Mainstreaming Remedial Math

Statistical courses, rather than algebra remediation, do a better job at helping first-year students succeed when they test into developmental education, a new report finds.

June 23, 2016

By

Ashley A. Smith

A student placed in remedial math has a better chance of succeeding in college by taking college-level statistical courses with additional support instead of developmental math, according to a new report published today in the American Educational Research Association's *Evaluation and Policy Analysis* journal.

The research -- conducted by researchers at the City University of New York -- found that for first-year college students who tested as needing remedial algebra, 56 percent of those assigned to and enrolled in college-level statistics passed, while only 39 percent of those assigned to and enrolled in elementary algebra passed. The students who passed the statistics course also subsequently accumulated more credits.

"The majority fail the remedial elementary algebra. They don't like it and they don't like taking it," said Alexandra Logue, one of the study's authors and a research professor at the Center for Advanced Study in Education at the City University of New York Graduate Center. "But if they take statistics, they have a more positive experience and they're much more likely to pass, and if they still want to do the algebra they can come back."

The researchers looked at three ways to approach remedial math. They examined a traditional remedial algebra course, a corequisite math course with a weekly workshop, and finally the statistics course with a workshop that took place for a couple of hours a week. The students in the study had all said they were not interested in pursuing STEM majors, Logue said.

The workshops used in the statistics courses were also slightly different from corequisite courses, which pair college-level classes with remedial supports. Corequisite remediation, which at one point was a controversial reform, has been advocated for by the nonprofit Complete College America.

Logue said the statistics workshops may involve algebra or helping students with any math area where they struggled in the statistics classes.

"Having students take a math course that's most useful to them in their major just makes sense," said Robin Ozz, president of the National Association for Developmental Education. "The statistics is in the quantitative reasoning path …. They're still getting that logical deduction and critical thinking just in ways they can use in their majors. There are a lot of ways we can teach that besides putting it in algebra."

Math remediation can be a huge barrier to increasing graduation rates. More than 80 percent of students who are assessed as needing math remediation never complete the course work, according to the report.

Ozz said the shift to more math pathways will help students be more successful when they're placed in remediation.

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JG • 9 hours ago

This quote from one of the study's authors caught my eye: The students "don't like it [i.e., remedial algebra] and they don't like taking it." I want my students to have a positive experience in college, and I definitely don't want them to fail. But--news flash!--sometimes you have to do things you don't like, both in college and the real world.

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Not Again JG • 9 hours ago

Don't worry. All these students did algebra in high school (despite their dislike), and yes they learned plenty then despite popular trashing of high school mathematics. They learned algebra! Why do it again if it is not relevant to their current studies?

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5tn37s Not Again • 7 hours ago

Did they learn 'plenty' if they were placed into a remedial course, based upon a test of things they should have learned in (junior) high school algebra? Still, point taken. The same students often remain resistant to learning the abstract rules and formal operations of high school algebra, past the remedial course, into succeeding college offerings in algebra, including the substantial amount of algebra needed in calculus, not to mention applied quantitative sciences. For students not majoring in sciences (including psychology and health) or business, a better understanding of applied statistical reasoning will serve them well.

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AssociateProfessor Not Again • 7 hours ago

"They learned algebra!"

Not if they are in a remedial course.

Seriously, though, there is no reason why a student at a 4-year college or university should be testing into remedial classes at all. Numeracy is so important in the modern world that we should expect more of all students. This goes double for students in programs which do not emphasize mathematical (or logical) thinking.

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Not Again AssociateProfessor • 6 hours ago

False. Still knowing is different than "did learn." Please don't make me take my PhD comps again or I'm pretty sure I'd be a remedial graduate student. When are people allowed to forget clearly irrelevant topics from their past? And who gets to decide when each person can forget what? Besides students are learning more math, just not the same math. Isn't a liberal arts education also about breadth and not just repeating the same old stuff?

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PanthernNation Not Again • 5 hours ago

If you think these topics are irrelevant, watch these same students try to figure interest payments on loans or manage their personal finances. I won't even start on the need to understand data as a citizen. The number of people who can't even begin to understand the data behind climate change or the national debt is astounding to me. And, from my view, citizens who don't understand those issues are not good for themselves or us. So, I would not take the notion of math to be irrelevant.

2

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Emik PanthernNation • 4 hours ago

I don't think anyone is saying 'math is irrelevant.' The whole point of this piece is an exploration of how best to present material to entry-level college students, and statistics certainly addresses the points you've raised.

2

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alsotps Emik • 3 hours ago

And yet, the posts have dodged the why.

