MTH 083 Student Learning Outcomes (SLO) Assessment
SLOAT Fall 2010 Final Report

*Introduction

Academic Foundations Math 083 is a beginning mathematics course designed to take students from concrete arithmetic ideas to the more abstract algebraic forms of these ideas. One of the instructional components of AFM 083 is two mandatory sessions (one hour each) of tutoring per week and the required completion of ALEKS (computer software) assignments. The Academic Foundations Math 083 course outline lists the following goals:

1. Demonstrate knowledge of the fundamental concepts and theories from arithmetic, algebra and geometry.

2. Utilize various problem-solving and critical-thinking techniques to set up and solve real-world applications.

3. Communicate accurate mathematical terminology and notation in written and/or oral form in order to explain strategies to solve problems as well as to interpret found solutions.

*Purpose

The purpose of the SLOAT was to determine if the students enrolled in AFM 083 are learning the goals set in the course outline. It was also meant to help the Math instructors understand how the students enrolled in the Center for Academic Foundations learn and what different teaching techniques they can use. This assessment was conducted by Violeta De Pierola and Arturo Vera and it was done based on 32 students.

*Methodology

For the Fall 2010 SLOAT the two goals that were assessed were goals 1 and 2 from the Course outline.

1. Demonstrate knowledge of the fundamental concepts and theories from arithmetic, algebra and geometry:

    1.1 perform arithmetic operations on signed numbers;
    1.2 perform arithmetic operations on fractions;
    1.3 perform arithmetic operations on decimals;
    1.4 perform arithmetic operations on percents;
    1.5 determine the perimeter and area for simple geometric figures;
    1.6 determine whether a ratio is a proportion;
    1.7 convert from one unit of measure to another;
    1.8 simplify basic algebraic operations; and
    1.9 solve simple linear equations involving one operation

2. Utilize various problem-solving and critical-thinking techniques to set up and solve real world applications:

   2.1 apply arithmetic to solve application problems encountered in daily life

*Population

We decided to use a total of 32 students as a sample size selected from 4 sections of AFM 083; i.e., even though we gave all of the students in the 4 sections the pre-test, questionnaire, and post-test we sampled only 32 of those students for this SLOAT study.

Since one of the purposes for this assessment was to help determine whether students taking AFM are achieving the Measureable Performance Objectives (MPOs) for this course, we decided to start by blueprinting the pre-test given to all students. From there we randomly chose 8 students from each section and kept track of those students' questionnaire responses, quiz and test scores, and Aleks (an online homework software) statistics.

*Instrumentation

For this study we used data from 3 sources:

- Blueprinted multiple-choice questions*
- Questionnaires*
- Statistics from Aleks

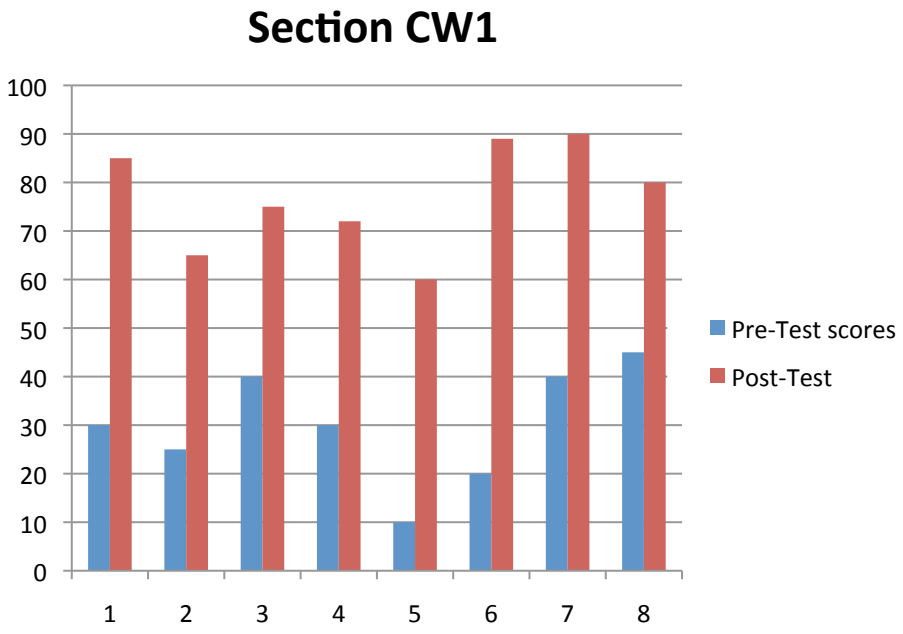
*Copies of assessment instruments used are included in Appendix A of this report.

