the College of Engineering, Computing, and Applied Sciences (CECAS). Sample courses for all course-related competencies (AH, CC, M, NS, SS, STS) were included in the study. More specifically, 28 courses, comprising 88 course sections, generated 2668 artifacts as presented in Figure 1. 91.92% of 2902 students enrolled in the participating courses submitted artifacts.

Figure 1. Breakdown of artifacts submitted across all competencies Fall 2017



Participants uploaded artifacts either using a batch upload process or by emailing files to the assessment office for staff to upload to the archive database.

Percentage of student submission by course can be found in Table 1. Of the 28 courses for which faculty encouraged uploading of the artifacts, the majority of the faculty chose to have students upload their assignments to Canvas for grading then simply downloaded the artifacts in a batch process and then uploaded the artifacts to the assessment database. This was the most efficient and effective method for gathering assignments. Five courses, HON 2220, REL 1020, BIOL 2000, PHYS 2070 and 2080, had a 100% artifact submission rate. This was likely because of the small size of the courses. Ten of the 88 course sections chose to email the artifacts to the assessment office to be uploaded to the assessment system. Accessing the assessment database requires dual-authentication, a process that acted as a barrier to many instructors. Unlike previous years, no faculty member chose to have students upload their own files to the database. This is likely due to the university's commitment to the Canvas LMS, to which students directly submit assignments. Faculty who had previously participated in the summer assessment session submitted artifacts from their general education courses.

Table 1. Fall 2017 Submissions

Competency	Course	Artifact Count	Enrollment	Percentage	# of Sections
Arts and Humantities	ENGL 2120	52	56	92.86%	2
	ENGL 2130	127	137	92.70%	5
	ENGL 2140	93	108	86.11%	4
	ENGL 2150	35	37	94.59%	2
	HON 2030	15	18	83.33%	1
	HON 2220	16	16	100.00%	1
	REL 1010	56	70	80.00%	3
	REL 1020	14	14	100.00%	1
	THEA 2100	29	32	90.63%	1

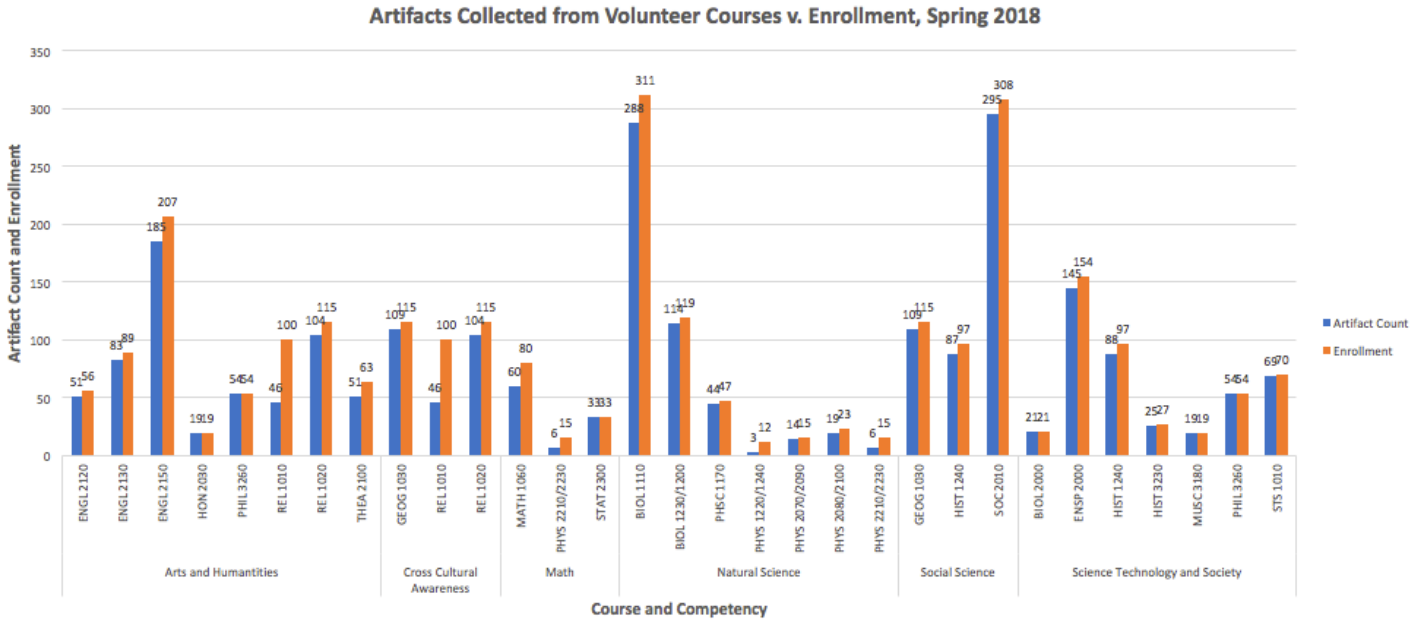
Cross Cultural Awareness	GEOG 1030	16	18	88.89%	1
	REL 1010	56	70	80.00%	3
	REL 1020	14	14	100.00%	1
Math	MATH 1060	166	190	87.37%	2
	STAT 2300	96	100	96.00%	1
Natural Science	ASTR 1010/1040	13	23	56.52%	1
	ASTR 1020/1030	15	18	83.33%	1
	BIOL 1100	474	515	92.04%	16
	BIOL 1230/1200	275	277	99.28%	14
	BIOL 2000	19	19	100.00%	1
	PHSC 1180	43	49	87.76%	1
	PHYS 1220/1240	1	18	5.56%	1
	PHYS 2070/2090	22	22	100.00%	1
	PHYS 2080/2100	23	23	100.00%	1
	PHYS 2210/2230	9	15	60.00%	1
Social Science	GEOG 1030	16	18	88.89%	1
	HIST 1220	104	114	91.23%	1
	HIST 1240	46	51	90.20%	2
	SOC 2010	421	429	98.14%	8
Science Technology and Society	BIOL 2000	19	19	100.00%	1
	ENSP 2000	149	159	93.71%	3
	HIST 1220	104	114	91.23%	1
	HIST 1240	47	51	92.16%	2
	MUSC 3180	15	16	93.75%	1
	STS 1010	68	72	94.44%	2
	Totals	2668	2902	91.94%	88

Of the 26 faculty who submitted artifacts in fall 2017, 20 participated in the summer 2018 assessment session. The goal of the summer session was to review a sample of student artifacts from fall 2017 and spring 2018 general education assessment courses to determine the degree to which students are achieving Clemson's general education competencies.

General Education Assessment Spring 2018

Twenty-five faculty members submitted general education artifacts for assessment from spring term 2018: 14 from AAH, 2 from BSHS, 7 from COS, and 2 from CECAS. Sample courses for all course-related competencies (AH, CC, M, NS, SS, STS) were represented. Specifically, 27 courses, representing 77 course sections, generated 2351 (Figure 2) artifacts. 88% of students enrolled in the participating courses submitted artifacts.

Figure 2. Breakdown of artifacts submitted across all competencies



Participants uploaded artifacts either using a batch upload process or by emailing files to the assessment office for staff to upload to the assessment database.

Five courses, HON 2030, PHIL 3260, STAT 2300, BIOL 2000 ,and MUSC 3180 had a 100% submission rate, which we attributed to small section sizes. These courses, with the exception of HON 2030, uploaded artifacts directly to the database after the faculty downloaded the artifacts from the Canvas LMS. For HON 2030, the faculty member asked thee assessment office to download artifacts from the LMS and them upload them to the assessment system. Percentages of student uploads can be found in Table 2. The split for faculty uploading on their own versus emailing the assessment office their artifacts was relatively even, with 10 of the 25 faculty choosing the email option. Instructors who sent artifacts to the assessment office likely did so because the security firewall protecting the database acted as a perceived barrier to ease of use.

Table 2. Spring 2018 Submissions

Competency	Course	Artifact Count	Enrollment	Percentage	# of Sections
Arts and Humantities	ENGL 2120	51	56	91.07%	2
	ENGL 2130	83	89	93.26%	3
	ENGL 2150	185	207	89.37%	7
	HON 2030	19	19	100.00%	1
	PHIL 3260	54	54	100.00%	2
	REL 1010	46	100	46.00%	3
	REL 1020	103	115	89.57%	4
	THEA 2100	51	63	80.95%	2
Cross Cultural Awareness	GEOG 1030	109	115	94.78%	1
	REL 1010	46	100	46.00%	3
	REL 1020	103	115	89.57%	4
Math	MATH 1060	60	80	75.00%	1

	PHYS 2210/2230	6	15	40.00%	1
	STAT 2300	33	33	100.00%	1
Natural Science	BIOL 1110	288	311	92.60%	12
	BIOL 1230/1200	114	119	95.80%	6
	PHSC 1170	44	47	93.62%	1
	PHYS 1220/1240	3	12	25.00%	1
	PHYS 2070/2090	14	15	93.33%	1
	PHYS 2080/2100	19	23	82.61%	1
	PHYS 2210/2230	6	15	40.00%	1
Social Science	GEOG 1030	109	115	94.78%	1
	HIST 1240	87	97	89.69%	1
	SOC 2010	295	308	95.78%	6
Science Technology and Society	BIOL 2000	21	21	100.00%	1
	ENSP 2000	145	154	94.16%	3
	HIST 1240	88	97	90.72%	1
	HIST 3230	25	27	92.59%	1
	MUSC 3180	19	19	100.00%	1
	PHIL 3260	54	54	100.00%	2
	STS 1010	69	70	98.57%	2
	Totals	2349	2665	88.14%	77

Of the 25 faculty who submitted artifacts in spring 2018, 21, including 17 who also submitted artifacts in fall 2017, participated in the summer 2018 general education assessment session.

