General Education Assessment 2014-2015 Academic Year: Fall Semester

Introduction

The general education assessment process was piloted in the 2013-14 academic year by collecting artifacts from four general education courses and analyzing them using a rubric for General Education Outcome (GEO) 2 Communicate effectively in writing using both Lakota and English. The outcome selected for the Fall 2014 semester was GEO 4 Apply quantitative analytical skills. Whereas only general education courses were considered during the 2013-14 pilot, artifact collection was expanded to include program-level courses. The Assessment Academy Team (AAT) in collaboration with the chairs of the various departments selected the following courses for artifact collection based on which courses align with GEO 4 and which courses were offered during the Fall 2014 semester: Math 103 Elementary Algebra (Math, Science, and Technology), Math 154 College Algebra (Math, Science, and Technology), Nurs 312 Pharmacology for Nursing I (Nursing), SoSc 313 Statistics for Social Science (Humanities and Social Science), ANTH 433 Introduction to Archaeology (Humanities and Social Science), and ED 489 Student Teaching (Education).[1]

Description of Processes

Artifact Collection Process

At the beginning of the Fall 2014 semester, the departments housing courses to be assessed determined which assignments would be collected as GEO 4 artifacts. The AAT received artifacts from all sections of all six courses, though the SoSc 313 instructor submitted the wrong assignment. The four departments submitted a total of 165 artifacts. More detail on the artifact assignments, number of sections and of received artifacts can be found in Table 1 below.

Course	Artifact	# of Sections	# of Sections Submitting Artifacts	# of Artifacts Received	# of Artifacts Scored
Math 103	Final Exam	11	11	98	30 (24 exams)[2]
Math 154	Final Exam	4	4	39	30 (18 exams)[3]
Nurs 312	Medication Calculation Exam	1	1	11	11
SoSc 313	T-Test Homework Assignment[4]	1	1	7	7
ANTH	Faunal Analysis	1	1	8	8

[1] Originally, Sowk 433 Social Work Elective was listed as a course from which to collect assignments for GEO 4 analysis, but the alignment between this course and GEO 4 was incorrect. Sowk 433 was therefore not included.
[2] Simple random sampling with replacement.
[3] Simple random sampling with replacement.
[4] The assignment received from the (adjunct) instructor was not the T-Test Homework Assignment but it was nonetheless included in the analysis.

433	Problem				
ED 489	Impact on Student Learning Project	1	1	2	2
TOTAL		**19**	**19**	**165**	**88**

Table 1: General education artifact collection Fall 2014.

Sampling and Scoring Process

In alignment with the pilot process from the previous academic year, the AAT decided to use one of the VALUE rubrics developed by the American Association of Colleges and Universities (AAC&U) as basis for OLC's own rubric. Representatives from all the departments from which artifacts were collected met in November 2014 to finalize the GEO 4 rubric: Minor changes were made to the wording of the Quantitative Literacy VALUE rubric. The VALUE rubric was expanded by adding the overall education goal (students will exemplify Wolakolkiciyapi) as rubric element at the top. The addition of the overall goal was piloted on the GEO 2 scoring rubric.

The AAC&U VALUE rubrics and therefore also OLC's GEO rubrics use the levels benchmark (score: 1), 1st milestone (2), 2nd milestone (3), and capstone (4). Scorers are encouraged to give a 0 when the benchmark for a certain element was not bet. The GEO 4 rubric includes the following elements: Wolakolkiciyapi, interpretation, representation, calculation, application/analysis, assumptions, and communication.

A capstone-level artifact is characterized as follows: a) demonstration of a thorough understanding of Wolakolkiciyapi and successful utilization of that knowledge; b) accurate explanations of information presented in mathematical forms and appropriate inferences based on that information (interpretation); c) skillful conversion of relevant information into an insightful mathematical portrayal that contributes to a deeper understanding (representation); d) successful calculations that are sufficiently comprehensive to solve the problem (calculation); e) deep and thoughtful judgments and insightful conclusions based on quantitative analysis (application/analysis); f) explicitly described assumptions and compelling rationale for each assumption (assumptions); and g) effective presentation of the use of quantitative information in connection with the purpose of the work (communication). Artifacts scored at the second milestone level don't show the same deep understanding as capstone-level work but the calculations, assumptions, etc. are mostly correct. First milestone work shows frequent errors and limited understanding. An artifact is scored at the benchmark-level when there are many errors and only basic understanding.