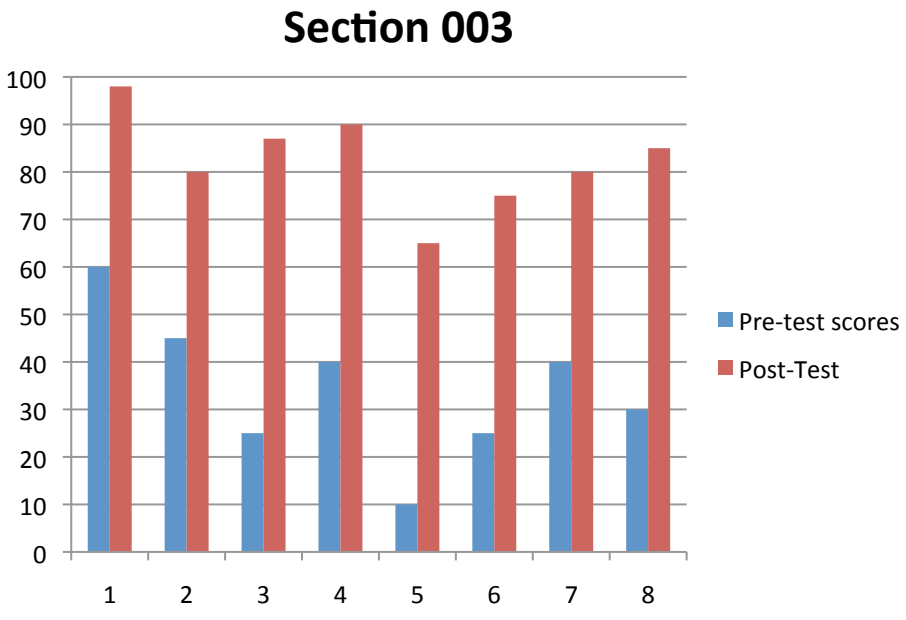
*Results

Pre- and Post-test Results

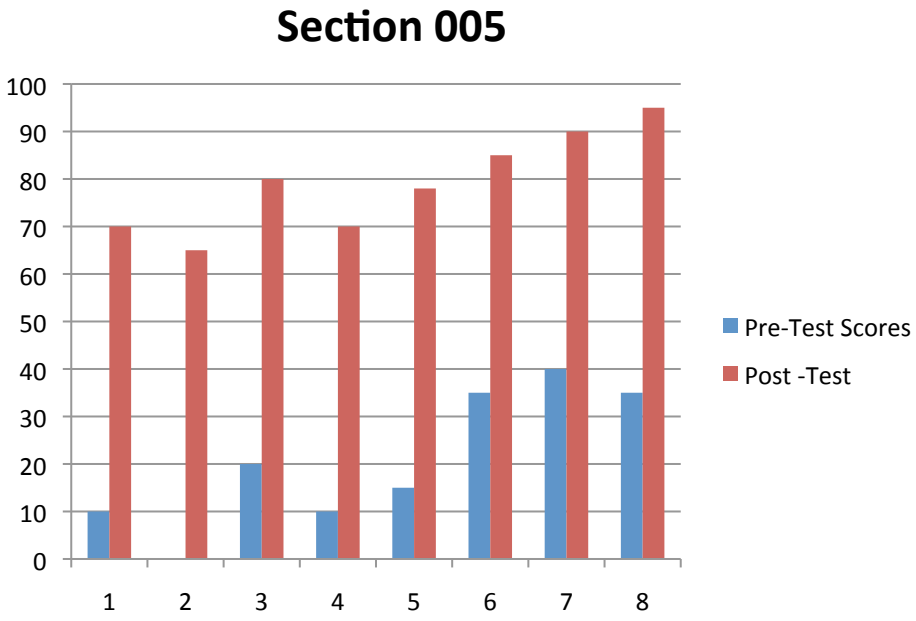
Graphs comparing the scores the 32 sampled students received on the pre- and post-tests are below.