General Education Summer 2018 Assessment Session

The goal of the summer assessment session was to review a representative sample of student artifacts from participating fall 2017 and spring 2018 general education courses to evaluate the degree to which students are achieving the competencies that Clemson has set forth for the University's general education curriculum. The faculty evaluation process was intended to provide insight on the quality of student artifacts illustrating achievement of Clemson's general education competencies, as well as to evaluate the clarity and applicability of the scoring rubrics. Participants also made suggestions for creating quality assignments for assessment of general education competencies (Appendix A). Additionally, in summer of 2018, we reviewed the re-envisioning process that is underway for the general education curriculum at Clemson. This included a preview of potential rubrics under consideration for general education competency assessment.

Student artifacts for six of the eight[1] general education competencies were examined and scored by 29 faculty evaluators representing departments across the university. Evaluators were a mix of previous

[1] Only the 6 course-connected competencies (AH, CC, M, NS, SS, STS) were included in the assessment. Distributed competencies (CT, EJ) were not included.

participants and new invitees based on recommendations from faculty that previously participated and from the Associate Dean of Undergraduate Studies. The group met for one week in May. 2014 artifacts were scored for content, using rubrics for each individual general education competency (Appendix B). Artifacts were also scored for quality of communication, using a university communication rubric (Appendix C). All artifacts were scored on a 1-4 scale with a score of 4 representing exemplary work, 3 indicating above-average work, 2 indicating satisfactory work, and a score of one indicating that the artifact did not adequately demonstrate competency.

The summer assessment team included 29 faculty members from a variety of disciplines across campus, 17 of whom submitted general education artifacts in both fall 2017 and spring 2018. Three faculty participants submitted in the fall, but not the spring. Four faculty participants submitted artifacts during spring 2018, but not fall of 2017. The faculty worked in groups within each competency area. On the first day of the assessment process, faculty met in larger groups to norm artifact scoring. Inter-rater reliability was deemed satisfactory only once all participants reached the same scores for a common set of artifacts. Faculty members that participated in the assessment session are listed below[2]:

Arts and Humanities
*Lucian Ghita – Lecturer, College of Architecture, Arts and Humanities
*Chelsea Clarey – Lecturer, College of Architecture, Arts and Humanities
*Megan Macalystre – Lecturer, College of Architecture, Arts and Humanities
*Shannon Robert – Associate Professor, College of Architecture, Arts and Humanities
*Rick St. Peter – Assistant Professor, College of Architecture, Arts and Humanities
*Gabriela Stoicea – Assistant Professor, College of Architecture, Arts and Humanities

Cross Cultural Awareness
*Candace Coffman – Lecturer, College of Behavioral, Social and Health Sciences
*William Terry – Associate Professor, College of Architecture, Arts and Humanities
Ralph Welsh – Senior Lecturer, College of Behavioral, Social nad Health Sciences
*Robert Stephens – Lecturer, College of Architecture, Arts and Humanities

Mathematics
*Ellen Breazel – Lecturer, College of Science
*Judith Cottingham – Sr. Lecturer, College of Science
*Christy Brown – Lecturer, College of Science

Natural Sciences
*Minory Nammouz – Lecturer, College of Engineering, Computing, and Applied Science
*Lih Sin The – Senior Lecturer, College of Science
*Jason Brown – Senior Lecturer, College of Science
Jack Wolf – Associate Professor, College of Business

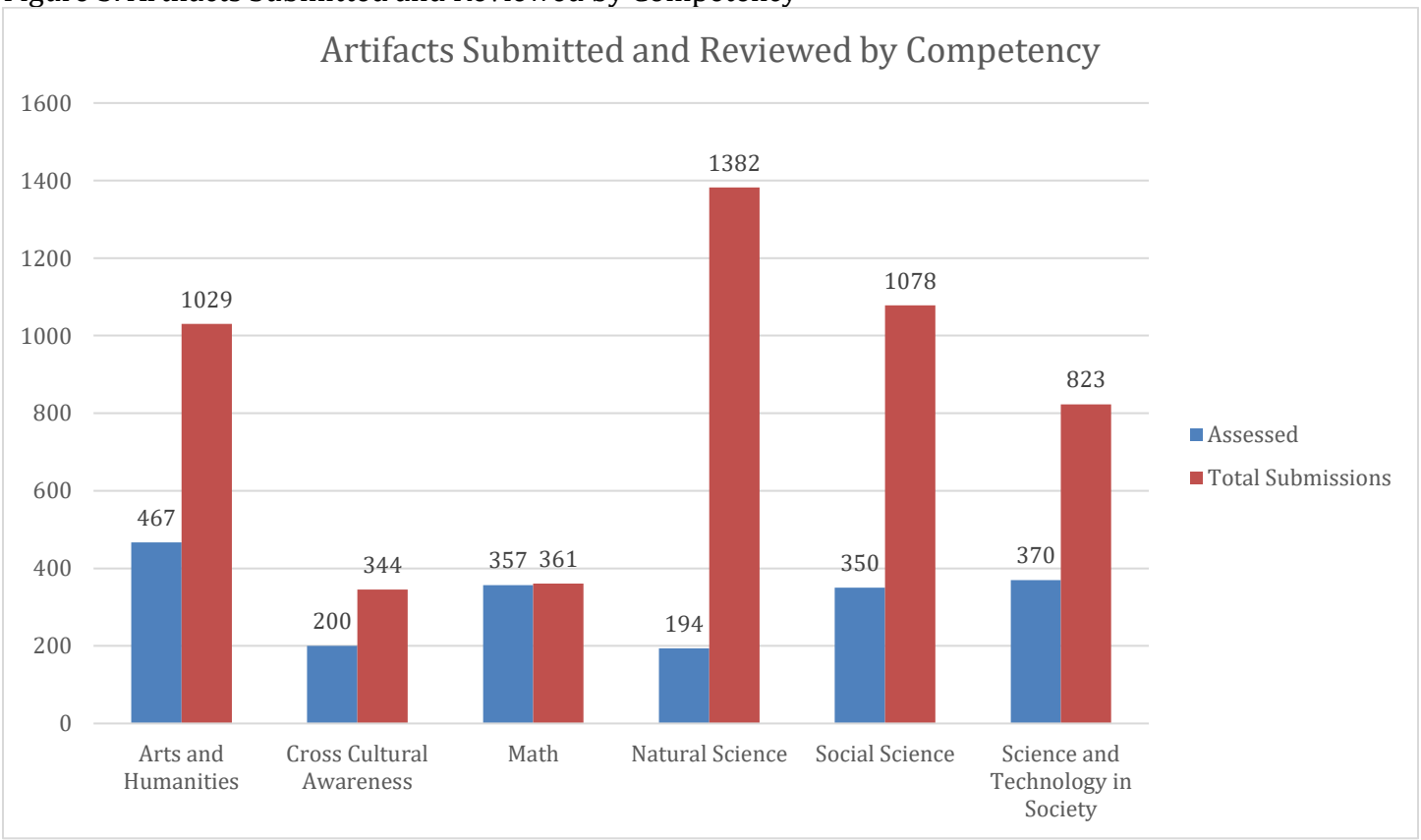
[2] *Represents faculty that submitted artifacts in fall 2017 or spring 2018 or both terms.

Social Sciences
*James Jeffries – Sr. Lecturer, College of Architecture, Arts and Humanities
*Andrew Mannheimer – Lecturer, College of Behavioral, Social and Health Sciences
*Jennifer Holland – Senior Lecturer, College of Behavioral, Social and Health Sciences
*Christa Smith – Associate Professor, College of Architecture, Arts and Humanities
Rachel Moore – Associate Professor, College of Architecture, Arts and Humanities
Catherine Mobley – Professor, College of Behavioral, Social and Health Sciences

Science and Technology in Society
*Elizabeth Stansell – Senior Lecturer - College of Architecture, Arts and Humanities
*David Foltz – Lecturer - College of Architecture, Arts and Humanities
*Tom Owino – Associate Professor, College of Engineering, Computing, and Applied Science
*Pam Mack – Associate Professor, College of Architecture, Arts and Humanities
*Bruce Whisler – Associate Professor, College of Architecture, Arts and Humanities
Sarah Grigg – Senior Lecturer, College of Engineering, Computing, and Applied Science

Participants evaluated a sample of student work for the six course-related competencies gathered during fall 2017 and spring 2018. Faculty assessors were grouped by content area. They reviewed a stratified random sample of submitted artifacts across AH, CC, M, NS, SS, & STS. 1938 artifacts were evaluated representing 39% of the 5017 total artifacts submitted. The most frequently assessed competency was Arts and Humanities (AH) with 467 (46%) artifacts reviewed, followed by the Science Technology in Society (STS) with 370 (45%) of the submitted artifacts evaluated. Because fewer artifacts were collected for mathematics, all submitted artifacts were reviewed. Figure 3 shows the distribution of competencies reviewed. Individual course results are presented in Appendix A.

Figure 3. Artifacts Submitted and Reviewed by Competency



In terms of scores, NS received the highest average overall average score of 2.32 (Figure 4). Table 3 provides percentages of artifacts scored. Rubrics for the competencies can be found in Appendix B. The distribution of content scores for each competency can be found in Figure 5. Figure 6 shows the six-year trend for content scores across the six competencies.

