



# **Investigating Learning & Success: Innovating in College Remediation**

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NCTM Research Conference  
April 2016



# Remediation

- Many are designated not college-ready
- Few make it to college-level
- It costs a lot of money

## Background

Shall we fall back, and abandon the ground which, for thirty years past, we have been striving so hard to gain? Are those who are seeking only a partial education to be admitted into the college, merely for the purpose of associating its *name* with theirs? of carrying away with them a collegiate *diploma*, without incurring the fearful hazard of being over-educated? Why is a degree from a college more highly prized, than a certificate from an academy, if the former is not a voucher of a superior education?

# Problems

- Repeat of high school curriculum
- Inaccurate placement
- It's a long slog (many exit points)
- Lack of alignment with k-12 and post-secondary
- Content (perceived to be) irrelevant
- Teaching quality inadequate
- Improvement focus is success rates

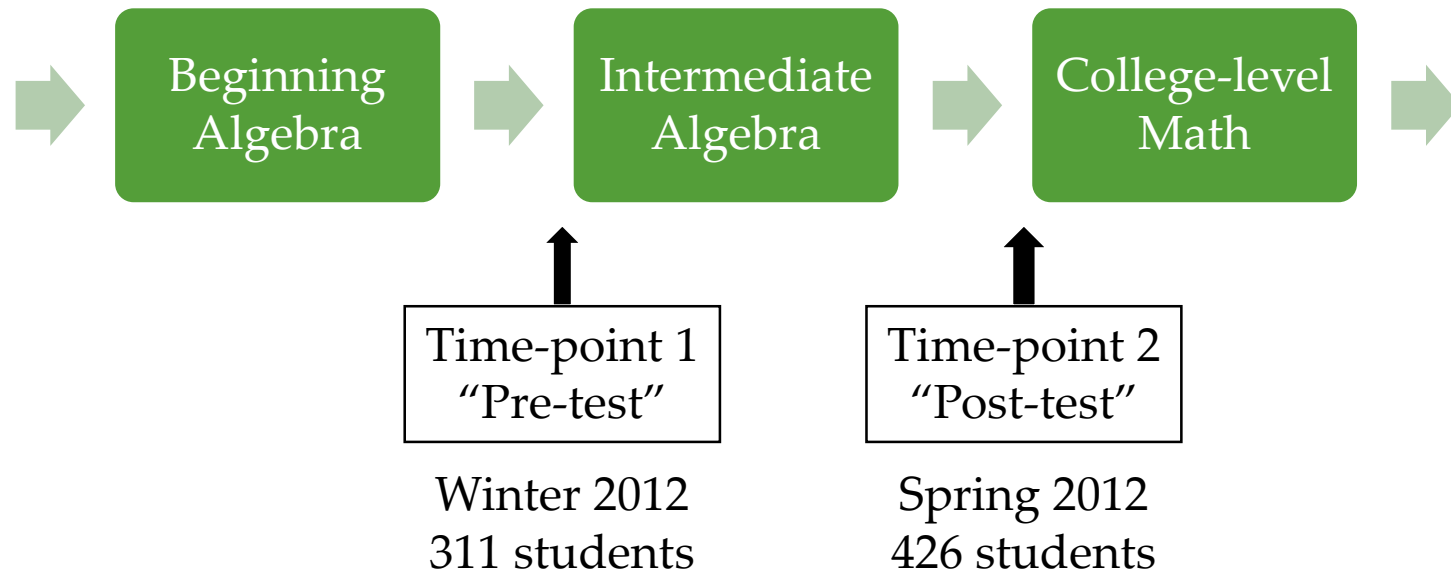
## Research Goal:

Examine the relationship between:

- Learning in developmental math
- Progress toward a degree
  - Pass rates
  - Grades
  - Completion

## The Students:

- Large, urban community college
  - ~ 12,000 students
  - ~ 6,500 Full-time equivalent students