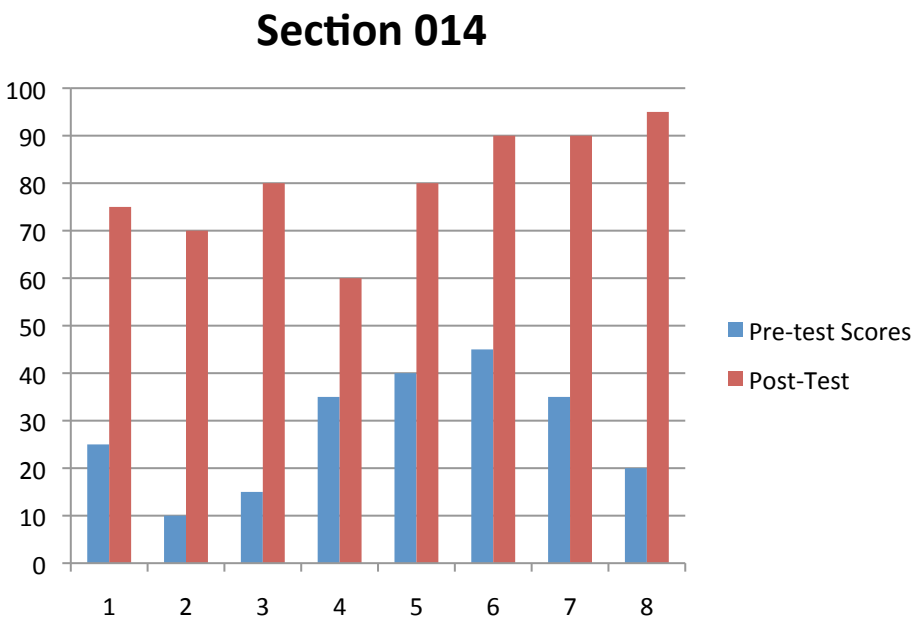
Pre- and Post-test scores





Pre- and Post-test scores (continued)





The pre- and post-tests were given by the instructors in class. The pre-test was given on the first day of class. Students were told to try their best and were not allowed to use calculators. The post-test was also given by the instructors and, by looking at the graphs above, we can see how remarkably the students' scores changed.

In section CW1, the average score on the pre-test was 30% and 79.8% on the post-test indicating an increase of 49.8%. In section 003, the average score on the pre-test was 35.6% and 81.7 % on the post-test indicating an increase of 46.1%. In section 005, the average score on the pre-test was 20.6% and 79.1% on the post-test indicating an increase of 58.5%. In section 014, the average score for the pre-test was 28.1% and 77.5% on the post-test indicating an increase of 49.4%.

By looking at the graphs we can also see that the students scored low as they entered this course. Many different factors could have influenced this result; for example, not expecting the test, coming back to school after many years, and not being well prepared. These are just a few reasons given by the students explaining why they did not perform that well on the pre-test.

Questionnaire Results

The students were given two questionnaires, the first one was conducted before they took the midterm and the second one was administered before the final. Average student responses to both questionnaires are given in Appendix B. From looking at the average responses of students' answers to the survey, we can conclude that the students still need extra help when working on the following MPO's:

1.4 Perform arithmetic operations on fractions;
1.8 Simplify basic algebraic operations;
2.1 Apply arithmetic to solve application problems encountered in daily life.