Figure 4. Average score by competency

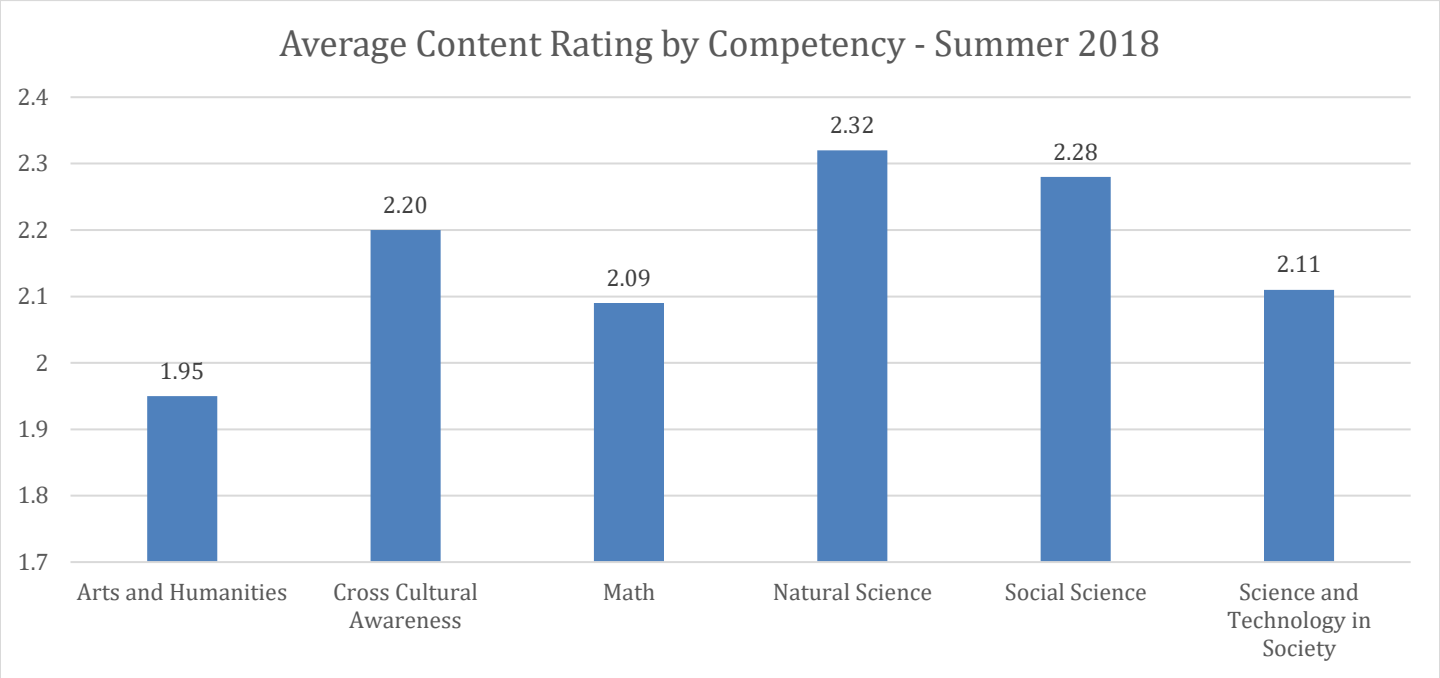


Table 3. Descriptive Statistics Broken Down by Competency

Competency	N	%	Minimum Score	Maximum Score	Mean
AH	467	45	1	4	1.95
CC	200	58	1	4	2.20
M	357	99	1	3	2.09
NS	194	14	1	4	2.32
SS	350	32	1	4	2.28
STS	370	45	1	4	2.11

Figure 5. Content Score Distribution by Competency

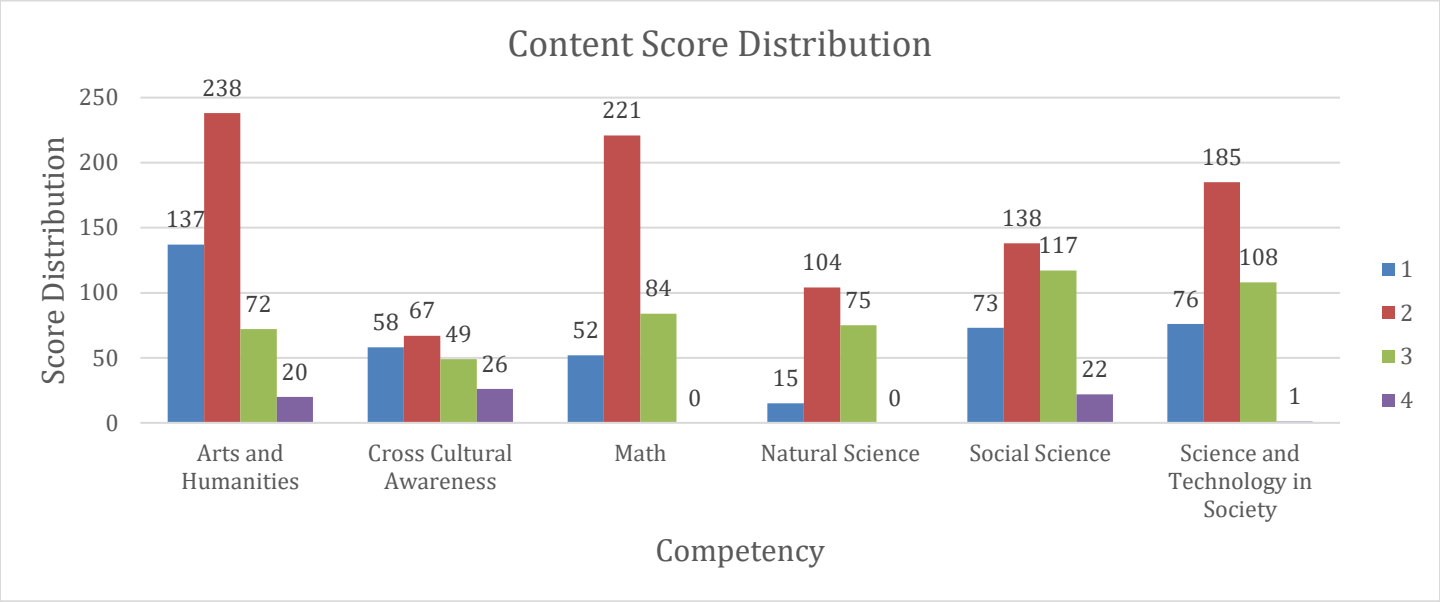
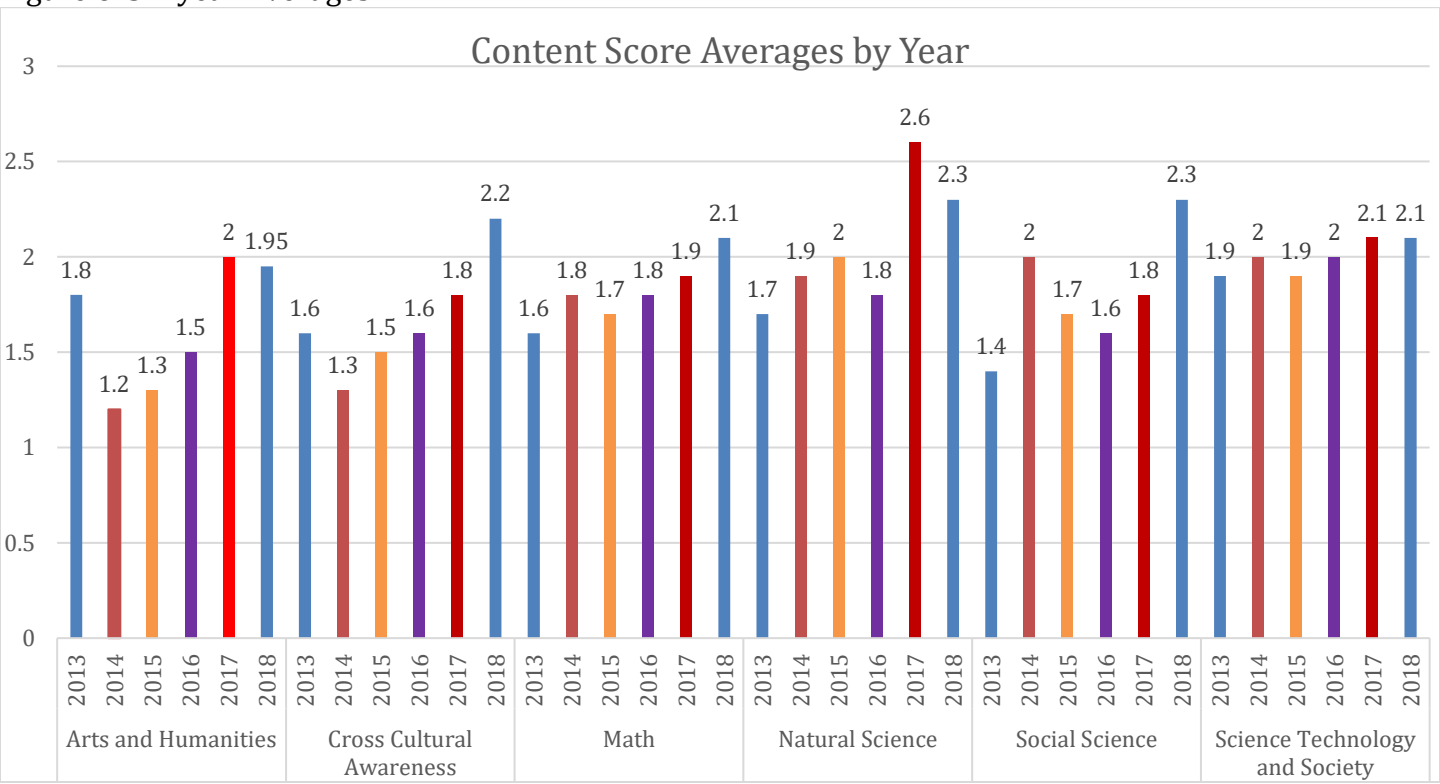


Figure 6. Six-year Averages



The trend of increasing scores over time likely reflects the fact that the faculty involved in teaching these courses are past participants in summer assessment sessions. Not only do they have experience scoring artifacts with the rubrics, but also they have spent time with their peers evaluating and improving their own syllabi and the assignments for artifacts that are submitted by students.