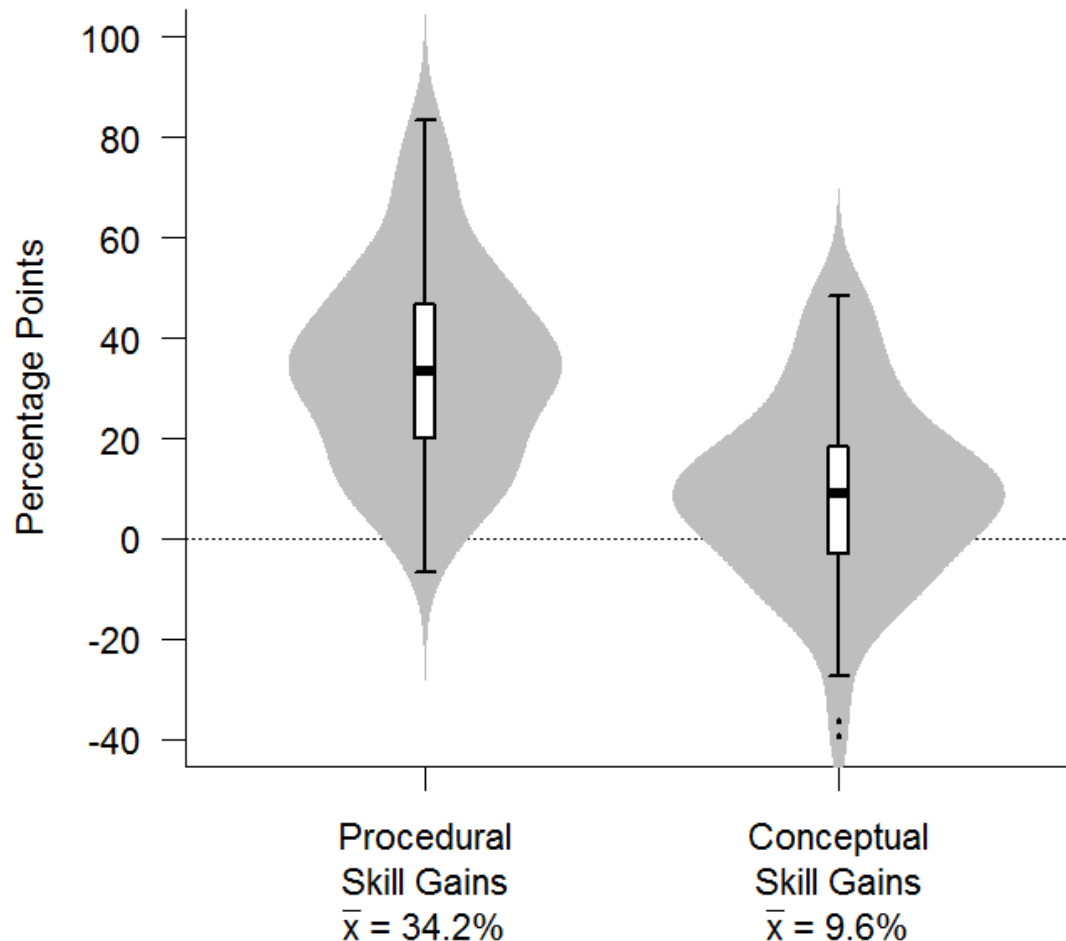


## The Algebra Assessment:

- Scales
  - Procedural: “solve” or “simplify”
  - Conceptual: algebra + writing + graphs + data

# What do students learn in Intermediate Algebra?

- Learning gains for students who took pre & post-test. (n = 107)





Do stronger algebra skills help students get better grades in college-level math?

## Stepwise Linear Regression

- Data set:
  - College-level math Students
- Predict grades in college-level math by:
  - Block 1: “Post-test” scores
  - Block 2: Previous math grades
  - Block 3: Demographic variables

Assessment Scores Only (Block 1)	Precalculus n = 158		Statistics & Liberal Arts Math n = 172	
	Procedural			
Conceptual				
All Variable Blocks	Precalculus		Statistics & Liberal Arts Math	
	B	SE	B	SE
Procedural	0.71	.45	0.19	.50
Conceptual	0.78	.48	1.26**	.46
Prev Math Gr	0.51***	.14	0.49***	.14
Age	-.03*	.02	0.01	.01
White	-.50*	.21	0.11	.21
Adjusted R <sup>2</sup>	.216		.142	