The scoring of the artifacts took place on February 13, 2015 with seven faculty members representing four academic departments (Math, Science, and Technology (3 scorers), Nursing (1), Education (1), and Humanities and Social Science (2)) as well as with the Assessment Director and the Vice President for Instruction. This group followed the process piloted in the previous year by looking at all artifacts from the courses with no more than 30 artifacts (Nurs 312, SoSc 313, ANTH 433, and ED 489) and by selecting a sample of 30 from the courses with more than 30 artifacts (Math 103 and Math 154).

Whereas systematic sampling was used in the previous year, the statistics experts among the scorers recommended using simple random sampling with replacement. The random number generator of the website www.random.org was used to produce 30 random numbers for Math 103 and Math 154. As the sampling was done with replacement, several artifacts were selected two or even three times. In that case, the scores for that artifact were counted as many times as the number was selected. In accordance with the process determined in the 2013-14 academic year, each artifact that was selected for analysis was scored by two individuals.

The artifacts for Math 103 and 154 were the final exams. To help with the scoring, the scoring group decided to go through both exams and identify which tasks would fit under which rubric element. The group determined that instead of trying to include the whole exams consisting of up to 41 questions, the scorers should focus on four questions from each exam. These questions fit under all or most of the rubric elements and therefore allow for adequate scoring. The alignment of tasks and rubric elements as well as the selection of tasks to consider are listed in Table 2 below.

Rubric Element	**Math 103 Final Exam Tasks**	**Math 154 Final Exam Tasks**
Interpretation	4-6, 21-25	12-14, 21, 24-25, 30, 41
Representation	7-9, 21-27, 29-30, 33	13-14, 17-21, 24-25, 30, 41
Calculation	1-3, 10-19, 21-24, 27-28, 31-33	1-26, 28-41
Application/Analysis	13-16, 20-26, 30, 33	7, 12-14, 17-21, 24-27, 41
Assumptions	17, 20, 25, 26	12-14, 21, 41
Communication	13-16, 20-26, 33	7, 12-14, 24-27, 41
Tasks selected for analysis	**21, 22, 23, 24**	**13, 14, 24, 41**

Table 2: Math 103 and 154 final exam task alignment with rubric elements.

Data Aggregation Process

Each artifact was scored by two reviewers and the scores from both reviewers for each of the rubric elements were recorded. For each element, the official score was determined by the arithmetic mean of both scores. In addition, an overall score was calculated for each paper by adding up all mean sub-scores with the exception of the Wolakolkiciyapi element. The Wolakolkiciyapi element was not included because it did not apply to most assignments.

Data Analysis Process

In order to allow for a comparison between the courses, arithmetic means of official scores (means of scores given by two reviewers) were calculated for each element as well as for the overall score separately for each course. The maximum possible for each individual element was 4.0 and 24.0 for the overall score. An overall score was considered to be in the capstone category if at least three of the six elements were scored at the capstone level and the other three not lower than at the second milestone level. As a result, capstone level includes overall scores between 21.0 and 24.0. The other

levels were defined in the same manner: a minimum of half of the elements had to be at the higher level but the other half could be at the next lower level. The bottom levels for each category were divided by the number of elements (six) to get the bottom level for each sub-score. Table 3 summarizes the different levels.[5]

	Benchmark Not Met	Benchmark Met	1st Milestone	2nd Milestone	Capstone
Individual Elements	0.0-0.4	0.5-1.4	1.5-2.4	2.5-3.4	3.5-4.0
Overall Score	0.0-2.9	3.0-8.9	9.0-14.9	15.0-20.9	21.0-24.0

Table 3: Sub-score and overall score levels.

Results and Interpretation

Table 4 shows the mean overall scores and sub-scores for the different courses as well as for all courses combined. The overall scores for Math 103, Math 154, and ANTH 433 were by far the highest (see also Chart 1 below). The average overall scores of these courses were all at the first Milestone level (9.0-14.9). "Calculation" was the element in which five of the six courses received the highest sub-scores (see Chart 2). The element "Assumptions" received the lowest scores after "Wolakolkiciyapi" in five of the six courses. The one course where the lowest and highest scores were different was ED 489, a course from which only two artifacts were received.

