Measuring the Impact of a Math Program As It Is Rolled Out Over Several Years

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Overview

The purpose of this presentation is to present the methodology and findings from an evaluation of Texas Insurements(TI) MathForward in an urban Texas school district.

The study used a complex interrupted time series design (ITS) to measure the impact on student achievement from a rolled-out deployment of TI MathForward.

Contents

Research Questions

- What is the impact of MathForward on the achievement of students in grades 7, 8, and 9 compared to students in similar classes from prior years?
- Does more experience with MathForward influence student outcomes?
  - Teachers with more years of MathForward
  - Students with more years of Mathforward

Theoretical Framework

- Interrupted Time Series (ITS)
- MathForward –developed by Texas Instrument, is a systemic algebra readiness program designed to improve student achievement and increase teacher content knowledge
- Comparison of multiple years of student achievement prior to and after receiving MathForward
- Staggered and leveled introduction of the intervention

- Measure Results™-suite of web based analytical tool that allows users to conduct their own program evaluation

- Outcome measure: Texas Accessment of Knowledge and Skills Test (TAKS) administered in the spring of each academic years. It is horizontally equated, means students can be compared across years within a single grade level.

Analytic Challenges and Solutions

- Intervention is introduced at different grades in different years.

	Year 1	Year 2	Year 3	Year 4
Grade 7	X	X	X	X
Grade 8	X	X	X	X
Grade 9	X	X	X	X

- Teachers teach different grades in different years.
- A set of dummy variables are included to model the effects of teachers' years of exposure and another set of indicators to model the effects of students' years of exposure.

Solution

- By models years exposure effects together, determine the added values of an additional year of teachers exposure net of the effect of student exposure, and vice versa
- By including a single indicator of exposure for students and teachers we obtain an estimate of the impact given average combined exposure
- By leaving out either years exposure indicators, to estimate an additional year of exposure for one group without controlling for imbalance in exposure across years for the other group

Total Number of Cases in 7th Grade

School year	Non-MathForward			MathForward		
	No. of schools	No. of teachers	No. of students	No. of schools	No. of teachers	No. of students
03-04	2	2	74	N/A	N/A	N/A
04-05	5	6	489	N/A	N/A	N/A
05-06	7	10	591	1	3	43
06-07	3	3	4	1	1	1
07-08	7	11	639	8	14	338
08-09	7	10	530	8	13	272

Total Number of Cases in 8th Grade

School year	Non-MathForward			MathForward		
	No. of schools	No. of teachers	No. of students	No. of schools	No. of teachers	No. of students
03-04	5	6	466	N/A	N/A	N/A
04-05	5	8	362	N/A	N/A	N/A
05-06	5	11	461	1	4	74
06-07	7	17	773	5	21	493
07-08	6	11	65	7	16	47
08-09	6	11	377	8	20	426

Total Number of Cases in 9th Grade

School year	Non-MathForward			MathForward		
	No. of schools	No. of teachers	No. of students	No. of schools	No. of teachers	No. of students
03-04	2	2	241	N/A	N/A	N/A
04-05	1	1	127	N/A	N/A	N/A
05-06	4	5	243	N/A	N/A	N/A
06-07	1	4	149	1	3	95
07-08	4	9	289	4	9	168
08-09	3	5	115	4	11	202

Participants: Richardson ISD

school years:

- 2003-2004
- 2004-2005
- 2005-2006
- 2006-2007
- 2007-2008
- 2008-2009

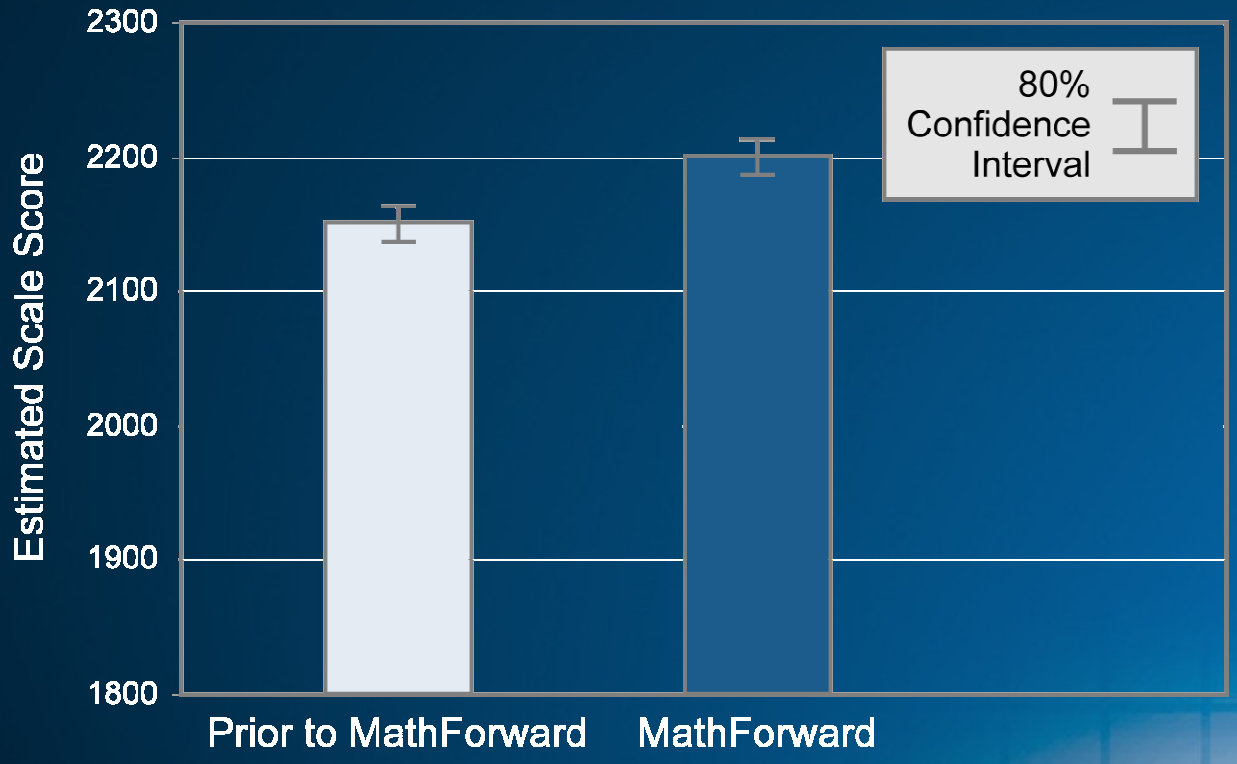
Data Sources

- Only teachers who taught at the same grade level before and after the intervention was introduced were included in the analysis.
- Included students with non-missing values for the outcome and for English speaker status, disability status, ethnicity, socioeconomic status, pretest, and gender.

Results

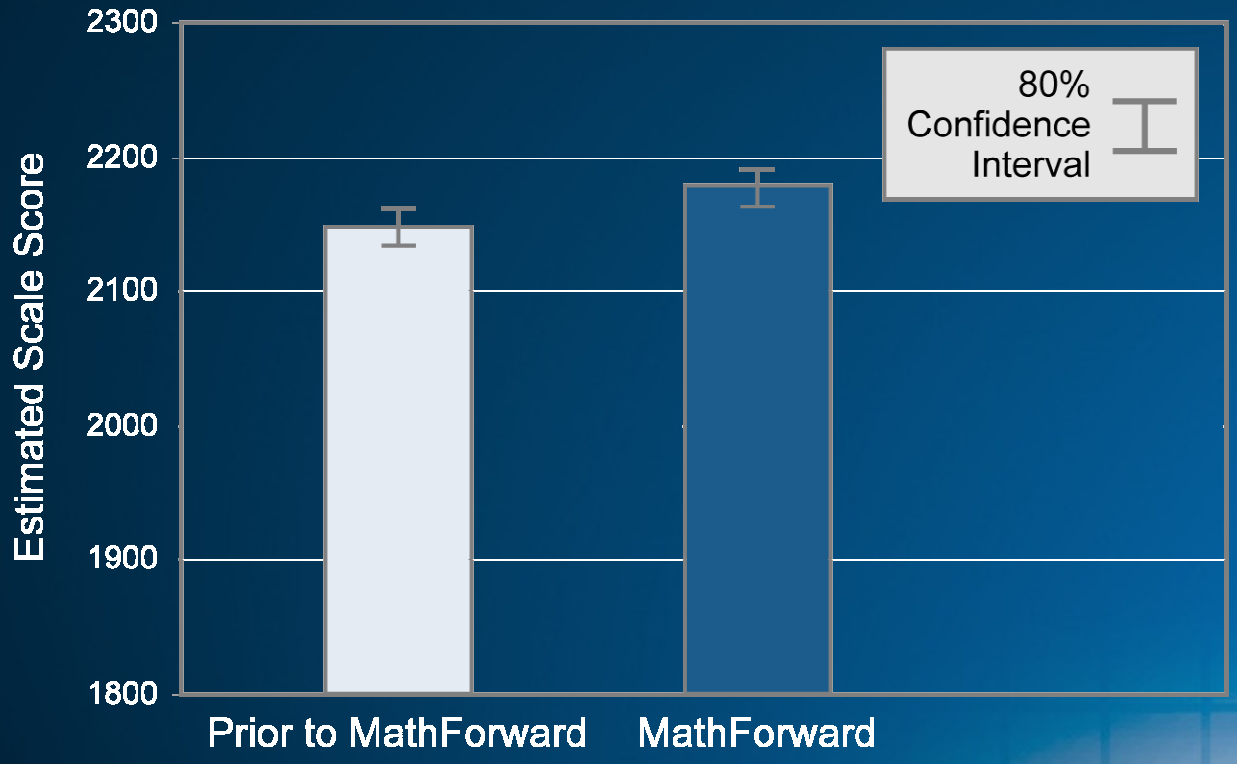
- In each grade level (7, 8, and 9), did students achieve higher math scores after the introduction of MathForward than students in similar classes from prior years?
- Did grade 9 students who had more years of participation in MathForward outperform students with fewer years of participation?
- Did grade 9 students of teachers who had more years of experience with MathForward outperform students of teachers who had no or fewer years of experience with the program?