When the current general education curriculum was put in place, communication was considered to be a university-wide competency, reflecting Clemson's commitment to writing across the curriculum. All artifacts thus were evaluated using a University-wide communication rubric in addition to being assessed for general education area competency achievement. Three summers ago, the communication-scoring criterion was changed from pass/fail to a four-point scale. This rubric can be found in Appendix C. Figure

7 provides a score breakdown for each general education area on communication, and Figure 8 provides the average communication score for each competency. Figure 9 shows the change in communication scores over the last three years.

Figure 7. Communication Scores for Each Competency

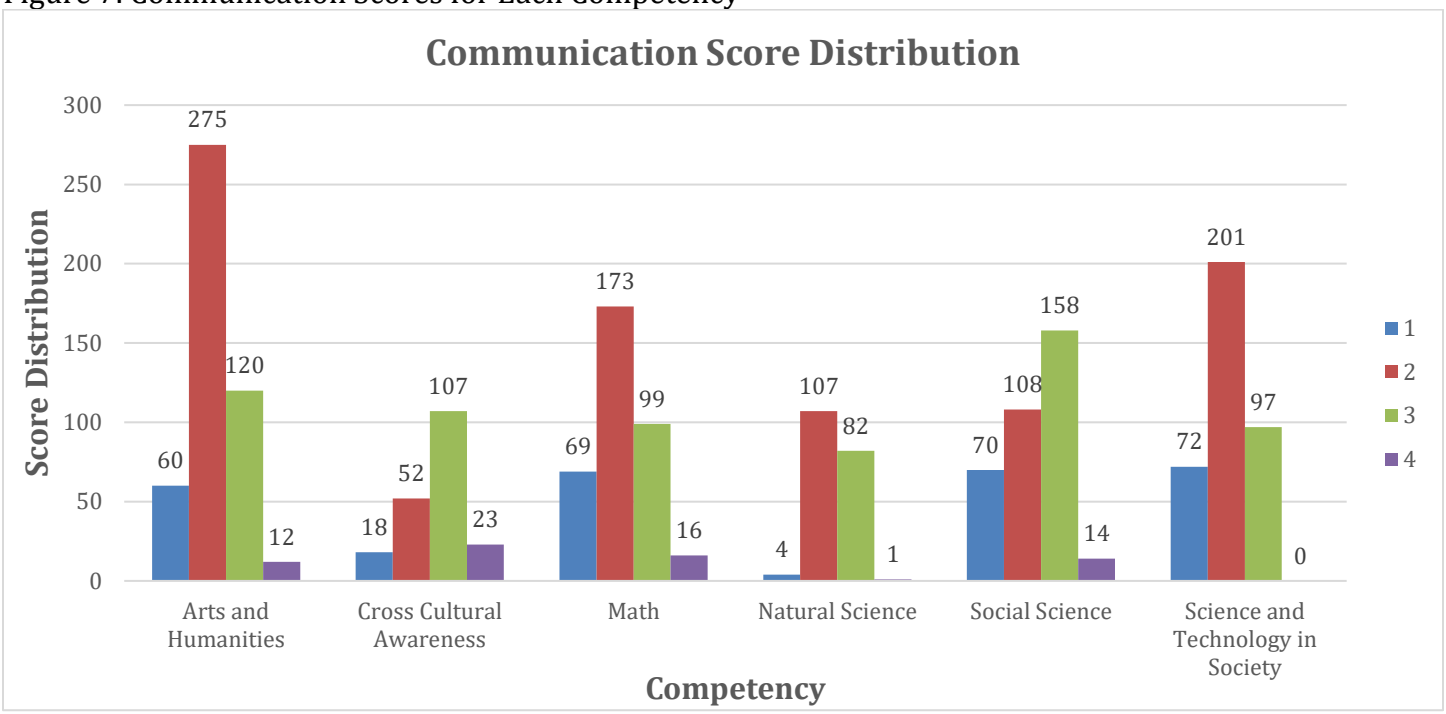


Figure 8. Communication Score Averages for Each Competency

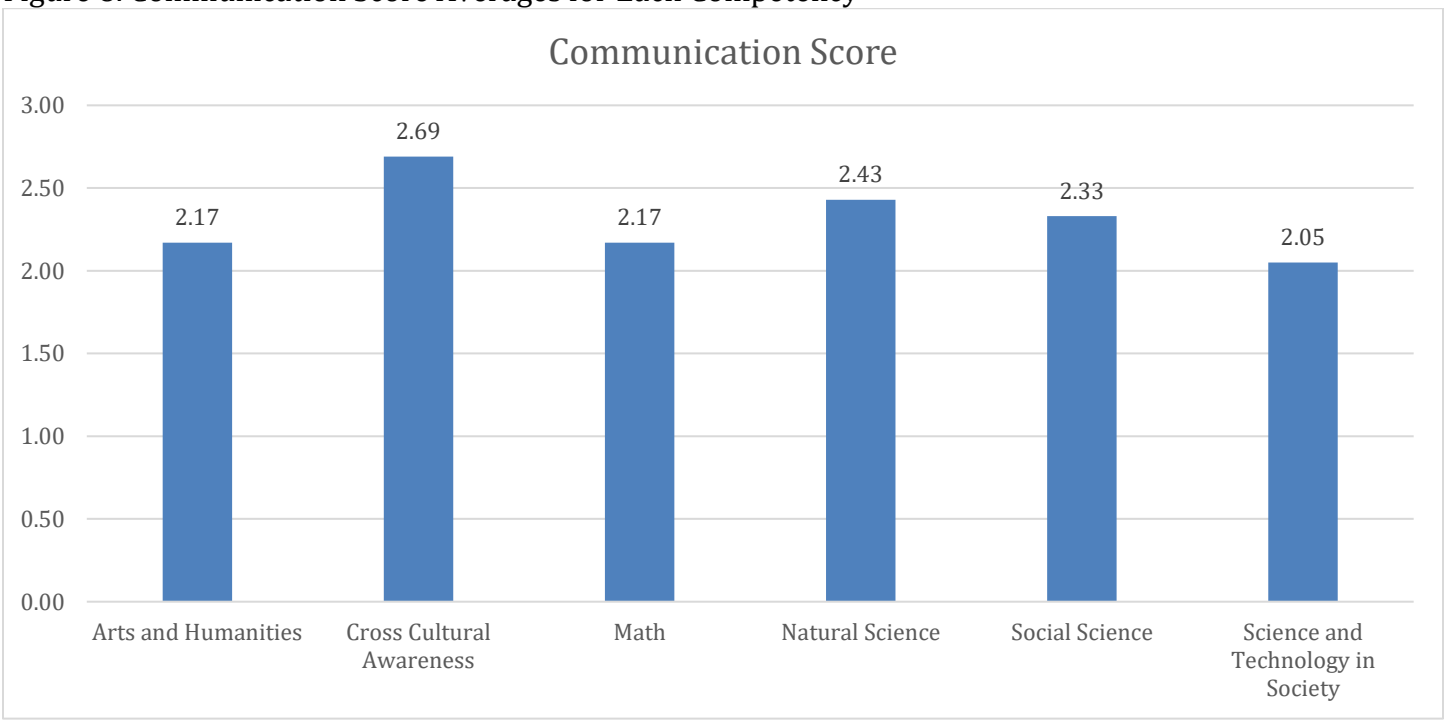
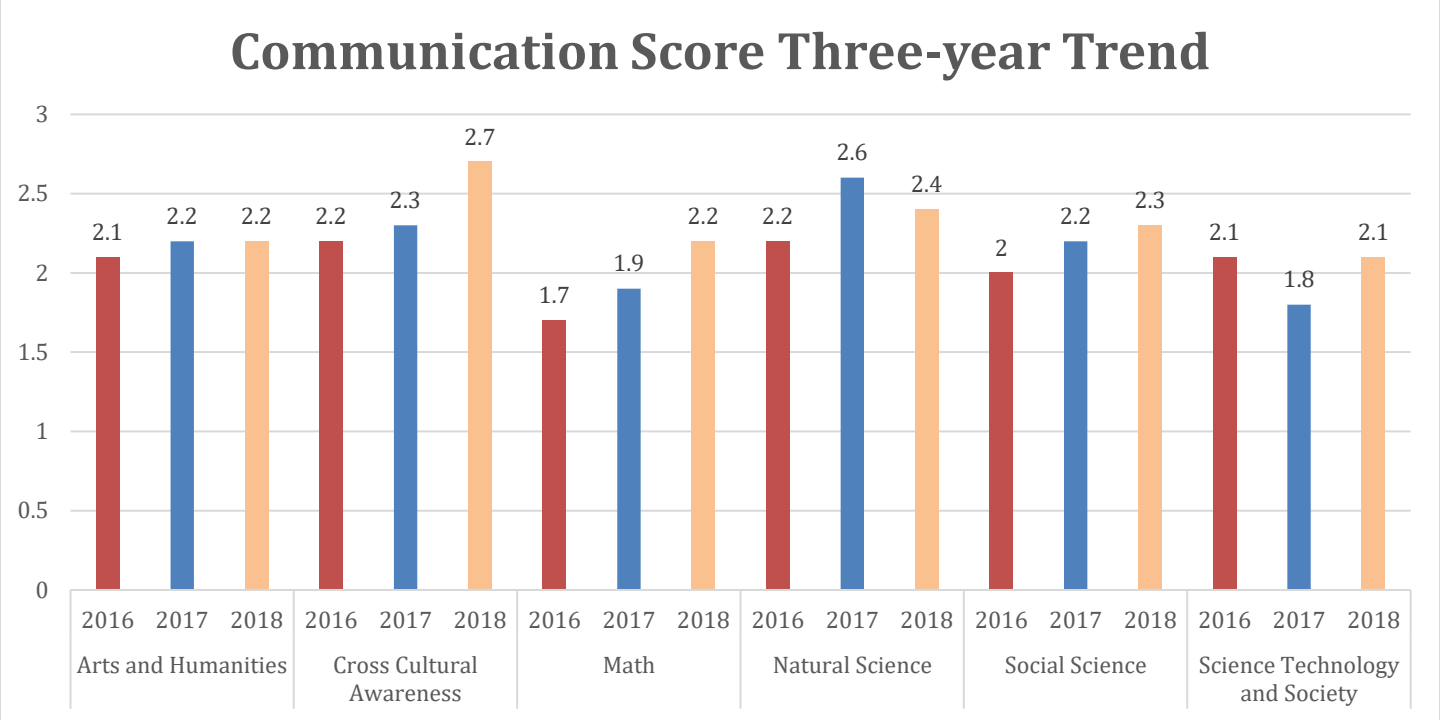


Figure 9. Communication Score History, Based on Revised Rubric



The improving score trend likely reflects the fact that artifacts submitted came from courses instructed by faculty who have experience in the summer assessment session. They understand assessment well and are designing high-quality assignments that results in the student artifacts that are submitted for the assessment session.