	Overall Score	**Wolakolkiciyapi**	**Interpretation**	**Representation**	**Calculation**	**Application / Analysis**	**Assumptions**	**Communication**
Math 103 (N=30)	12.50	0.00	2.08	2.23	2.57	2.03	1.73	1.85
Math 154 (N=30)	11.85	0.07	2.10	2.20	2.35	1.77	1.50	1.93
Nurs 312 (N=11)	5.27	0.00	0.18	2.41	2.50	0.18	0.00	0.00
SoSc 313 (N=7)	7.86	0.71	1.36	1.43	1.07	1.36	0.93	1.71
ANTH 433 (N=8)	11.31	0.19	2.06	1.63	2.31	2.13	1.19	2.00
ED 489 (N=2)	4.75	1.75	0.75	0.00	0.00	0.00	2.25	1.75
ALL	**10.72**	**0.14**	**1.76**	**2.07**	**2.28**	**1.62**	**1.34**	**1.65**

Table 4: Mean sub- and overall scores.

[5] The levels were defined differently in the2013-14 general education assessment. At that time, a paper was only considered to be e.g. at the capstone level if all sub-scores were at the capstone level. This interpretation seemed to be too harsh and was therefore changed for the 2014-2015 year.

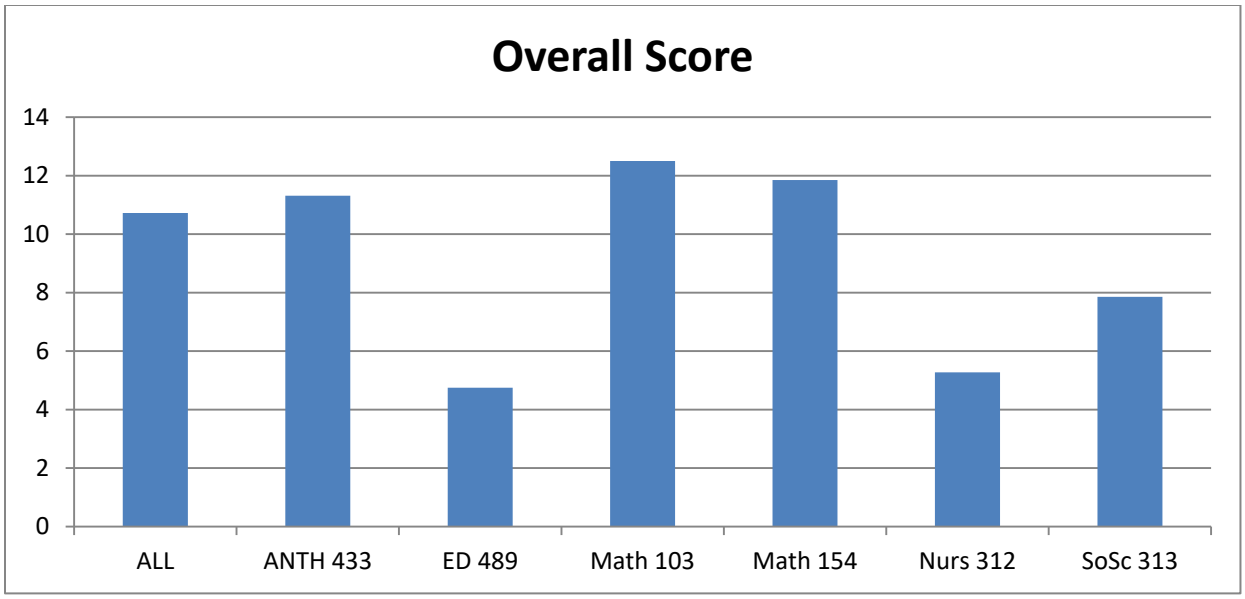

Chart 1: Overall scores by course (maximum: 24).

