



Assessment of a Redesigned Elementary Algebra Course: Fall 2000 – Fall 2005

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Background

- Riverside Community College District is composed of three campuses: Riverside City, Moreno Valley and Norco.
- Elementary Algebra is a 4-unit class, and at the beginning of the project enrolled approximately 3600 students in 72 sections.
- Prior to the project it was taught only in the traditional lecture format.



Pew Grant for Course Redesign

Major Goals

- ❑ To replace “seat-time” with active learning in a lab setting;
- ❑ To use technology to assess student weaknesses and construct lecture sessions that targeted them;
- ❑ To offer students a variety of workshops to supplement learning;
- ❑ To reduce costs by replacing human labor with technology.



Beginning of the Assessment Project

- One course, enrolling 35 students, was piloted in fall 2000
 - Decreased lecture time by 2 hours/week
 - Had students 2 hours/week in a lab setting using ALEKS as a tutorial and for online homework
 - Idea was to try out the design of the course to see where there might be problems.
- Established baseline data by giving a common final exam and pretest to all traditional classes



The Pre-Test and the Common Final

- The common final (45 questions) was created by a committee of faculty in the math discipline from all campuses, being careful to select questions that could map to each of the 6 learning objectives from the course outline
- The pretest was a subset of 20 questions from the common final. The pretest targeted 6 student learning outcomes.
- Learning gain was measured at the end of the semester by subtracting the common final scores from the pre-test scores



Student Learning Outcomes

- Perform arithmetic operations on real numbers and polynomial, rational, and radical expressions. (SS1)
- Evaluate algebraic expressions. (SS2)
- Solve equations involving linear, quadratic, rational, and radical expressions. (SS3)
- Graph linear equations and inequalities given the equation and find equations given the graph. (SS4)
- Factor polynomials. (SS5)
- Use the symbols and vocabulary of algebra to clearly communicate mathematical concepts. (SS7)



Findings and changes, fall 2000

- Based on the assessment data from ALEKS in the pilot class, it appeared that often there was no clear consensus on which topic was weakest;
- Abandoned the idea of constructing lecture sessions that targeted weak spots and constructed a common outline for all instructors to follow.



Redesign, Spring 2001

- Nine sections of the redesigned course were piloted (2 at Norco, 3 at Moreno Valley and 4 at Riverside City)
- Assessments given:
 - Pre-tests and the common final were given
 - Learning style surveys were administered
 - A common timetable was agreed upon at each campus; made necessary because of testing.
 - Faculty and students focus groups were conducted.



Major Elements of the Redesign

Spring 2001

- Lecture
 - Shortened lecture time (from 4 to 2 hours/week) and increased class sizes (from 50 to 75 students)
- Introduction of the Math Lab
 - Drop-in for help from instructors and tutors
 - ALEKS online assessment and homework
 - Study Skills Workshops
 - Workshops centered on math topics
 - Testing occurs over a one-week period in the lab
- The “salad bar” approach



Major Findings from Spring 2001

- ❑ Overall, students had a significant gain in learning from beginning to course end.
- ❑ Student learning (determined by the common final results) was about the same as for the traditional lecture students from fall 2000.
- ❑ Students were unhappy with “mastery” needed to proceed on ALEKS,
- ❑ Students were averaging only 2 hours/week on homework.



Changes made for fall 2001

- Introduced paper and pencil worksheets to supplement ALEKS homework.
- Made lecture and lab attendance mandatory;
- Continued Workshops.



Assessments in fall 2001

- Pre-tests, Common Final: showed learning gains significantly better in “redesigned” classes
- Focus groups with faculty:
 - Unhappy with ALEKS (not enough practice, different types of problems than text)
 - Unhappy with managing paper and pencil worksheets
- Compared rates of enrollment and completion in Intermediate Algebra for traditional Elementary Algebra students with those who took a “redesigned” course: no significant difference.
- Learning style survey: unable to access results



Tracking into Intermediate Algebra: Fall 2000 (All Traditional)

- ❑ 1260 students enrolled in Elementary Algebra
- ❑ 652 completed Elementary Algebra with C or better (51.7%)
- ❑ 257 (of 652) enrolled in Intermediate Algebra in spring 2001 (39.4%)
- ❑ 158 (of 257) completed Intermediate Algebra with C or better (61.5%)



Tracking into Intermediate Algebra: Fall 2001 (All Redesign)

- 1668 students enrolled in Elementary Algebra
- 767 completed Elementary Algebra with C or better (46.0%)
- 318 (of 767) enrolled in Intermediate Algebra in spring 2001 (41.5%)
- 202 (of 318) completed Intermediate Algebra with C or better (63.5%)



Changes made for Spring 2002

- Changed from ALEKS to MyMathLab
 - More practice on problems
 - More structured
 - More in alignment with lecture topics

- No need for pencil and paper worksheets for extra practice



Assessments Spring 2002

- Pre-tests and Common Finals: no significant difference in 4 of 6 objectives; significantly better for “redesigned” students in the other two.
- Learning style survey: unable to access results



Changes for fall 2002

- To allow for options for both students and faculty
 - Riverside and Moreno Valley continued to offer the original “redesign” as well as traditional lecture format
 - Norco modified the “redesign” and offered this as well as traditional lecture.



Fall 2002 to Present

- Continued pre-tests until fall 2005
- Continued common finals until present
- Grade analysis and successful completion rates from spring 2001 to spring 2004. When this was done, there were (and still are) no consistencies in grading policies

Chi Square Results – Spring 01 – 04

Withdrawals Included

	Success	Nonsuccess	Total
Redesign Norco	1259 51.3%	1197 48.7%	2456 100%
Redesign MOV/RIV	2251 42.6%	3035 57.4%	5286 100%
Traditional	2562 54.0%	2184 46.0%	4746 100.0%
Total	6072 48.6%	6416 51.4%	12488 100%

Chi Square Results – Spring 01 – 04

Withdrawals Not Included

	Success	Nonsuccess	Total
Redesign Norco	1259 63.7%	718 36.3%	1977 100%
Redesign MOV/RIV	2251 55.7%	1787 44.3%	4038 100%
Traditional	2562 66.5%	1291 33.5%	3853 100.0%
Total	6072 61.5%	3796 38.5%	9868 100%



Questions for discussion

- How could the low mean on the common final be interpreted?
- Should anything be done as a result of the grade and successful completion rate analysis?
- Is there any way that the data for the past three years can be used to close the assessment loop?
- Is the common final useful? What other types of assessment might be needed?