Overall recommendations related to improving student communication skills

Participants agreed that the 4-point communication Rubric developed at the 2015 Summer Assessment Institute should be retained. Some participants argued that if the writing is not "college level," it should not receive a passing score. Currently, one can submit an artifact that does not represent college-level writing and receive a "Pass with reservations" score. More discussion needs to occur in the individual courses about what characterizes "college-level" writing. This has been a consistent complaint over the last three years. No action has been taken due to the current general education revision process.

Final Recommendations

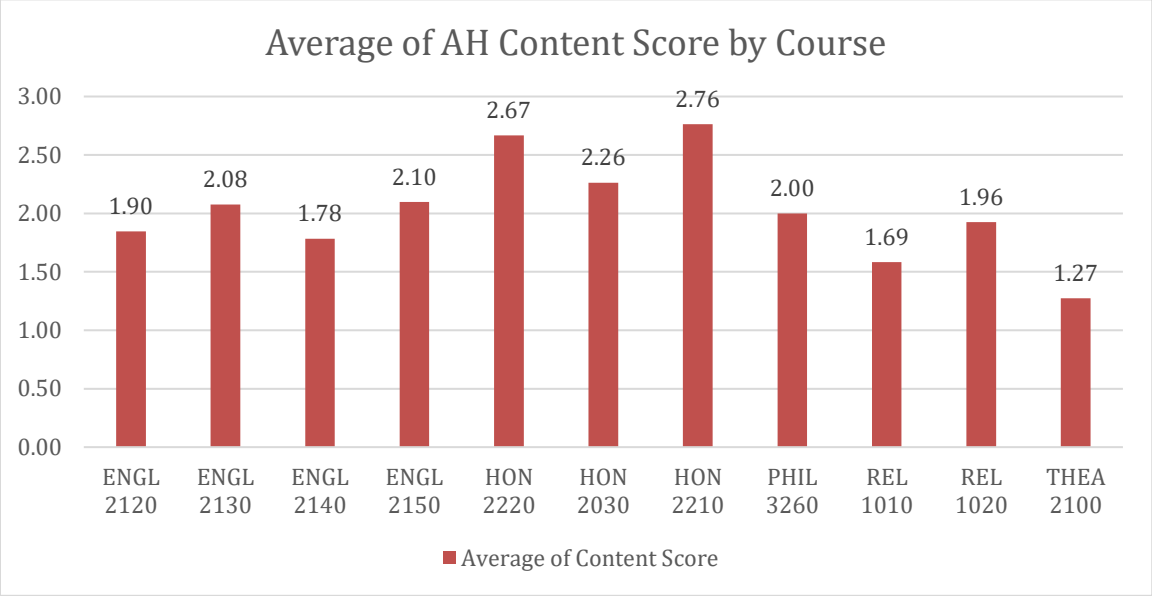
Participants agreed that, as we move forward with general education assessment, it is essential to have departmental involvement in general education and the assessment of student work. Participants suggested that all general education courses should be reviewed to ensure relevant competencies are addressed in the courses. All participants agreed that professional development should be provided that addresses writing student learning outcomes for syllabi and designing and aligning assignments appropriate for general education competencies. With the re-establishment of the Office of Teaching Effectiveness and Innovation, this should be an immediate goal once the new general education guidelines are completed.

Most participants think that the summer review of general education artifacts should continue in roughly the same format. They recommended that faculty should commit to participating for a minimum of two consecutive years so that there is overlap from year-to-year. They suggested that there should be at least one new faculty from each content area each summer.

Appendix A

Arts and Humanities

Figure 10. Average AH Content Score by Course



Recommendations for THEA 2100 course based on use of results
The majority of these artifacts were simple summaries and reflection papers, lacking sufficient analysis. We recommend that the students be given concrete guidance on how to analyze art movements and/or review theatre production with critical analysis. THEA 2100 assignments encourage review of material - these reviews should be based on standards that require analysis.

Recommendations for REL 1010 course based on use of results
The majority of these artifacts were simple comparisons with limited analytical possibility or execution. The artifacts should focus on the significance through analysis, not simply the positioning of two or more elements in proximity with a couple of sentences identifying overt, evident "similarities and differences." Papers often incorporated unexamined bias, logical fallacies, and generalizations which marred their analysis.

Recommendations for REL 1020 course based on use of results
The majority of these artifacts were shallow comparisons, written in an encyclopedic style. They lacked sufficient analysis. We recommend that the students be given concrete guidance on how to analyze religious belief or practice in a scholarly fashion. Papers often incorporated unexamined bias, logical fallacies, and generalizations which marred their analysis.

Recommendations for PHIL 3260 course based on use of results
Papers consistently displayed a lack of critical engagement with the topic. Please explain to students that even when they discuss what other people have written on the topic, they need to evaluate the respective arguments, not just report on them. The instructor might also consider limiting the number of sources that students have to discuss from three to one or two, and encourage students instead to develop their own analysis of the topic. These group's contention that these were apparently misfiled as AAH and should have been in the STS group was incorrect. PHIL 3260 is a double dip course, and while the faculty member may have designed this particular competency, another should have been provided. Writing was

a recurrent issue. Please discuss with students what the expectations are for college-level writing in your discipline.

Recommendations for ENGL 2120 course based on use of results
Some good, some bad papers. Some present thesis-driven arguments and critical engagement with the texts (although quality varies). Some use of undigested concepts/conceptual frames. Emphasize the importance of a thesis in a paper. There were some well-written papers with extensive analysis, but they were difficult to read because it was not clear at all where the analysis was going.

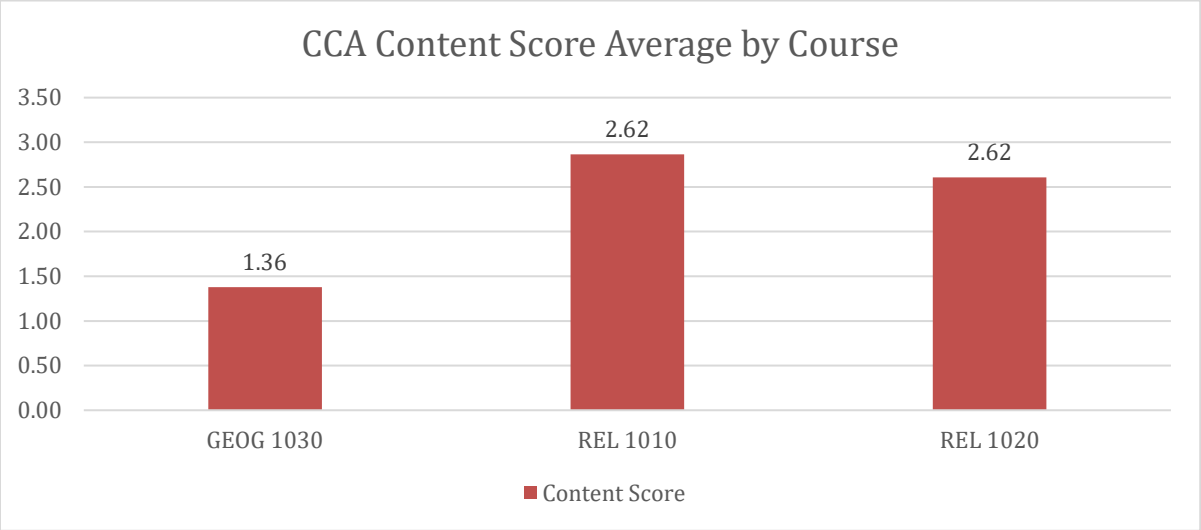
Recommendations for ENGL 2130 course based on use of results
Some good, some bad papers. Some present thesis-driven arguments and critical engagement with the texts (although quality varies). Sometimes there was no thesis other than that the respective texts had obvious things in common, like a female character. Please insist that the comparative analysis be on a deeper aspect and that students do more than comparison for comparison's sake. Papers often incorporated unexamined bias, logical fallacies, and generalizations which marred their analysis.

Recommendations for ENGL 2140 course based on use of results
Emphasize the importance of a thesis in a paper. There were some well-written papers with extensive analysis, but they were difficult to read because it was not clear at all where the analysis was going.

Recommendations for ENGL 2150 course based on use of results
Need a wider diversity of topics. Emphasize the importance of a thesis in a paper. There were some well-written papers with extensive analysis, but they were difficult to read because it was not clear at all where the analysis was going. Papers often incorporated unexamined bias, logical fallacies, and generalizations which marred their analysis.