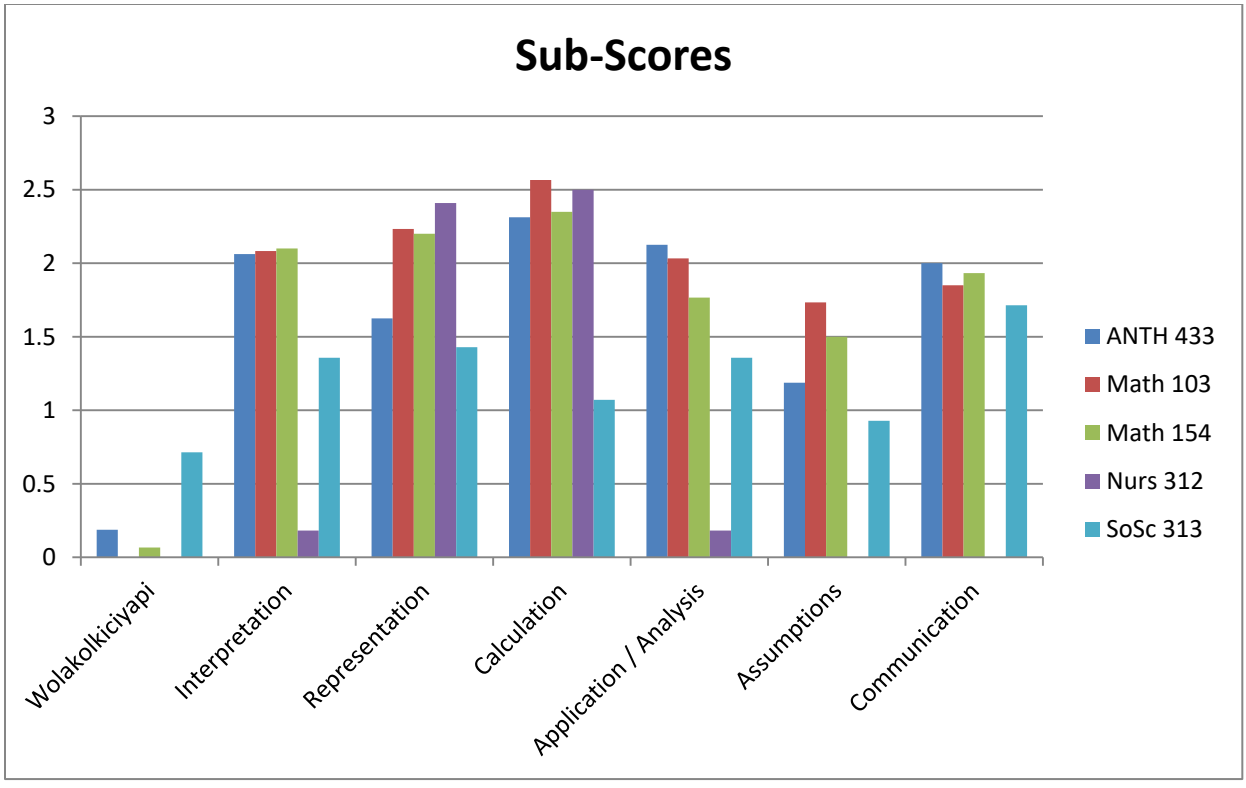

Chart 2: Sub-scores by course (maximum: 4). ED 489 is excluded due to the small number of artifacts.

The data listed above could be interpreted as students' math skills decreasing as they move on to upper-level courses. However, multiple factors impact the scores and thereby limit possibilities for

comparison of courses: The artifacts in Math 103, Math 154, and ANTH 433 were the only ones that required tasks that align with all of the GEO 4 rubric elements. As a result, these courses received the highest overall scores. A low average score in e.g. Application/Analysis might be caused by a task not requiring explicit application and analysis or only at a very basic level. As an example, Nurs 312 artifacts received very low scores in Wolakolkiciyapi, Interpretation, Application/Analysis, and Communication but very high scores for Representation and Calculation. The rubric that was used cannot adequately assess assignments where quantitative reasoning is only tangential.

Another limitation for the data analysis is the small number of artifacts received from the courses other than Math 103 and Math 154, in particular ED 489.

The low Wolakolkiciyapi scores indicate that the Lakota perspective is not evident in most of the assignments used as GEO 4 artifacts. However, this should not be interpreted as the Lakota perspective being missing in those courses. It is difficult to incorporate Lakota values into a math test in a non-superficial manner but they can be embedded in how the course is conducted in general. Wolakolkiciyapi scores based on exams do not truly reflect what is happening in the courses.

Math 103 was the only general education course assessed in the Fall of 2014. This course received the highest overall average score and higher sub-scores than Math 154 in Calculation, Application/Analysis and Assumptions (Interpretation and Representation sub-scores were very similar). In order to find possible explanations for Math 103 scoring higher than Math 154, variation of scores from the same course are analyzed next.