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math guy • 6 hours ago

Those who are pushing to replace algebra and calculus with statistics seem to have missed one important point. A deep understanding of statistics requires calculus and even a cursory understanding of statistics requires skills in algebraic manipulation. Let's be honest about where we're headed. Just as it was decided many years ago that a college education no longer required an understanding of Greek and Latin, we are now deciding a college education no longer requires an understanding of mathematics.

2

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TheJonesest math guy • 5 hours ago

But, with more and more states pushing performance funding measures, the race is on to get students through their gen ed courses and onto upper division classes. Dev Ed is a huge problem at the community college level (in Florida CCs are the only colleges allowed to offer dev ed courses) with *pre* algebra the rocks upon which the ships of student ambitions crash. Mainstreaming dev ed students (who account for upwards of 60% of incoming college students) via statistics (useful for far more college majors and post-graduation employment than algebra and calculus) is just so crazy it might work.

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        alsotps TheJonesest • 3 hours ago

        Ambitions end up on the rocks because students have not been given the tools with which to pursue learning in college. They have NOT been taught how to learn; they have not been taught math reasoning; they have not had to write.

        Their fault? Hardly. Developmental work proof of inability to learn? Hardly.
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    King Goat math guy • 4 hours ago

"Just as it was decided many years ago that a college education no longer required an understanding of Greek and Latin"

This undercut your argument imo as I think a person can be well educated for success in today's society without much understanding of Greek and Latin.

Reply

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Another CC Prof math guy • 3 hours ago

But you don't need a DEEP understanding of statistics to understand a news story about medical advances or apply it in the social sciences. We decided generations ago that a college education does not require understanding mathematics. It only requires passing a freshman class duplicating what is taught in high school on topics that are long forgotten by the senior year. Statistics is much more useful for most careers, and none of these students are pursuing a major that requires calculus or even business calculus.

Further, these classes are perceived as "not sixth grade math". It is very easy for a math guy (like myself) to discount the psychology of facing the same thing taught the same way after failing to grasp it six or more times before.

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BoredHousewife Another CC Prof • 3 hours ago

Statistics is a field where a little knowledge is dangerous. Frequently, news stories report butchered statistics that both author and readers accept as accurate.

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dwpittelli math guy • 2 hours ago

What in statistics requires calculus? I ask because I look at statistics every day (mostly linear and logistic regressions, in Excel or R, with Tableau visualizations) and unless I am using calculus subconsciously, it isn't coming up.

Algebra is of course required in statistics, but that means that if the students are passing statistics at higher rates than they would remedial algebra, they're probably also learning and able to use algebra.

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carl jacobs • 6 hours ago

They don't like it and they don't like taking it

Funny. That's what I said about those utterly worthless Literature courses I had to take. I don't remember anyone rushing to provide me with a more palatable alternative.

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      Doug Holton carl jacobs • 6 hours ago

      If they started failing 80% of students taking literature courses, you can bet they would offer a more palatable alternative
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            carl jacobs Doug Holton • 5 hours ago

Are you saying that the administration would interpret an 80% failure rate to mean that the students in question were incapable of passing the course? Do we debase the standard or uphold it? If students in college are incapable of passing algebra, then they shouldn't be in college.

Or is it perhaps an act of civil disobedience. Maybe these students are refusing to pass the course to demonstrate their anger at being made to take it in the first place. I'm sure every Chemistry major would love to apply this principle to Physical Chemistry.

Or perhaps the students are lazy and undisciplined and need to be held to account. I didn't pass those Lit courses because I enjoyed them. (I do presume that there is a way to teach Literature that can't be compared to having bamboo shoved under one's fingernails. I've just never experienced it.) I passed them because I had to. It wasn't fun, but then life isn't always about fun.

Students need to learn that as well.

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alsotps carl jacobs • 3 hours ago

Shame on you, blaming P-Chem!

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alsotps carl jacobs • 3 hours ago

Way off the point. As are the people calling for an end to math in college...though that call is NOT the point of this article. The article actually assumes a need for math reasoning in several guises.

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claudewc carl jacobs • 2 hours ago

Can you say what your undergrad major was and what literature courses you took? And maybe how large your school was?

At larger schools, many classes in Science Fiction or "The Romance Novel" or Rap Poetry came about because the literature faculty was trying to come up with "palatable alternatives."

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Curmudgeon • 6 hours ago

What can you teach in a statistics course that doesn't require an understanding of high school algebra? Sure, you can show how to calculate the mean, but not why sample mean is an unbiased estimator of the population mean (that requires summation notation). You can show how to calculate a correlation coefficient, but not why it will always be between -1 and 1 (with the attendant understanding that correlation is just normalized covariance). College-level math should be more than algorithmic calculation, even for non-majors.

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TheJonesest Curmudgeon • 5 hours ago

Ironically, gradate level quantitative research work using SPSS/SAS/R requires almost zero knowledge of algebra and that's where much of the "data science" work is learned. You might be over-emphasizing the necessity of algebraic knowledge, at least for applied statistics.

