CAC GEO IV: Mathematical/Scientific Inquiry and Analysis
GEO Pilot Results Spring 2011: MAT151 College Algebra, Standard

Executive Summary

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GEO Pilot Background:
The Math department has assessed student learning outcomes in **MAT151** since 2006.

Data Collection Process:
We kept our instrument, system for data collection, analysis, and reporting the same for spring semester 2011.

Student Sample:
We chose eight (8) sections of MAT151 which comprised 95 students and collected a common midterm.

Assessment:
We chose three basic General Education Outcome (GEO) Math Objectives which are reflected on the CAC Institutional Rubric under construction and crafted three specific GEO questions that corresponded to those GEO's. We graded student responses to those questions using the same 0-3 point Likert Scale rubric that we used last year.

Results:
For Math GEO Objectives #1-3 the mean scores were 1.45, 1.42, and 1.81 respectively. Students completing MAT151 were approaching mathematical competency as defined by CAC's Student Learning Outcomes Assessment Committee and the General Education Outcomes Executive Subcommittee. For example, for outcome #1, we had 42 students achieve a score of 3 and 40 students achieve a score of zero (0) which means that the student either didn't attempt to answer the question posed or all the work they demonstrated to solve the problem lacked the appropriate formula and the mathematical understanding required. It seems as though students either mastered the outcome or did not have any idea how to solve the problem.

Next Steps Based on Results:
In the fall, we plan on using **MAT121** for the Math GEO Pilot due to the fact that it has a high enrollment and serves as a gatekeeper course for most students pursuing a CAC degree. MAT121 has many student learning outcomes that translate into General Education Outcomes.

I believe we will change a few things based on these results, including: 1) collect data from all sections of the newly selected MAT121 course (determine total student population needed which is representative of all students enrolled in MAT121 Fall 2011semester and secure buy-in and adherence to assessment process from all Fall 2011 faculty teaching the course, as well as support for the GEO initiative from the Mathematics Division chair), 2) revise the rubric and gain further support from CAC leadership to achieve more consistent grading, 3) choose more than one question for each outcome (provide students with at least two opportunities to demonstrate competency in each GEO Objective area), and 4) provide opportunities for students to practice the essential skills and receive feedback from faculty prior to implementation of the GEO assessment as part of the mid-term and final examinations.

To verify the accuracy of the GEO assessment results, we plan to use other student achievement markers such as grades on the midterm and final examinations. During the next round of assessment, we will collect Midterm and Final Exam scores.

However, since faculty teach the same material differently and grade the standardized examinations differently, I am not sure how we can tie grades to evidence of student learning or general education outcomes. We do have a standardized reporting template for this data. I think we can use this to a certain degree for program level assessment and for Program Review although it is not exact since the faculty grade differently. I think we need to include pre- and post-tests to secure more evidence and to confirm the learning gauged on the final examination.

In addition, CAC Executive Director of Institutional Research, Bill Brown, provides routine reports which include student success rates on a per course basis. Once all the grades are entered for MAT151 for spring 2011, we should have the rest of the data which shows the percentage of students active in the course as of the 45-Day head count, the percentage of students who passed the course, the percentage that didn't pass, and the percentage that dropped the course after Day 45.

I don't believe that percentages alone prove anything. For example, 70% mastery based on three questions posed on the midterm and three on the final examination may be insufficient to truly gauge a student's ability and knowledge. I need clarification on what percentages of student competency for a specific GEO set of Objectives shows and how the results tie into our evidence of student GEO-related learning.

Although we have more work to do, I do think that the pilot GEO assessments produce some useful evidence about student learning. Standardizing the Midterm and Final examinations have allowed us to keep track of our course outcomes and gauge the degree to which they are being met. It also helps us ensure our adjuncts are teaching the required course student learning outcomes.

I'm not sure that the results obtained spring 2011 show any proof that our students have met the CAC General Education Outcomes. I think we need to look at rewriting some of our outcomes to make them broader and more encompassing so that students pursuing any CAC degree can demonstrate competency. It has been suggested to me that we look more closely at the Science/Technology GEO objectives.

I think it is important that we continue to ensure that each subject area is covering the GEO's. However, providing the evidence is still difficult. Ultimately, GEO assessment results will routinely be used to improve student learning as standards are raised and students become better prepared.

As far as increasing support and participation from students and CAC members, I think we should use our All College In-Service Day to get everyone on the same page. We could meet in smaller groups facilitated by a GEO Subcommittee leader to talk to each other about the GEOs, the GEO assessment process, institutional GEO rubric, GEO Pilot Student Learning results, and ways to use evidence to improve student learning.

In addition, the math software, *MyMathTest*, will become the placement test of choice at CAC with the *COMPASS* and *ASSET* placement tests used as secondary confirmation that students are placed in the correct CAC mathematics course based on their knowledge and skills upon entering CAC. Students will be strongly encouraged by math faculty and CAC advisors to complete the math tutorial prior to taking the placement test, and re-tests will be offered throughout the first few weeks of the semester to replace students in the correct math course.

The *MyLabsPlus* component of the math software suite which serves as the course management system will further ensure students are academically progressing toward achieving the course student learning outcomes. Besides incorporating new and existing software into the math courses, faculty have requested that hybrid courses include 50% face-to-face instructional time.

To complete the student learning math GEO pilot, the faculty leading the GEO math pilot plan to use the Arizona *ASSIST* database to track student success in subsequent math courses, such as MAT121, and to track completers of MAT151 who then transfer to one of the three Arizona public universities: Arizona State University, Northern Arizona University, and the University of Arizona.

Reflections on Data Analysis:
I am not sure the mean data results mean much in terms of evidence of student learning, since student grades were not equated to the GEO score achieved. Also, a mean of 2.0 would indicate that all students in the population sample achieved competency based on the faculty team who assessed the student responses to the three GEO questions on the examinations.

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