From: Mark Whisler, Chair, Dept. of Mathematics

August 2, 2010

To: Kim Krull, Vice-President of Academic Services, Josh Coltrain, Assessment Coordinator, College Algebra instructors

Subject: General Education Assessment for Mathematics, 2009-2010

The General Education goals for College Algebra are:
Goal A: The student should apply mathematics by demonstration of proficiency in one or more of the following ways:

1. Extracting data from mathematical problems.
2. Representing data using one or more of the following methods: graphs, charts, tables, and equations.
3. Analyzing data using one or more of the following techniques: estimation, modeling, calculations, extrapolation, and interpretation.
4. Interpreting data.
5. Drawing correct conclusions from data.
6. Presenting data and making conclusions.

Goal B: The student should demonstrate applied mathematics in a career setting in at least one of the following areas:
1. financial
2. scientific
3. agricultural
4. other career settings

Goal C: The student should use appropriate technology to solve mathematical problems.

Our method of evaluation and rubric is as follows:
Goal A: Three questions from the final exam will be used. The student will score a 0 if none are correct, 1 if one is correct, 2 if 2 are correct, and 3 if all three questions are correct. Our target is that 75% of the students should score at least 2.

Goal B: The final exam will contain one type of each problem. Our target is that 95% of the students should answer at least one question correctly.

Goal C: Three questions from the final exam will be used. The rubric is the same as for Goal A, as is the target.

The students tested all took the College Algebra final exam for either Fall 2009 or Spring 2010. Since there are a few sites that did not return their tests, I will not try to assess

whether there was an increase in the number of students. As of this date, at least 176 students had taken the exam. Last year we had at least 376 students take College Algebra. It is likely that the number of students taking the course will decrease, based on historical enrollments at the missing sites.

Results:
In the fall semester, we met none of our three goals, as summarized in the table below, although we missed Goal B by one percentage point. We had 64 % of our students meet Goal A. We had 94 % meet Goal B, which is very good, and 58 % meet Goal C, with targets of 75%, 95%, and 75% respectively. This is very disappointing.
In the spring, performance was much better, with all three goals being met. 80 % of our students met Goal A, 96 % met Goal B, and 78 % met Goal C.

Since reporting is incomplete, comparisons between on-campus and off-campus are not possible.

	Goal A	Goal B	Goal C
Fall 2009	64	94	58
Spring 2010	80	96	78

Analysis
This year, we had a better performance in the spring than in the fall, exactly the reverse of our performance last year. In the fall, we did not meet any of our goals, and weren't even close on two of them. As usual, goal C seem to need special attention with all students. What were the differences in the questions that I was using? I took a look at this question, comparing the questions used in these two semesters with questions used in Fall 2006, in which we met all three goals. Those questions are identified by category below:

Fall 2006 (Goal A)
1. Approximating interval over which the value of a function was positive given its graph.
2. Finding balance in a compound interest situation
3. Describing effects of rigid transformations on graph of a function.

Fall 2009 (Goal A)
1. Using the Vertical Line Test to identify graphs of functions.
2. Matching the description of a linear model with its graph.
3. Making a prediction in a linear model situation.

Spring 2010 (Goal A)
1. Using the Vertical Line Test to identify the graph that was not a function.
2. Finding the y-intercept of the graph of a rational function.
3. Identifying the range of a function from its graph.

Fall 2006 (Goal C)

1. Finding a local maximum of a quadratic function
2. Finding the balance in an account earning compound interest
3. Finding the product of two matrices.

Fall 2009 (Goal C)
1. Using a graphing calculator to approximate solutions to a cubic equation.
2. Solving a mixing problem in a simple interest situation.
3. Finding the maximum of a quadratic function in an applied setting.

Spring 2010 (Goal C)
1. Solving a logarithmic equation.
2. Finding how long it would take for a compound interest account to grow to a certain level.
3. Finding the original price of a sale item.

For Goal C two of the six questions used this year involved exponential and logarithmic functions, which often give students difficulties. Since we use calculators extensively with these topics, they are prime candidates to be chosen to measure this goal. But these were both in the spring, when performance was very good. Of the questions in the fall, the first one was unfamiliar, probably, since we don't spend time on approximating solutions. The other two questions are certainly familiar. Perhaps the applied setting caused problems, because the students would have had to interpret the model. The questions in the fall of 2006 also require less thought and analysis; the first and third questions used in that semester are easy.

For Goal A, I would guess that the poor performance had to do with the linear modeling. The first question, using the Vertical Line Test, should have been relatively easy. If so, this would be at odds with the previous fall, when students did well on linear modeling questions. The spring questions were relatively easy.

Recommendations

We should give more attention to the skills in Goal C in our classes. This is nothing new, but it's hard to do with so much material to cover. There is also variability due to the questions being used, and how they are written. This is something we will have to accept as long as multiple instructors are writing the final exams.

At this point in time, it is difficult to make comparisons with performance from the previous year. We have results missing from both campuses and outreach sites. I will refrain from making recommendations for on-campus classes at this time.

Sincerely,
Mark Whisler

Chair, Department of Mathematics