We came to this conclusion after noticing that the average student responses for each question related to these three MPOs were less than 70%. Since students need at least 70% to pass the course, the instructors should ensure that students spend more time practicing these topics.

This information is already being shared with CAF instructors and students. One such way is by creating the Class Syllabi for the Spring 2011 semester which reflect the course outlines prepared by SLOAT members. These are the following categories that we included in the syllabus:

- Course Number and Name
- Credit Hours
- Prerequisites
- Co-requisites
- Course Description
- Course Goals
- Course Requirements
- Methods of Evaluation
- Academic Integrity
- Student Code of Conduct

- Course Content Outline (by week)

We decided to include these elements because doing so will make the students aware of what is expected from them on day one, and they will know what they must learn by end of the semester.

*Suggestions

After reviewing all the data collected from the assessment, we realize that instructors need to spend more time reviewing fractions (adding, subtracting, multiplying and dividing), relating word problems to real life, and solving basic algebraic equations. Some suggestions to help students learn more effectively include the following:

- Instructors can have SIs work with students struggling in these areas.
- Have the students work on Aleks at least one day per week during tutoring time.
- Have the students work together while working on these difficult topics.

APPENDIX A

Center Academic Foundations
Academic Foundation Mathematics
AFM 083 Pre-test

Name: _____ Date: _____ Section: _____

1. Name the property that is illustrated
   4 x (3+6) = (4 x 30 + (4 x 6)

2. What is the product of 1636 and 58?

3. Write in expanded form 353, 999.

4. Write in expanded form x^5.

5. What is nine thousand seventy eight in standard form?

6. The average age of students in College X is 23.58 and the average age of students in College Y is 23.5798. Which College has the lower average?

7. Express seventy one thousand seventy-one and seventy-six hundredths in decimal form.

8. **Evaluate:** -22 + (-11) + 11 + (-10)

9. **Evaluate:** $d^3 - b^3$ if $b = 5; d = 6.$

10. Write the following phrase, using symbols*:* *Twice the difference of x and y*

Center Academic Foundations
Academic Foundation Mathematics
AFM 083 Midterm Questionaire

Name: _____ Date: _____ Section: _____

*Please mark only **one X** on the one that applies to you.*

1. How do you think you will do on the midterm?
   __ Really good __ good __ average __ not so good

   On a scale from 0% - 100%

2. How comfortable do you feel rounding? (round 8,416 to the nearest thousand)
   __ 100% __ 75% __50% __25% __0%

3. How comfortable do you feel dividing fractions? ($\frac{3}{8} \div \frac{2}{8}$)
   __ 100% __ 75% __50% __25% __0%

4. How comfortable do you feel finding product? (Find the product of -90 and 60)
   __ 100% __ 75% __50% __25% __0%

5. How comfortable do you feel with prime factorization? (Find the prime factorization of 144)
   __ 100% __ 75% __50% __25% __0%

6. How comfortable do you feel finding the perimeter? (A rectangle has a length of 26m and a width of 12m. Find the Perimeter of the rectangle)
   __ 100% __ 75% __50% __25% __0%

7. How comfortable do you feel with evaluating expressions? ($-xy$ For x=12 and y = -3)
   __ 100% __ 75% __50% __25% __0%

8. How comfortable do you feel simplifying? (Simplify $-8 \div 2 + (-6)^2$)
   __ 100% __ 75% __50% __25% __0%

9. How comfortable do you feel with absolute value? (Write in ascending order $-|4|, |9|, -|17|, 8|$)
   __ 100% __ 75% __50% __25% __0%

10. How comfortable do you Multiplying Fractions? ($\frac{5}{3}$) x ($\frac{4}{9}$) x ($\frac{5}{2}$)
    __ 100% __ 75% __50% __25% __0%

Center Academic Foundations
Academic Foundation Mathematics
AFM 083 Final Questionaire

