SLO Assessments for Math 152, 152A and 153 during Fall Semester, 2013

Math 152 SLO’s (active):

The student will:
1. Solve problems involving the mathematical concepts of function and functional inverse.
2. **Show increased skill in setting up and solving applications.**
3. Solve mathematical problems using concepts that may be useful for learning statistics: logarithms, sigma notation, and the binomial theorem.
4. Solve mathematical problems in topics useful for trigonometry: functions and inverses and their graphs, quadratic equations, and conic sections.

MATH 152 SLO’s (pending):

The student will:
1. Manipulate mathematical expressions, at an intermediate level.
2. Solve mathematical equations, at an intermediate level.
3. Demonstrate the qualitative behavior of graphs, at an intermediate level.
4. **Apply mathematical tools and concepts in solving word/situation-based problems, at an intermediate level.**
5. Operate a calculator, at an intermediate level.

Math 152A SLO’s:

The student will:
1. Solve problems involving the mathematical concepts of function.
2. Demonstrate the ability to graph and algebraically solve systems of linear equations.
3. **Show increased skill in setting up and solving word problems.**
4. Solve problems involving geometric applications useful for trigonometry.

Math 153 SLO’s:

The student will:
1. Manipulate mathematical expressions, at an intermediate level.
2. Solve mathematical equations, at an intermediate level.
3. Demonstrate the qualitative behavior of graphs, at an intermediate level.
4. **Apply mathematical tools and concepts in solving word/situation-based problems, at an intermediate level.**
5. Operate a calculator, at an intermediate level.

Most Math SLO’s have changed recently, from ones that look like the active Math 152 SLO’s to ones that look like the pending Math 152 SLO’s. Those that have not changed will soon. At the time the data was collected, Math 153’s SLO 4 looked more like Math 152A’s SLO 3 and Math 152’s active SLO 2, so what is being assessed for all three courses is whether the students
showed increased skill in setting up and solving word problems, though credit for meeting the new SLO 4’s should be given.

**METHODOLOGY**

Students were asked to set up and solve a word problem at the start and end of the semester, and twice in between for Math 152A and Math 153, three times in between for Math 152. It was always a mixture problem (loosely defined to include total-value problems). Both the pre-test and post-test had standard mixture problems of the $ax + by = c$ variety, but not identical problems. The Math Department at one time decided to see if students could set up such problems correctly. That is what is tested here.

**RESULTS**

At the start of the semester, no one in Math 152A knew how to set up the problem, let alone do it. In Math 153, no one knew how to do the problem, though two set it up correctly. In Math 152, two did the problem correctly and one more (out of 41) at least set the problem up correctly, for a best-ever overall first-day success percentage of 7.32%. Of the 29 who took the Math 152A final, 14 had a correct set-up (and 10 went all the way); of the 29 who took the Math 153 final, 13 had a correct set-up (and 9 went all the way); of the 29 who took the Math 152 final, 23 had a correct set-up (and 20 went all the way).

Using 7.32% as the starting point (the highest I’ve ever had at semester’s start), these results are statistically significant at the .00000000000001 level for each class, i.e., there was improvement.

The difference between Math 153’s 13 out of 29 (45%) and Math 152A’s 14 out of 29 (48%) is not significant, nor is the difference between these two percentages and the 47% and 48% in the same classes a year before. The noteworthy difference (and statistically significant at the .01 level) is the 79% success rate on this finals question for Math 152 students, as contrasted with the combined 47% rate for the other two classes. If we limit ourselves to those who showed improvement, the comparison is 77% versus 45%, also significant at the .01 level.

We would be wrong less than one time in 100 in asserting that my Math 152 classes do better on this final question than my Math 153 or 152A classes, assuming similar circumstances. The two likeliest reasons are that they are better in math or the one extra time being tested about mixture problems helped. Unlike Math 153 students, who are limited to taking Math 159 or 156, the Math 152 students can take Math 181 and all that follows. Unlike Math 152A students, who feel they need two semesters before tackling Math 181, Math 152 students can take Math 181 after just one semester. The one extra exposure probably helped, too.
NEXT STEPS

It would be worthwhile if everyone did a pre-test and post-test on mixture problems so we could learn about best practices. Lacking that, I feel that no major changes are needed in what I do, as the data shows all three classes definitely showed large, statistically significant, improvement. A minor point, which I might test, is what happens if I test mixture problems in Math 152 one time fewer between pre-test and post-test. That, however, is not as important as the kind of thing indicated in the addendum to this assessment.