In addition to the arithmetic mean of sub- and overall scores, the distribution of scores is of interest. Table 5 and Chart 3 below show the percentage of students in each of the levels with regard to the overall score: Benchmark not met (0.0-2.9), Benchmark met (3.0-8.9), 1st Milestone (9.0-14.9), 2nd Milestone (15.0-20.9), and Capstone (21.0-24.0). Table 5 also includes the standard deviations as another measure of variation.

	Benchmark Not Met	**Benchmark Met**	**1st Milestone**	**2nd Milestone**	**Capstone**	**Standard Deviation**
ALL (N=88)	6.8%	34.1%	30.7%	18.2%	10.2%	6.44
Math 103 (N=30)	0.0%	33.3%	26.7%	26.7%	13.3%	6.65
Math 154 (N=30)	13.3%	10.0%	40.0%	23.3%	13.3%	6.71
Nurs 312 (N=11)	9.1%	81.8%	9.1%	0.0%	0.0%	2.88
SoSc 313 (N=7)	14.3%	28.6%	42.9%	14.3%	0.0%	5.21
ANTH 433 (N=8)	0.0%	50.0%	37.5%	0.0%	12.5%	6.23
ED 489 (N=2)	0.0%	100.0%	0.0%	0.0%	0.0%	0.35

Table 5: Percentage of artifacts at each level.

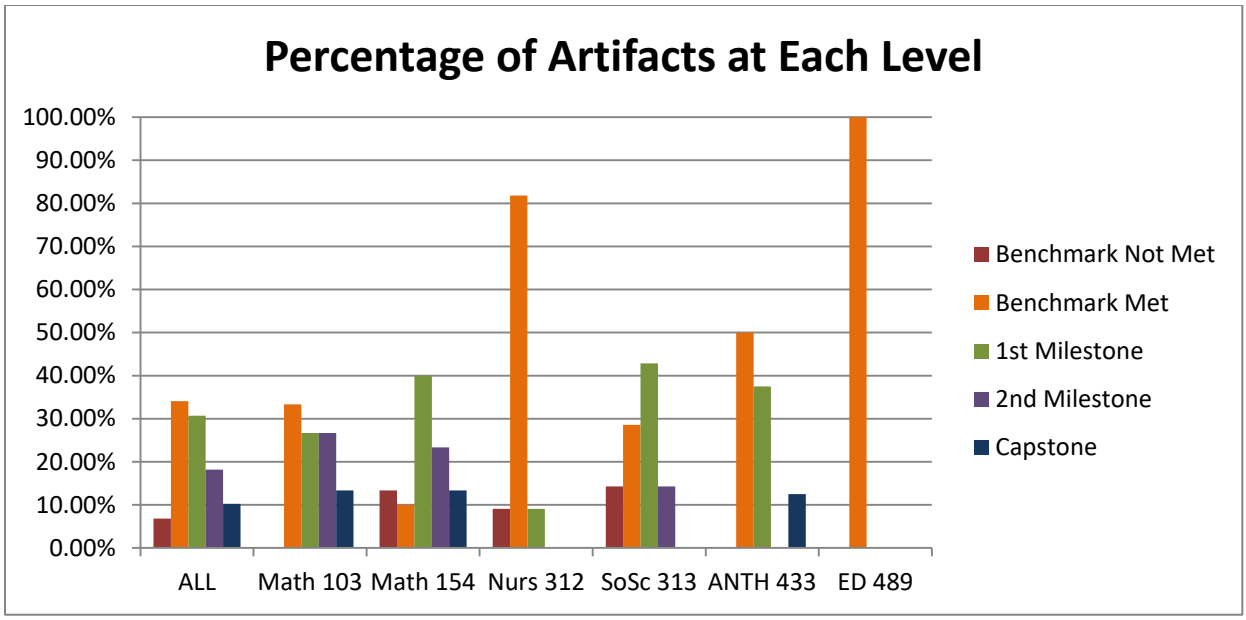

Chart 3: Percentage of artifacts at each of the levels (overall score): Benchmark not met: 0.0-2.9, Benchmark met: 3.0-8.9, Milestone: 9.0-14.9, Milestone: 15.0-20.9, Capstone: 21.0-24.0.