Name: _____ Date: _____ Section: _____

*Please mark only **one X** on the one that applies to you.*

1 How do you think you will do on the final?
__ Really good __ good __ average __ not so good

2. Do you think you will do better on the final then you did on the midterm?
___ yes ___ no

On a scale from 0% -100%

3. How comfortable do you feel working with order of operations? (20-16 ÷ 4)
__ 100% __ 75% __50% __25% __0%

4. How comfortable do you feel working with percents? (write 0.818 as a percent)
__ 100% __ 75% __50% __25% __0%

5. How comfortable do you feel solving proportions? ($\frac{38}{} = \frac{}{616}$ is this proportion true?)
__ 100% __ 75% __50% __25% __0%

6. How comfortable do you feel simplifying variable expressions? 4+ 5m + (-5m)
__ 100% __ 75% __50% __25% __0%

7. How comfortable do you feel solving equations? 2d = -12
__ 100% __ 75% __50% __25% __0%

8. How comfortable do you feel dividing fractions? (-110 ÷ $\frac{3}{17}$)
__ 100% __ 75% __50% __25% __0%

9. How comfortable do you feel solving word problems?
(A digital camera with a regular price of $265 is on sale for 19% off the regular price. Find the sale price.)
__ 100% __ 75% __50% __25% __0%

10. How comfortable do you feel multiplying exponential expressions? ($z^3 * z^2 * z$)
__ 100% __ 75% __50% __25% __0%

APPENDIX B

Center Academic Foundations
Academic Foundation Mathematics
AFM 083 Midterm Questionaire

Name: _____ Date: _____ Section: _____

*Please mark only **one X** on the one that applies to you.*

1. How do you think you will do on the midterm?
   __ Really good __ good __ average __ not so good

   On a scale from 0% - 100%

2. How comfortable do you feel rounding? (round 8,416 to the nearest thousand)
   85%

3. How comfortable do you feel dividing fractions? ($\frac{3}{8} \div \frac{2}{8}$)
   67%

4. How comfortable do you feel finding product? (Find the product of -90 and 60)
   73%

5. How comfortable do you feel with prime factorization? (Find the prime factorization of 144)
   80%

6. How comfortable do you feel finding the perimeter? (A rectangle has a length of 26m and a width of 12m. Find the Perimeter of the rectangle)
   71%

7. How comfortable do you feel with evaluating expressions? ($-xy$ For x=12 and y = -3)
   78%

8. How comfortable do you feel simplifying? (Simplify $-8 \div 2 + (-6)^2$)
   72%

9. How comfortable do you feel with absolute value? (Write in ascending order $-|4|, |9|, -|17|, 8|$)
   86%

10. How comfortable do you Multiplying Fractions? ($\frac{5}{3}$) x ($\frac{4}{9}$) x ($\frac{5}{2}$)
    62%

Center Academic Foundations
Academic Foundation Mathematics
AFM 083 Final Questionaire

Name: _____ Date: _____ Section: _____

*Please mark only **one X** on the one that applies to you.*

1 How do you think you will do on the final?
good

2. Do you think you will do better on the final then you did on the midterm?
yes

On a scale from 0% -100%

3. How comfortable do you feel working with order of operations? (20-16 ÷ 4)
95%

4. How comfortable do you feel working with percents? (write 0.818 as a percent)
81%

5. How comfortable do you feel solving proportions? ($\frac{3}{8} = \frac{6}{16}$ is this proportion true?)
76%

6. How comfortable do you feel simplifying variable expressions? 4+ 5m + (-5m)
68%

7. How comfortable do you feel solving equations? 2d = -12
78%

8. How comfortable do you feel dividing fractions? (-110 ÷ $3\frac{1}{7}$)
69%

9. How comfortable do you feel solving word problems?
(A digital camera with a regular price of $265 is on sale for 19% off the regular price. Find the sale price.)
69%

10. How comfortable do you feel multiplying exponential expressions? ($z^3 * z^2 * z$)
71%