Recommendations for HON 2030 course based on use of results
Many of these artifacts were simple summaries, lacking sufficient analysis. We recommend that the students be given concrete guidance on how to analyze cultural phenomena such as conspiracy theories. Some of these artifact assignments were extremely long for assessment review - assessors found that papers at 6 pages maximum are sufficient for an Arts and Humanities artifact.

Figure 11. Average CC Content Score by Course

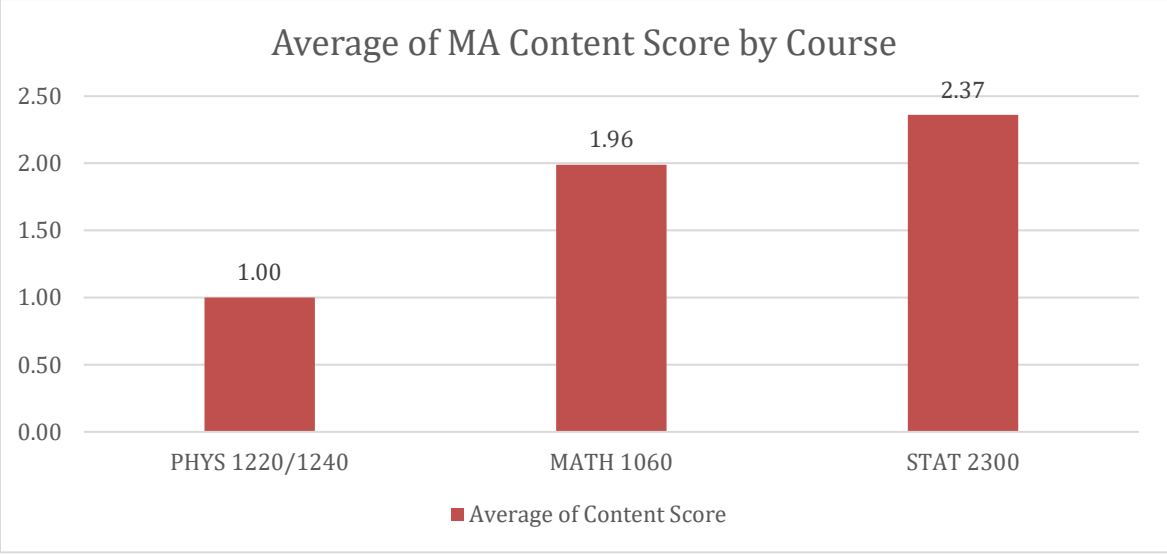


Cross Cultural Awareness

The CC group provided comments on areas for improvement:
No culture
No linkage of culture and behavior
Poor work on the assignment
Responses need further development or fleshing out
Poor writing overrode clarity of response
"Solid" on culture and behavior but not extraordinary
Minimal depth/overly generalization

Mathematical Sciences

Figure 12. Average MA Scores by Course



Recommendations for PHYS 1220/1240 competency based on use of results

PHYS 1220/1240 is not a course that satisfies the mathematics competency for general education. These artifacts should not be assessed for math competency. However it does fall into the Math and/or Natural Science category hat students must complete.

It is difficult for Math faculty to assess math competency from a lab where Physics techniques that are specific to that discipline are used. The assessors were unfamiliar with the content and methods for the artifacts submitted.
In a scientific lab report if a Methods section is not required because methods are given to students and followed then those methods need to be provided to the assessors of the artifacts. Students did not repeat methods in the lab reports which made it even more difficult for Math instructors to follow the logic of the reports.
Artifacts ideally should be individual work and not group work.
If group work is submitted then have students indicate what part of the group assignment they were responsible for.

Recommendations for MATH 1060 course based on use of results
Deductions in content scores were in general taken for:
No supporting work (incomplete check for critical values; no sign chart)
Confusing function being undefined with function equal to 0
Derivatives calculated incorrectly because of negative exponents
Not listing domain of function to be optimized
No showing verification of maximum
Unable to translate question into relevant model
Not answering the question posed
It is recommended that the coordinator of MATH 1060 continue to emphasize to the instructors the need for these verifications. It is not recommended that the artifact change the open ended nature of the questions.
Deductions in communication scores were in general taken for:
Not communicating final answers in the form of a complete sentence
Not labeling steps or methods taken to arrive at solution
Not arranging process in a logical flow
Not defining variables
Lack of diagram
No units or incorrect units provided
Using a non-standard method without justification/explanation
Instructors may want to emphasize to students the importance of writing complete sentences and using units for clarity.
Artifacts that received an exemplar flag would demonstrate:
Extra explanation of solutions
Provided reasoning for the process used
Generally neater/well organized

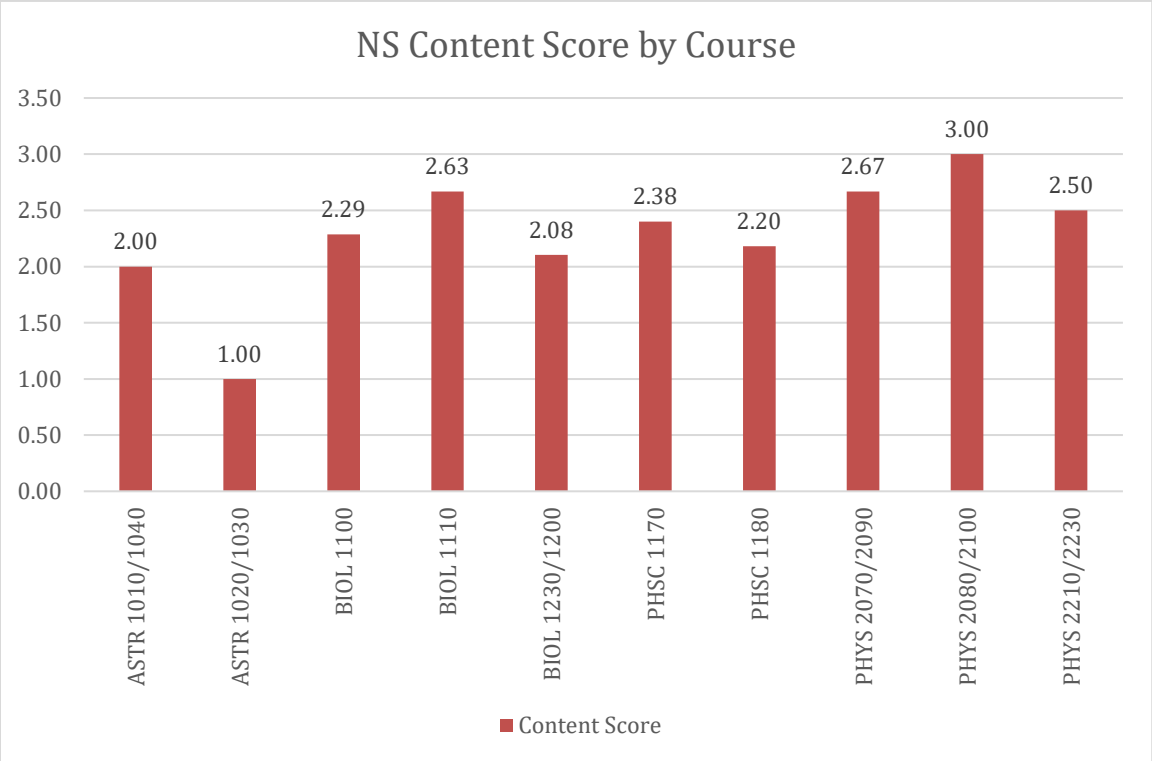
Recommendations for STAT 2300 course based on use of results
Deductions in content scores were in general taken for:
Confusing correlation and slope
Incomplete interpretation of correlation
Not understanding how to interpret slope
Not understanding extrapolation
Reversed residual calculation
Not answering the question posed
It is recommended that the coordinator of STAT 2300 continue to emphasize to the instructors the importance of the above mentioned key concepts.
Deductions in communication scores were in general taken for:
Not providing context of the question posed
Using deterministic language for interpretation of slope

Not providing proper notation on predicted values
Not providing calculations/formulas for values
Not following instructions
Poor sentence structure
Not explaining answers
Instructors may want to emphasize to students the importance of good sentence structure, answering questions in context, and using non-deterministic language for statistical results.

Recommendations for STAT 2300 - Honors course based on use of results
Deductions in content scores were in general taken for:
Miscalculation of p-value
Confusion about generalizability of the results based on sampling technique
Unable to define parameters properly
Poorly constructed research question
It is recommended that the instructor of STAT 2300 - Honors continue to emphasize the importance of the above mentioned key concepts.
Deductions in communication scores were in general taken for:
Not including supporting JMP output
Not using proper notation
Poor sentence structure
Lack of clarity
Instructor may want to emphasize to students the importance of good sentence structure, answering questions in context, and the purpose of statistical inference.

Natural Sciences

Figure 13. Average NS Score by Course



Recommendations for BIOL 1100 – Osmosis Lab
Students need to understand the difference between explanatory and null hypothesis.
Students need to understand how the test statistics are used.
Students seem to not understand that failure to reject the null supports van't Hoff's law by rejecting the concentration of water and bound water hypotheses

Recommendations for BIOL 1110 – Tomato Lab
Students need to provide scientific justification for hypotheses (both null and explanatory).
Students need to understand how the test statistics are used.
Raw results need to come before the test statistics.