Overall, less than seven percent of students placed in the "Benchmark not met" level. Almost two thirds (64.8%) of papers received a "Benchmark met" and "1st Milestone" overall score. When comparing Math 103 and Math 154, two main differences stand out: No Math 103 student received an overall score in the "Benchmark not met" category whereas 13% of Math 154 received such a score. These students did not attempt the tasks that were reviewed for this general education assessment, or they only completed a very small portion of them. These very low scores pulled down the average of all Math 154 artifacts drastically and can therefore help explain the slightly lower average of overall scores of Math 154 compared to Math 103 artifacts. The other difference between Math 103 and Math 154 is that for the former, the majority of artifacts were scored at the "Benchmark met" level whereas for the latter, the majority scores were at the "1st Milestone" level. This supports the interpretation that despite the slightly lower mean of Math 154 compared to Math 103, students' quantitative reasoning skills increased.

When comparing standard deviations of the overall scores (see Table 5 above), it stands out that the Math 103, Math 154, and ANTH 433 scores are dispersed more widely than the ED 489, and Nurs 312 scores. Standard deviation is largest for Math 154 (6.71), meaning that the scores from individual students differ most, and lowest for ED 489 (0.35) and Nurs 312 (2.88).

Other Findings

All scorers were asked to write down students' strengths and weaknesses regarding quantitative reasoning as well feedback regarding the assessment process. In addition, the scorers discussed the

findings and possible recommendations at the end of the scoring session. The scorer feedback is included in this section as well as in the next one.

Student Strengths:

- Calculations: Most students solved calculation tasks correctly. The final exams in Math 103 and Math 154 emphasized calculation more than the other elements of the GEO 4 rubric (see Table 2 above).
- Several scorers remarked that Math 154 students showed a deeper understanding of math concepts. This is, however, not evident in the rubric data.
- Students have a basic understanding of using graphs.

Student Weaknesses:

- Following instructions: Students frequently did not complete all the tasks that were part of a question. For instance, they completed the calculations but then did not complete the rest of the assignment.
- Communication: Many students completed all the calculations but did not effectively communicate the results. This finding is not clearly visible in the rubric results but it was seen as a weakness by all scorers.
- Incomplete tests: Some students skipped several test items. It is unclear if this occurred because of time pressure, overlooking the items, or not knowing how to solve the tasks.
- Interpretation: Calculations are done correctly but the results are misinterpreted.
- Analysis/Application: Some students struggle making accurate conclusions based on quantitative analysis.
- Use of incorrect formulas: Students e.g. mix up formulas for area and perimeter.
- Test anxiety: Math instructors reported that many students do well in class during the semester but then perform poorly on the final exam because they are very nervous as it is a high-stakes test.
- Retaining skills/knowledge for future courses: Students are able to complete many difficult tasks at the end of the Math classes but struggle with math assignments in later classes even when these tasks are easier than what was required in the Math courses.
- Many OLC students have a negative attitude toward math and assume that they are not good at math and therefore build a mental barrier.
- Many students who have completed the remedial Math courses (Math 083 and Math 093) are not ready yet for Math 103.

Assessment Process:

- Wolakolkiciyapi: Most artifacts did not allow assessment of this area because alignment is missing.

- Scoring difficulties: Some scorers did not feel they had the necessary knowledge to adequately assess some of the artifacts, especially when the correct answers were not provided or the task description was not available.
- Artifact selection: The Math 103 and Math 154 final exams are very long which makes scoring using a general education rubric difficult. In addition, using a high-stakes comprehensive exam can lead to biased results because students tend to be very nervous which is reflected in their performance.
- Identification of key tasks: It was immensely helpful to go through the two math exams first to identify key questions on which the assessment could focus. This took up much time.
- The rubric was not yet finalized at the beginning of the semester. This led to a slight mis-match in assignment and rubric, especially with regard to non-math courses.
- Alignment of courses to GEOs: Some courses were wrongly identified as being aligned with GEO 4.
- One adjunct instructor did not submit the correct assignment.
- All of the questions selected as key tasks for Math 103 were about geometry. Students tend to be weak in geometry so the selection of key tasks might have led to a bias in the results.
- The beginning of the scoring was delayed because the artifacts from the two large courses had to be numbered first and a random sample had to be selected.