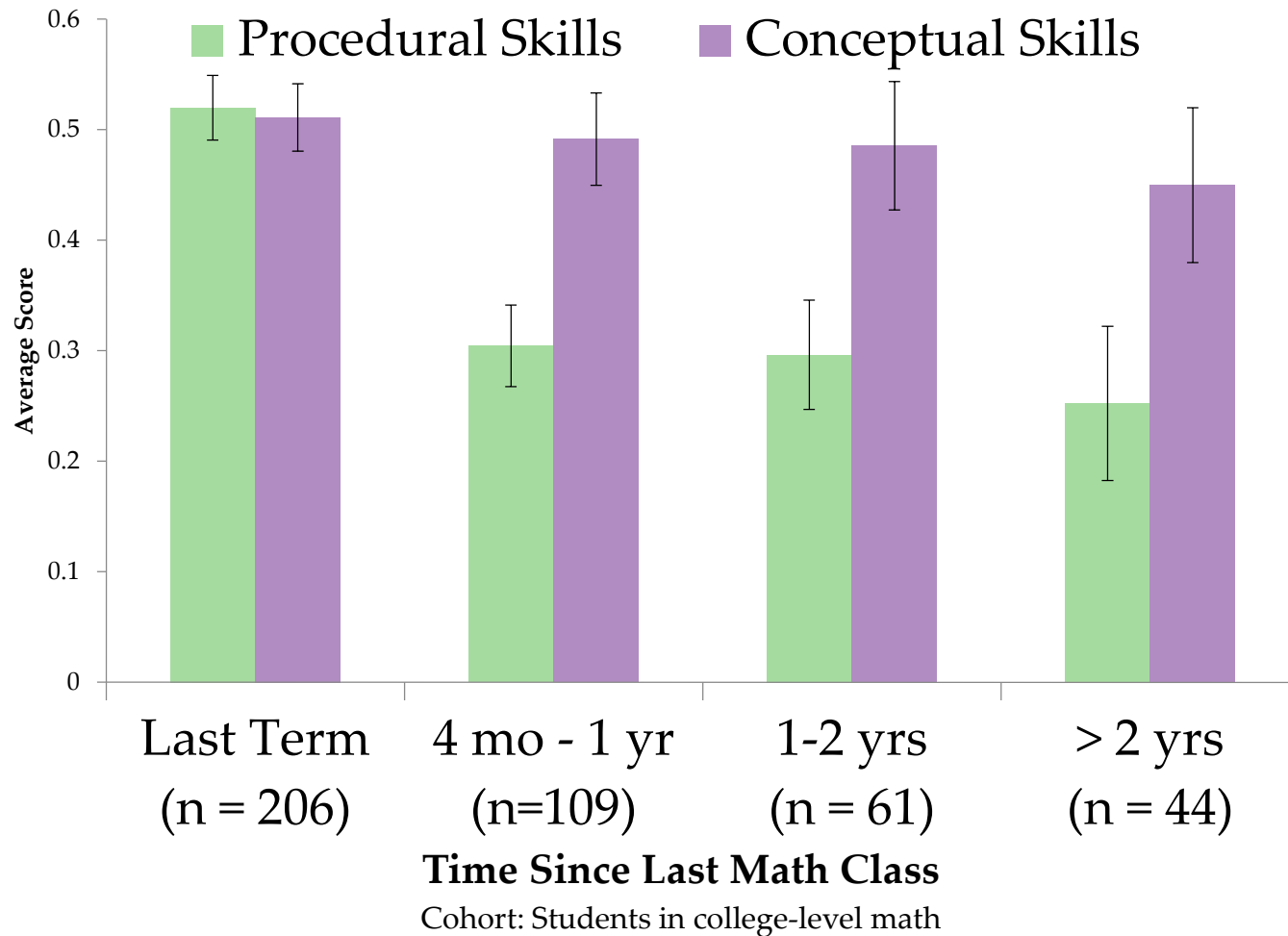
Are students with more algebra skills more likely to graduate?

- Compare logistic model vs “null” model

$$\begin{aligned} \text{logit}(\text{Complete}_i) = & \alpha + \beta_1 \cdot Ppost_i + \beta_2 \cdot Cpost_i + \beta_3 \cdot Male_i + \beta_4 \cdot PellElig_i \\ & + \beta_5 \cdot White_i + \beta_6 \cdot PrevGrades_i + \epsilon_i \end{aligned}$$

- Students with stronger algebra skills were not more likely to graduate.

# Is conceptual understanding retained longer than procedural skills?



## Our research suggests...

- Students are required to learn mostly procedural math
- Procedural math doesn't help students pass college-level math
- Conceptual skills are retained longer than procedural skills
- Students are denied access to degrees and certificates by mathematics courses that do not appear to provide much value



Changing the type of math taught may improve pass rates

- Less procedure
- Requirements targeted to student needs
- More conceptual understanding, interpretation, and explanation