

**Math Course Redesign Intervention Analysis**

**March 27, 2012**

**Office of Planning and Institutional Research**



## Executive Summary

An analysis was conducted to evaluate the effectiveness of the Math Course Redesign Achieving the Dream (AtD) Intervention, which took place during Fall 2011 in nine 16-week sections of MATH 0013 – Beginning Algebra. The analysis included a comparison of 149 students in the sections in which the curriculum was redesigned (henceforth called “redesign group”) with 152 students in nine other 16-week sections of Beginning Algebra (henceforth called “control group”), for a total of 301 students in the study. Of the 301 students, 139 (46.2%) were in the Fall 2011 AtD cohort (75 in the redesign group and 64 in the control group).

### *Outcomes*

There were three outcomes of interest in the present study: 1) scores on an algebra skills assessment written by the Math faculty at TCC, 2) scores on the Mathematics Anxiety Rating Scale-Short Version (MARS-S), and 3) successful completion rates for MATH 0013 (defined as percentage of students earning a grade of C or better in the course). Students completed the algebra assessment as well as the anxiety scale both at the beginning and end of the semester. Thus, in addition to comparing scores across the redesign and control groups, pretest and posttest scores were compared to examine the impact of taking MATH 0013 on algebra skills and math anxiety.

### *Results*

All statistical tests were conducted using a 95% confidence level. Moreover, the results remained the same when including only students in the AtD cohort and when including only those who were not in the cohort. Overall results including both AtD cohort and non-cohort students are presented in this report.

The results from a paired-samples *t*-test revealed that posttest scores were significantly higher than pretest scores on the algebra assessment,  $t(228) = -16.86, p < .001$ . Additionally, a second paired-samples *t*-test indicated that anxiety scores were significantly lower at the end of the course than at the beginning,  $t(300) = 7.90, p < .001$  (see Table 1 below for statistics for each measure). It is noteworthy that the differences between the pretest and posttest means for algebra skills and anxiety were statistically significant for both the redesign and control groups.

Table 1. Pretest and Posttest Mean Scores (Redesign and Control Groups Combined)

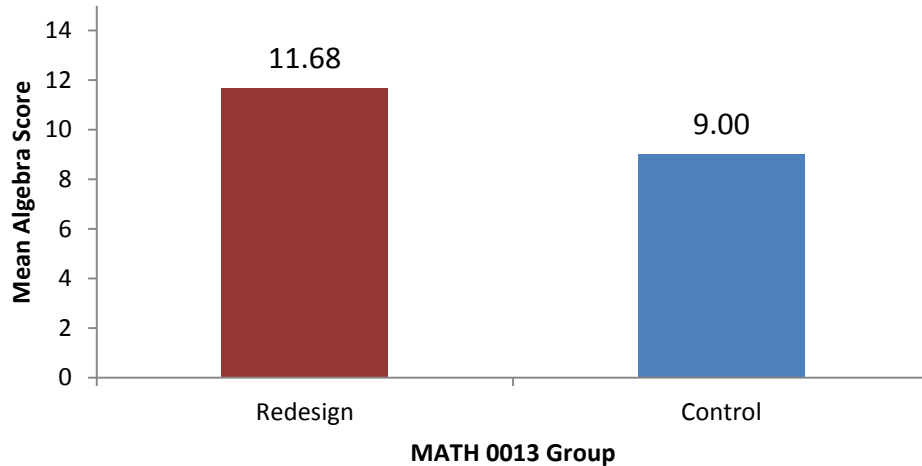
Measure		Matched Sample Size (N)	Mean (Std. Deviation)	p-value
Algebra Skills*	Pretest	229	5.84 (2.94)	< .001
	Posttest	229	10.38 (3.97)	
Math Anxiety*	Pretest	301	67.63 (27.54)	< .001
	Posttest	301	48.05 (36.33)	

\*Statistically significant difference with a 95% confidence level.

In addition to exploring overall differences between pretest and posttest scores on algebra skills and math anxiety, mean posttest scores on each of these measures were compared for the redesign and control groups. To ensure any differences in posttest scores were not due to preexisting differences between the groups, pretest scores were examined as a function of group using independent-samples *t*-tests. Findings for pretest scores revealed no significant differences between the redesign ( $M = 5.77, SD = 3.28$ ) and control ( $M = 5.47, SD = 2.94$ ) groups for algebra skills,  $t(290) = -.83, p = .41$ , or for math anxiety,  $t(299) = -1.45, p = .15$  ( $M = 69.95, SD = 24.58$  and  $M = 65.36, SD = 30.06$  for redesign and control groups, respectively).

To compare the redesign and control groups on their posttest mean algebra and anxiety scores, two independent-samples *t*-tests were conducted. Results indicated that the difference between the redesign ( $M = 49.91, SD = 35.52$ ) and control ( $M = 46.22, SD = 37.12$ ) groups for posttest math anxiety scores was not statistically significant,  $t(299) = -.88, p = .38$ . Yet, the redesign group ( $M = 11.68, SD = 3.56$ ) had a significantly higher posttest mean on the algebra skills assessment than the control group ( $M = 9.00, SD = 3.86$ ),  $t(236) = -5.57, p < .001$  (see Figure 1 below).

**Figure 1. Mean Posttest Algebra Scores by Group**



Lastly, the redesign and control groups were compared on their success rates in MATH 0013 – Beginning Algebra (i.e., percentage of students earning a C or better). A chi-square test showed that the difference between the success rates of the redesign (72.5%) and control (75.0%) groups was not statistically significant,  $\chi^2 (1, N = 301) = .25, p = .62$ .

### *Conclusions*

The present findings indicate that students participating in the MATH 0013 course redesign demonstrated significantly stronger algebra skills at the end of the semester than did those in the control group. However, success rates in the Beginning Algebra course did not vary across these groups. Lastly, results suggest that algebra skills increase and math anxiety decreases significantly across the semester for students in all sections of MATH 0013.