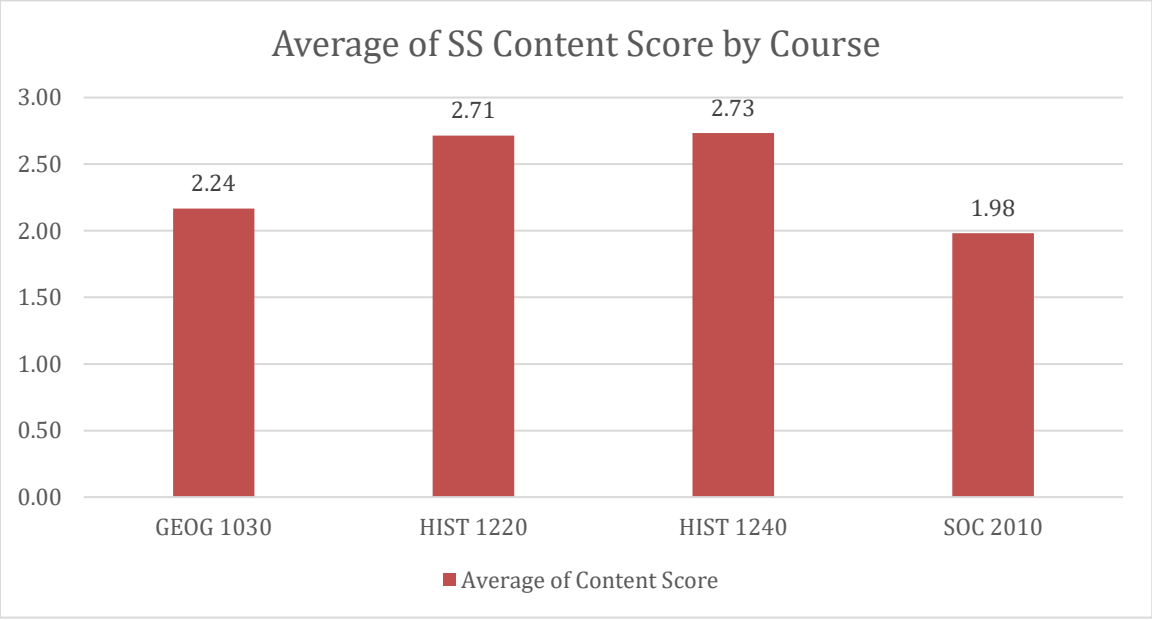
Recommendations for BIOL 1230 – Bacteria Lab
Students must provide specific scientific justification of hypotheses.
Students need to understand that a comparison of average without consideration of statistical variation is important when drawing conclusions from the data.
The experimental design must be better controlled through a true pre/post swab pairing.

Recommendations for PHSC 117/1180
Students must provide specific scientific justification of hypotheses.
Plot all mass versus volume curves on one set of coordinate axes to demonstrate difference in slope.

Recommendations for Labs that use Worksheets
Students must be able to explain what has been learned from the exercises provided and how these exercises tie into the 3 important general aspects of the experiment.

Social Sciences

Figure 14. Average SS Score by Course



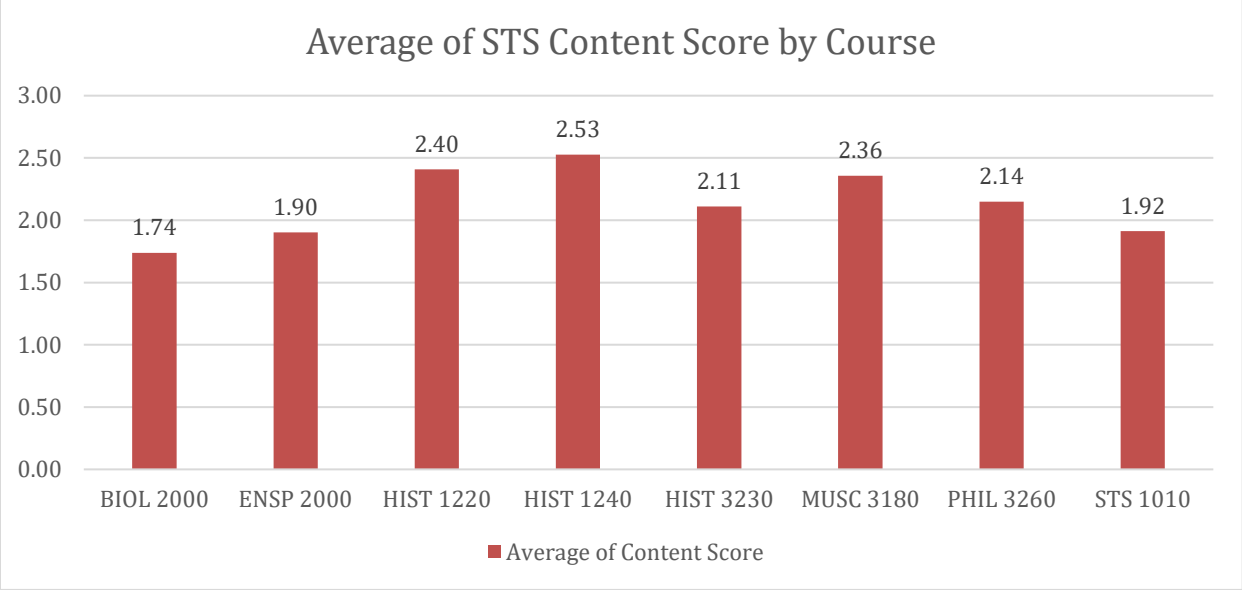
Recommendations for <u>GEOG 1030</u> course based on use of results
Hard to evaluate artifact as the incorrect assignment was uploaded and scored.

Recommendations for HIST 1220 course based on use of results
Assignment already entails application of social science concepts and many artifacts did demonstrate an explanation of human actions
Low scores typically resulted from an explicit lack of explanation of human actions, often by staying focused on explaining general social impacts of a particular technology.

Recommendations for HIST 1240 course based on use of results
Assignment is appropriately focused on developing social science explanations of human action.
Low scores typically resulted from an explicit lack of attention to the social factors behind those human actions.
Assignment may ask students to more fully address social causes of human actions.

Recommendations for SOC 2010 course based on use of results
These artifacts generally include social science concepts, but provide little evidence to back up arguments.
Students need to include more data, theories, and support from the literature.
The addition of a thesis statement in the assignment would improve the focus of the papers and more clearly address the rubric.

Figure 15. STS Average Scores by Course



Science and Technology in Society

Recommendations for BIOL 2000 course based on use of results
These papers tended to be cursory treatments of controversial news stories, favoring summary over analysis.
Students should better differentiate between nature and scientific concerns; the students are often currently conflating nature and science, or health and science (e.g., hurricanes and measles are not science).
Students should focus further on analysis of social components--not just mentioning it, but exploring it, discussing social ramifications, perhaps formulating an ethical position, etc.

Recommendations for ENSP 2000 course based on use of results
These papers tended to be very basic in nature, providing broad overviews in only a couple of pages.
Students should better differentiate between nature and scientific concerns; the students are often currently conflating nature and science (e.g., hurricanes and coral reefs are not science).

Students should focus further on social component of the topic--not just mentioning it, but exploring it, discussing social ramifications, perhaps formulating an ethical position and/or a viable solution, etc.

Recommendations for HIST 1220 course based on use of results
These artifacts largely met the competency. A number of students struggled with putting forth a coherent analysis, providing information but failing to satisfactorily handle said information to prove a central thesis.

Recommendations for HIST 1240 course based on use of results
These artifacts tended to meet the competency. They would be even more successful if the students focused more on analysis than mere summary of historical facts. Quite a few students achieved the level of 3, which indicates analysis of multiple STS interactions, but many provided "book report"-type essays that didn't demonstrate critical thinking per se.

Recommendations for HIST 3230 course based on use of results
These artifacts typically met the competency, but many struggled with rampant proofreading errors as well as problems with coverage: attempting to discuss too much in too little space. Thus, they ended up identifying STS interactions but not providing successful or convincing analysis.
In addition, a lot of the essays lacked coherence, reading like two or three mini-essays in one paper rather than one coherent argument.

Recommendations for MUSC 3180 course based on use of results
Most of these artifacts met the competency. They would be more successful if the students concentrated more on making a particular argument rather than generally discussing digital piracy. The less successful artifacts tended to provide information without analysis.

Recommendations for PHIL 3260 course based on use of results
The writing in these essays was generally higher quality than that from other courses. However, these essays tended to provide more summary than analysis. The general structure was the exact same for each paper and didn't leave much room to explore the student's final estimation of the philosophers.
We recommend tweaking the assignment to allow more variation in structural approach, to require a specific example of a biological enhancement, and to emphasize analysis over summary.

Recommendations for STS 1010 course based on use of results
The cookbook analyses rarely met the competency, as they largely ignored actual technological/social interactions. Students should be reminded that they need to make a direct connection to technology and its social impacts.
The reading response assignments were varied in success of their arguments, though they mostly succeeded in at least identifying an STS interaction. Students should be reminded of necessary support for their arguable claims.

General recommendations/observations for STS competency based on scores. (Make generalizations for each score value based on comments)
Encourage students to go beyond identification.
Encourage further analysis, and find more ways to add depth to analysis.
Work on improving communication. Perhaps institute a policy in which student work must "pass" (i.e, be able to earn a 2 on gen-ed rubrics) before it can count for your class credit.

Appendix B

General Education Rubrics

Rubrics represent guides for course designers/instructors, students, and evaluators. Course designers and instructors can use the rubrics as a basis for creating activities for students that will meet General Education competencies. Students can use the rubrics to identify target criteria for creating evidence of each competency. Evaluators will use the rubrics to score student work collected via sampling methods.

These General Education rubrics were originally created at a faculty rubric development workshop directed by D. Switzer (Teacher Education) on Nov. 11, 2005. After instruction on rubric creation, faculty worked in small groups arranged by General Education competency area (Ethical Judgment, for example). These groups were populated by faculty from disciplines with interest in each area. Initial drafts were transcribed and edited by J. Appling (Undergraduate Studies) to standardize rubric levels and language. Additional feedback and content revision was provided by faculty groups formed from members of the Undergraduate Curriculum Committee and the University Assessment Committee. Draft rubrics were edited for language and style by B. Ramirez from English.