Other:

- The Math 103 and Math 154 artifacts were very long and seemed redundant. When there were multiple questions that were basically the same, it was observed frequently that students would solve the first task correctly but then did not attempt to solve the other tasks that were the same, or they tried to solve them differently.

Recommendations

Suggestions for Improvement of the Assessment Process

Artifact selection:

- Most artifacts collected in Fall 2014 did not include opportunities for students to display the goal of OLC's general education, Students will exemplify Wolakolkiciyapi: Learning Lakota ways of life in community. The AAT needs to collaborate with the Lakota Studies Department to provide guidance to all departments regarding inclusion of Wolakoliciyapi. An alternative to forcing inclusion of Wolakolkiciyapi on math tasks might be to include instructor observation reports.
- Long artifacts are difficult to score with a general education rubric, especially with regards to GEO 4. Shorter assignments (e.g. homework assignments) should be considered where possible. When a longer assignment such as a final exam is selected, the department should

determine which tasks can serve as key tasks prior to the scoring. This selection needs to be made carefully so it does not lead to a bias.

Submission of artifacts:

- The description of the assignment needs to be submitted with the artifacts. Otherwise it is not possible to evaluate whether an assignment met the assigned task. In addition, alignment of tasks to course-level outcomes can be helpful to scorers.
- Artifacts for GEO 4 should be submitted either with an answer key or with corrections by the instructor. This does not apply to artifacts for other GEOs.
- Student names should be removed from the artifact to allow blind scoring.
- Artifacts should be numbered and submitted to the AAT no later than one week before the scheduled scoring session. This will allow the AAT to conduct the random sampling prior to the scoring session.

Quantitative Reasoning rubric:

- A "0" column and scores for each of the levels should be added (this applies to other GEO rubrics as well).
- The "Interpretation" element needs to be clarified.
- The terms Wolakolkiciyapi, benchmark, 1st and 2nd milestones, and capstone need to be defined (this applies to other GOE rubrics as well).
- A widening of the scope of the rubric should be considered so it is of more use to assignments that do not focus only on quantitative reasoning.
- In general, the general education rubric for the GEO that is assessed needs to be completed prior to the beginning of the semester.

Scoring:

- Random sampling and selection of key tasks (where needed) should be conducted prior to the scoring session to allow for more time to discuss the rubric prior to scoring and to reduce chaos.
- Having one person focus only on entering the scores in an Excel file and keeping track of which artifacts have been scored twice and which still need more scoring has been an improvement compared to the general education scoring conducted in the summer of 2014.

Recommendations to the Academic Departments

Math, Science, and Technology Department (Math 103 and Math 154):

- Find ways to incorporate Wolakolkiciyapi. Collaboration with the Lakota Studies Department on this matter is suggested.

- Emphasize application in instruction to help students see the importance of calculation to interpretation, analysis and communication. Instruction should be cognitively guided instead of focusing on methods/calculations. In addition, math instructors should show students how what they are learning in the math courses will be needed in later courses in their major. One strategy for this could be to include some similar tasks as what program-level courses from other departments require. This will establish a clearer connection to the relevance of certain methods.
- Consider shortening the exams by decreasing redundancy.
- Consider using a different assignment as GEO 4 artifact: an assignment that is not as high stakes and therefore is less affected by test anxiety.

Humanities and Social Science Department (ANTH 433 and SoSc 313):

- Make sure adjunct instructors comply with the assessment requirements and consider disapproving adjuncts who repeatedly don't comply.
- Work with the Math, Science, and Technology Department to include tasks relevant to Humanities and Social Science courses into math classes.
- Find ways to incorporate Wolakolkiciyapi. Collaboration with the Lakota Studies Department on this matter is suggested.

Nursing Department (Nurs 312):

- Work with the Math, Science, and Technology Department to include tasks relevant to Nursing courses into the math classes.
- Consider using a different assignment as GEO 4 artifact (one that includes tasks for most of the rubric elements)
- Find ways to incorporate Wolakolkiciyapi. Collaboration with the Lakota Studies Department on this matter is suggested.

Education Department (ED 489):

- Work with the Math, Science, and Technology Department to include tasks relevant to Education courses into the math classes.
- Consider using a different assignment as GEO 4 artifact and/or realignment of courses to GEOs.
- Find ways to incorporate Wolakolkiciyapi. Collaboration with the Lakota Studies Department on this matter is suggested.

