# The Case For Repeating Algebra 1
Sid Soni

At midyear, each of my Algebra 2 courses had several students with failing grades. I felt that this failing cohort had simply not mastered the prerequisite Algebra 1 skills required to navigate this challenging course. Despite this being a patently obvious connection, I administered an explicit Algebra Skills diagnostic exam to formally measure how closely prerequisite skills correlated with Algebra 2 performance. I deliberately chose prosaic algebra topics that should require no preparation or memorization, but should be intuitive skills for anyone who has taken the course: plotting a Cartesian point, solving a 2-step equation, understanding order of operations, distributive property, basic probability, etc.
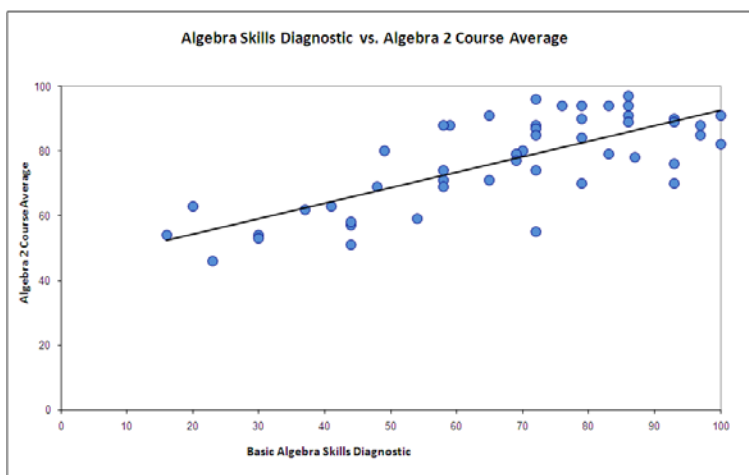
The correlation between the students' scores on the algebra skills diagnostic and their Algebra 2 midyear average was **r=.75** Furthermore, the bottom 20th percentile (scoring 44% or less) correlated to a **100% fail rate** in the Algebra 2 course at midyear. This was strong evidence that this subset of the class simply did not have the prerequisite algebra skills to pass Algebra 2. In light of this, I pondered what measures could be taken to avoid this situation in the future.

Course averages can be distorted by homework points, participation points, and/or test 'retakes'. Also, the NY State Algebra Regents exam has a significant curve, rendering the grade meaningless. As a result, some students may have technically passed Algebra 1, yet really not had a firm grasp on the subject. Just as you can't properly read if you only know 65% of the alphabet, you can't do Algebra 2 if you don't have algebra skills. There is only so much inline remediation a teacher can do without compromising the education of the other students.

Courses with axiomatic prerequisite skills should require students to pass a basic entrance exam; the one I administered was comprised of 15 questions, and took less than one period. Ultimately, if the borderline student is passed, he's promoted into a class he probably won't pass. The alternative is to give him another chance at actually mastering the basics under different circumstances: a different teacher, being one year older, seeing the material a second time, etc. For those who cannot demonstrate adequate algebra skills, I feel that repeating Algebra 1 is the better option. Yes, it might be embarrassing or disheartening, but so is failing the next course, *even if you're trying*. Weak Algebra foundations will have substantial downstream ramifications on all subsequent Math and Science experiences. Further, many college majors have explicit Math requirements.[i] Ergo, the exit requirements of Algebra 1 should be the most stringent of any high school Math course.

One pressure in promoting students is to ensure they complete four years of Math in high school. Putatively, this bolsters their college application. However, I would like to dispense with this notion because its logic seems flawed:

1. Epistemologically speaking, what can the student possibly have learned in those four credits if he doesn't possess staple 9th grade algebra skills?
2. Weak algebra skills will hamper performance in Geometry & Algebra 2. My data suggests most will end up failing Algebra 2, so they'll only earn three total credits anyway.
3. Marginal algebra skills will ensure lousy Math SAT scores.[ii]

In light of these points, regardless of having taken 4 years of Math, it is unlikely they will qualify for the caliber of college that stipulates this.

Lastly, at many colleges, particularly less competitive ones, incoming students are given a Math placement exam that is heavily skewed towards measuring their algebraic skills. They will take this exam after a two-year hiatus from this material and several summer vacations. If I had to wager on the outcome of this exam, I'd predict this cohort will be re-taking Algebra in college. This begs the question, were they better off repeating Algebra in 10th grade or 13th? Q.E.D.

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[i] High school algebra skills include: symbolic notation, manipulating expressions, formulas & variables, solving equations, probability, XY plane graphing, etc. Algebra skills are the sine qua non of college Math courses. Statistics and Economics require it since they are replete with data, formulas, equations, and graphing. Calculus additionally requires geometry and trigonometry skills. Which majors have an explicit Statistics or Calculus requirement? Psychology, Nursing, Accounting, Economics, Social Work, Management/MBA, Business, Marketing, Finance, Chemistry, Biology, Computer Science, Physics, and Engineering.
http://www.thesoni.com/majors.php

[ii] Some of these students will spend good money for SAT classes and tutors. The general approach for these programs is to practice sample SAT problems. Yet, how effective can this be for weak Algebra students? The Math SAT is an aggressively timed exam which demands strong numeric, algebraic, and geometric *foundations*. Effective preparation for the SAT should first backfill core deficiencies in Math skills vs. jumping right into drilling advanced SAT problems (which students are not yet sufficiently prepared to tackle).