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PanthernNation TheJonesest • 5 hours ago

True. But as a former journal editor, the number of essays submitted where the data was just nonsense astounded me. And, when as an editor I would write a review that pointed this out, the response back was often more concerning.

Reply

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BoredHousewife TheJonesest • 5 hours ago

As a long-time SAS programmer, I can assure you that to do anything interesting you need to understand algebra. Saying that graduate level quant research doesn't require an understanding of algebra is absurd.

It also extremely helpful to understand linear algebra and calculus.

Reply

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TheJonesest BoredHousewife • 2 hours ago

Sure, an understanding, but no one is doing quadratic equations. For pure research, absolutely, but in "data-driven decision making" (IR and assessment offices) you don't do much more than descriptive stats with the occasional regression thrown in, if that. Now Operations Research, yes, algebra (matrix) is a key component, but we're talking about undergrads trying go get through to (most likely) a business degree. Stats 101 is about all they'll need, and you don't need algebra for that. Most students forget everything they learned in algebra almost immediately (as anyone who has taught an advanced math class can attest to).

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Brown_Dog • 5 hours ago

Statistics is about numeracy and divergent thinking; algebra is about computation and converging on unique right answers. Of course the critics who want to drive thinking out of higher education want to herd the sheep back into algebra. They represent the same wrecking crew mentality that tried to write thinking out of the academy a few years ago as part of the state Republican platform in Texas.

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BoredHousewife Brown_Dog • 3 hours ago

You say: "statistics is about divergent thinking". What does that mean?

Statistics is an application of algebra and calculus. An OLS regression coefficient is a "unique right answer" that is the analytic solution to minimizing the distance between vectors. Hypothesis testing is rooted in a thorough understanding of PDF's (not the portable document format) and areas under curves. Anyone who believes statistics is about opinion or divergent thinking doesn't understand the discipline at all.

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Fretful Porpentine • 4 hours ago

I suspect the issue here is not really algebra vs. statistics, but remedial vs. non-remedial coursework. In my experience, remedial courses are hell to teach because 1) the students know they are remedial and know that being in the course at all carries a stigma, so they come in already ashamed and demoralized; 2) the course isn't credit-bearing, so they don't have as much of an incentive to work; and 3) they're in a class that consists entirely of weak students, so they have very few peer models to show them what being a successful college student looks like (especially if, as is common at my university, they're enrolled in the Bermuda triangle of remedial math, reading, AND writing, plus the learning-skills lab course required for students in more than one remedial course, in which case they might get through their entire first semester without ANY credit-bearing classes or contact with students outside the remedial ghetto). I would bet that anything that breaks down those barriers will lead to more success.

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alsotps Fretful Porpentine • 2 hours ago

Your description is spot-on. Not only do student face this absurdity, they face it without having been taught how to lean how to learn...and have had little experience with either math reasoning or writing or reading.

Ask incoming first year students if they have a favorite book, If they have read a book more than once or how many books they read over the past summer....include all types of reading. Ask them how much writing (and what type) have they done? Then ask them to solve math-related problems, calling on just the ability to figure within parameters so that if the answer is illogical, they'll recognize it.

Be prepared to be shocked.

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Ckmeagher • 3 hours ago

Statistics is also more contextualized than algebra. Students see examples of statistics all the time in the media and assignments can be created to help them come up with a use of statistics that is interesting to them.

Algebra becomes a tool for understanding something meaningful instead of yet another "drill-and-kill" activity. They may find they can easily use the algebra in this context instead of having to grind through one abstract worksheet after another.

alsotps • 3 hours ago

Are we asking the wrong question? Both JG and Not Again have valid points, pointing to what I would consider the deficiencies in high school, despite Not Again's claim. MOST math placement exams test for h.s. competency in algebra and math reasoning....and the students cannot meet the requirements.

At the four year regional university at which I worked, some 70 % of each incoming class placed into developmental math and/or English. WHY?

For one thing, students in nearby school districts used calculators instead of (NOT in addition to) learning how to 'do' math by hand. Students could push buttons but did not know the why's and how's. For English, few students were required to write much at all...and much of that writing was in the form of first-person "I feel" essays and not attempts to explain or develop logic al positions.

If students cannot reason in math or practice writing, how can we expect them to place well on the placement tests? MOST IMPORTANTLY, WHY do we accept having students do developmental work in college (for which they pay and may or may not even get credits)? This is NOT an issue about accepting unprepared students. It is WHY are they unprepared in the first place? Most of these students have the ability to succeed...but have not been given the tools to do so.

Stop looking for new ways to teach developmental math and English. Look instead at how we can stop having to deal with such numbers.