These draft rubrics are constructed on a four-level system. The bottom level, 1, represents unsatisfactory work. The upper level, 4, represents exemplary work. Thus only descriptions of levels 2 and 3 are necessary to set the scale. Level 3 represents work that meets general expectations of competency. Level 2 represents work that has components of reasonable performance, but is indicative of a student still developing skill or knowledge in that area.

It is hoped that there will be few level 1 examples of student work. Ideally the largest fraction of students will fall in categories 3 and 4. The populations that exhibit work in levels 1 and 2 could give an indication of areas where attention should be given. Level 2, as an indicator of emerging student ability, helps provide better discrimination in order to improve the usefulness of the scale for program assessment. This is not an interval scale, only ordinal (i.e., the difference between 1 and 2 is not the same as between 2 and 3, etc.). Frequency profiles, rather than means, can be used to indicate changes from year to year.

The Undergraduate Curriculum Committee approved these rubrics at the May 6, 2006 meeting.
*Subsequent changes to STS and Communication have been made since 2006.

Competency Area: Competency AH1: Arts and Humanities
Demonstrate an ability to analyze and/or interpret the arts and humanities.

Criteria	1	2	3	4
Analysis/interpretation	Purely summary detail. No analysis/interpretation present	Provides a brief overview and analysis/interpretation. Very general in nature. Does not drill down to detailed analysis.	Drills down to specifics and provides detailed analysis/ interpretation of several key points in the work(s) discussed.	Demonstrates exemplary work.

Competency Area: Cross-Cultural Awareness

Competency CC1: Explain how aspects of culture are integrated into a comprehensive worldview; and then demonstrate how culture influences human behavior.

Criteria	1	2	3	4
Comprehensive Worldview	Demonstrates unsatisfactory college-level work.	Provides a brief overview of the impact aspects of the culture being studied on the subject's worldview.	Provides an in-depth, detailed analyses of the impact aspects of the culture being studied has on the subject's worldview.	Demonstrates exemplary work.
Human Behavior	Demonstrates unsatisfactory college-level work.	Provides, with minimal detail, citing only one or two examples, the influence one's culture has on human behavior.	Provides in great detail, using multiple examples how aspects of a specific culture can influence human behavior.	Demonstrates exemplary work.

Competency Area: Mathematics Competency M1: Demonstrate mathematical literacy through solving problems, communicating concepts, reasoning mathematically, and applying mathematical or statistical methods, using multiple representations where applicable

Type of Artifact	1 (Minimal)	2 (Developing)	3 (Substantial)	4 (Complete)
Individual Assignment	Demonstrates math concepts that are not college-level (i.e., basic graphs, basic algebra, etc.) OR Provides an artifact from a college level math course with no work shown (i.e., exam that is only multiple choice)	Demonstrates basic college-level math concepts with explanation (i.e., any evidence from an introductory math course showing development toward higher level thinking)	Provides clear communication for medium to upper level math concepts (math reasoning may be shown by software calculations or hand calculation)	Demonstrates upper level analytical reasoning with work and complete explanations OR Provides research paper authored by student (and possibly faculty) showing upper level math concepts with sources cited.
Group Assignment	Provides group work with below college-level math (with explanation of student's participation in project)	Provides group work that demonstrates college level math skills at minimal level (with explanations of student's participation in project)	Provides group project that demonstrates college level math reasoning, research provided, and sources cited	Demonstrates exemplary group work.

Examples of Competency Score

Score of 1 (Minimal)	• Blank Documents (would like to give a 0) • Algebra or arithmetic calculations without interpretation • Statistics calculations or analysis without interpretation • Basic graphs or tables with/without labels and interpretation • Substituting numbers into a simple formula without explanation Example of Artifact: • Calculating loan payments without interpretation • Calculating test statistics without interpretation
Score of 2 (Developing)	• Algebra or arithmetic calculations with labeling and fully developed interpretations • Introductory Statistics calculation or analysis with properly developed interpretations • Complex graphs with labels and interpretation • Calculating values using arithmetic or formulas and fully interpreting those values in context of a problem Example of Artifact: • Calculating loan payments while fully interpreting the pros and cons of those loan payments for a given situation • Calculating test statistics while interpreting the implications of that test statistic on a particular hypothesis test (Excellent artifacts from MATH 1060, 1070, 1080, 2070 and STAT 3090 will score a 2) (Superior artifacts from MATH 1010, 1020, 1150, 1160, 2160 and STAT 2220, 2300 will score at most a 2)
Score of 3 (Substantial)	• Intermediate Statistics Analysis with properly developed interpretations • Fully developed intermediate Calculus problem with interpretation in context of a problem Example of Artifact: • Statistical Analysis with ideas and thoughts beyond scope of course • Multiple Regression Analysis in context of a problem • Analysis of Variance Analysis in context of a problem • Optimization problem interpreted in context of a problem (Excellent artifacts from STAT 3300 will score a 3) (Superior artifacts from MATH 1060, 1070, 1080, 2070 and STAT 3090 will score at most a 3)
Score of 4 (Complete)	• Advanced Statistical analysis of complex problem with interpretation • Research paper authored by student • Upper level mathematical proofs with explanation (Superior artifact from STAT 3300 may score a 4)

Competency Area: Competency NS: Natural Sciences

Demonstrate the process of scientific reasoning by performing an experiment and thoroughly discussing the results with reference to the scientific literature, or by studying a question through critical analysis of the evidence in the scientific literature.

Criteria	1	2	3	4
Major Principles and Theories	Demonstrates unsatisfactory college-level work.	Exhibits a limited understanding of the major principles and theories of a particular scientific discipline.	Exhibits a mature understanding of the major principles and theories of a particular scientific discipline.	Demonstrates exemplary work.
Hypotheses	Demonstrates unsatisfactory college-level work.	Exhibits undeveloped or unclear hypotheses.	Exhibits skill in formulating complete and clear hypotheses.	Demonstrates exemplary work.
Scientific Approach	Demonstrates unsatisfactory college-level work.	Exhibits incomplete designs to test working hypotheses.	Exhibits skill in designing and testing working hypotheses, including use of appropriate experimental controls.	Demonstrates exemplary work.
Data Collection	Demonstrates unsatisfactory college-level work.	Exhibits collection of inaccurate or inadequate data to test working hypotheses. Does not include all relevant variables.	Exhibits skill in collecting accurate and objective data to test working hypotheses. Data structures include all relevant variables.	Demonstrates exemplary work.
Data Analysis	Demonstrates unsatisfactory college-level work.	Analyses, interpretations, or conclusions are incomplete or inaccurate. Inconsistently uses multi-step approaches.	Analyses, interpretations, or sound scientific conclusions are fully and clearly supported by the data collected. Correctly uses multi-step formalism.	Demonstrates exemplary work.

Competency Area: Science and Technology in Society
Competency STS Demonstrate and understanding of issues created by the complexinteractions among science, technology and society.

Criteria	1	2	3	4
Interaction between science, technology and society	Demonstrates unsatisfactory college-level work.	Identifies a interaction between science or technology and society	Analyzes multiple impacts related to the interaction (such as, local and global impacts, controversies surrounding the interaction, impact on ethical decision-making, the impact of social forces on science and technology etc.)	Demonstrates exemplary work.

Competency Area: Competency SS1: Social Sciences
Describe and explain human actions using social science concepts and evidence.

Social Science Competency with Rubric: Describe and explain human actions using social science concepts and evidence.				
	1	2	3	4
Identifies social science concepts	Utilizes few, if any, relevant social science concepts that shape human behavior	Utilizes a limited number of social factors that shape human behavior	Utilizes many of the relevant social factors that shape human behavior	Displays the characteristics of a level 3 artifact, but with exceptional quality
Applies social science concepts, models, and theories to explain human actions	Fails to go beyond simple description and to make connections between social science concepts and human behavior	Makes limited and/or superficial connections between social science concepts, models, and theories and human behavior	Makes a variety of relevant and meaningful connections between social science concepts, models, and theories and human behavior	Displays the characteristics of a level 3 artifact, but with exceptional quality
Utilizes social science evidence to support conclusions	Lacks evidence to support conclusions and/or reaches logically inconsistent conclusions	Reaches reasonable and logical conclusions based upon limited evidence collected through social science methods	Reaches meaningful and logical conclusions based upon substantial evidence collected through social science methods	Displays the characteristics of a level 3 artifact, but with exceptional quality

Appendix C

Written and Oral Communication

Effective oral and written communication is the means by which all competencies will be demonstrated. Evaluation Criteria Demonstrates college-level writing/speaking and/or multimedia communication using relevant, appropriately documented sources to express logically organized, fully-developed ideas appropriate for the discipline and genre of the artifact.

Communications Rubric

1. Doesn't Pass	Artifact is hard to understand because of logical incoherence, poor sentence structure, or serious and widespread spelling, grammatical, word-usage (there-their, affect-effect, then-than) errors. Citations (if needed) are missing or obviously inappropriate.
2. Pass with Reservations	Artifact has less serious problems, but is still not college-level writing. It may be awkward, difficult to follow, may lack a central thesis, and/or has some spelling, grammatical, and word-usage errors. Citations (if needed) are present, but may not be of appropriate quality or in the right format.
3. Good	Artifact has college-level writing with logical flow and adequate development of ideas. It has few spelling, grammatical and word-usage errors. Citations (if needed) are appropriate for the course level.
4. Excellent	Artifact is exceptionally well organized, has superior logical flow and excellent choice of words. It has strong development of ideas. It is devoid of spelling, grammar, and word-usage errors. Citations (if needed) are extensive and extremely relevant to the arguments made in the paper.