Course: _____ Artifact #: _____

OLC General Education Goal: Students will exemplify Wolakolkiciyapi: Learning Lakota ways of life in community.

Wolakolkiciyapi is a philosophical concept, a mutual agreement for continued peace harmony within one's life and community. One may gain a better understanding of the definition by displaying aspects of Lakota virtues including; compassion, bravery, fortitude, generosity, patience, humility, and wisdom. By continuing to improve oneself through the practice of "wolakolkiciyapi" one may better his/herself and therefore the community.

Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Demonstrates a thorough understanding of "wolakolkiciyapi" and successfully utilizes that knowledge to aid within school and community.	Demonstrates increased knowledge of "wolakolkiciyapi" within classroom and begins to utilize knowledge expanding into communities.	Demonstrates knowledge of Lakota perspective and attempts to utilize "wolakolkiciyapi" in certain aspects of life and classroom.	Demonstrates minimum level of awareness and display of "wolakolkiciyapi"

Ability 3 Quantitative Reasoning

Learning Outcome 4: Apply quantitative analytical skills.

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

	Capstone	Milestone 3	Milestone 2	Benchmark
Interpretation *Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words)*	Provides accurate explanations of information presented in mathematical forms. Makes appropriate inferences based on that information. *For example, accurately explains the trend data shown in a graph and makes reasonable predictions regarding what the data suggest about future events.*	Provides accurate explanations of information presented in mathematical forms. *For instance, accurately explains the trend data shown in a graph.*	Provides somewhat accurate explanations of information presented in mathematical forms, but occasionally makes minor errors related to computations or units. *For instance, accurately explains trend data shown in a graph, but may miscalculate the slope of the trend line.*	Attempts to explain information presented in mathematical forms, but draws incorrect conclusions about what the information means. *For example, attempts to explain the trend data shown in a graph, but will frequently misinterpret the nature of that trend, perhaps by confusing positive and negative trends.*

Representation *Ability to convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words)*	Skillfully converts relevant information into an insightful mathematical portrayal in a way that contributes to a further or deeper understanding.	Competently converts relevant information into an appropriate and desired mathematical portrayal.	Completes conversion of information but resulting mathematical portrayal is only partially appropriate or accurate.	Completes conversion of information but resulting mathematical portrayal is inappropriate or inaccurate.
Calculation	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented elegantly (clearly, concisely, etc.)	Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem.	Calculations attempted are either unsuccessful or represent only a portion of the calculations required to comprehensively solve the problem.	Calculations are attempted but are both unsuccessful and are not comprehensive.
Application / Analysis *Ability to make judgments and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis*	Uses the quantitative analysis of data as the basis for deep and thoughtful judgments, drawing insightful, carefully qualified conclusions from this work.	Uses the quantitative analysis of data as the basis for competent judgments, drawing reasonable and appropriately qualified conclusions from this work.	Uses the quantitative analysis of data as the basis for workmanlike (without inspiration or nuance, ordinary) judgments, drawing plausible conclusions from this work.	Uses the quantitative analysis of data as the basis for tentative, basic judgments, although is hesitant or uncertain about drawing conclusions from this work.
Assumptions *Ability to make and evaluate important assumptions in estimation, modeling, and data analysis (hypothesis testing)*	Explicitly describes assumptions and provides compelling rationale for why each assumption is appropriate. Shows awareness that confidence in final conclusions is limited by the accuracy of the assumptions.	Explicitly describes assumptions and provides compelling rationale for why assumptions are appropriate.	Explicitly describes assumptions.	Attempts to describe assumptions.
Communication *Expressing quantitative evidence in support of the purpose of the work (in terms of what evidence is used and how it is formatted, presented, and contextualized)*	Uses quantitative information in connection with the purpose of the work, presents it in an effective format, and explicates it with consistently high quality.	Uses quantitative information in connection with the purpose of the work, though data may be presented in a less than completely effective format or some parts of the explication may be uneven.	Uses quantitative information, but does not effectively connect it to the purpose of the work.	Presents a purpose for which quantitative evidence is pertinent, but does not provide adequate explicit numerical support. (May use quasi-quantitative words such as "many," "few," "increasing," "small," and the like in place of actual quantities.)