Did students in 7th grade achieve higher math scores after the introduction of MathForward than students in similar classes from prior years?



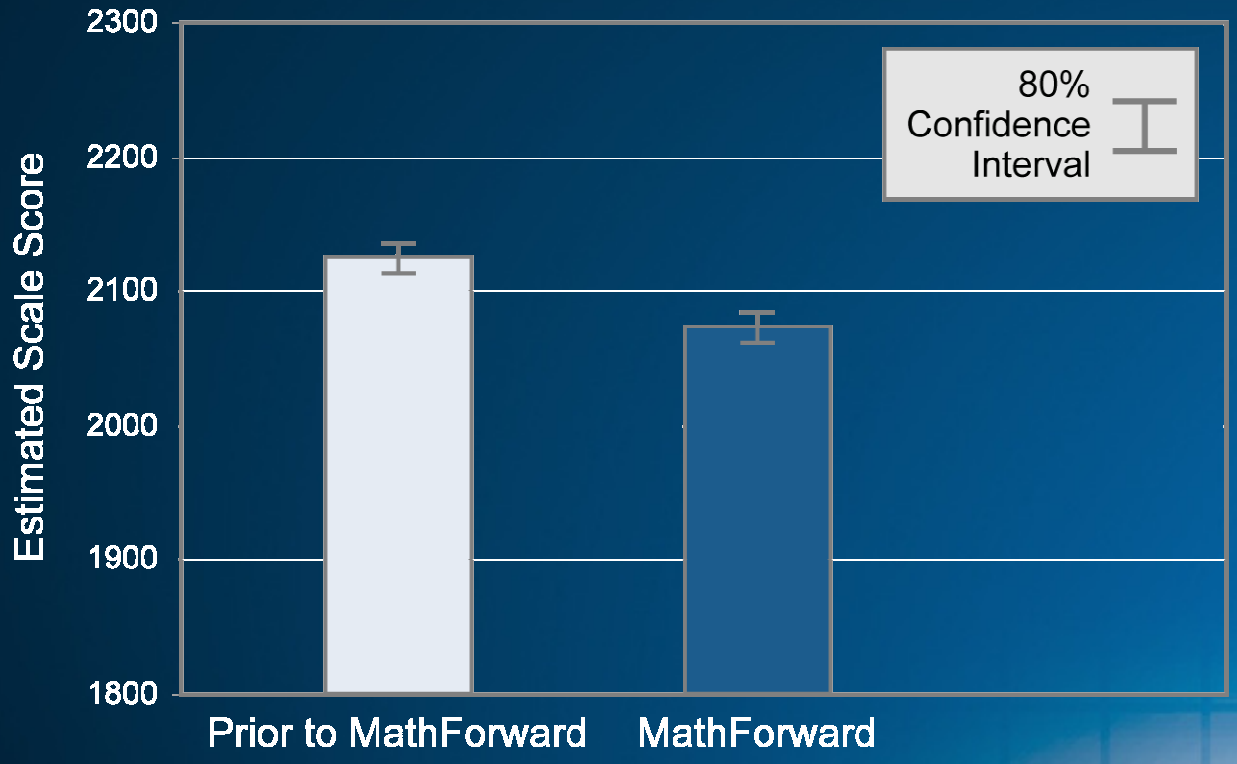
Yes, 11% points higher, p value < .01

Did students in 8th grade achieve higher math scores after the introduction of MathForward than students in similar classes from prior years?



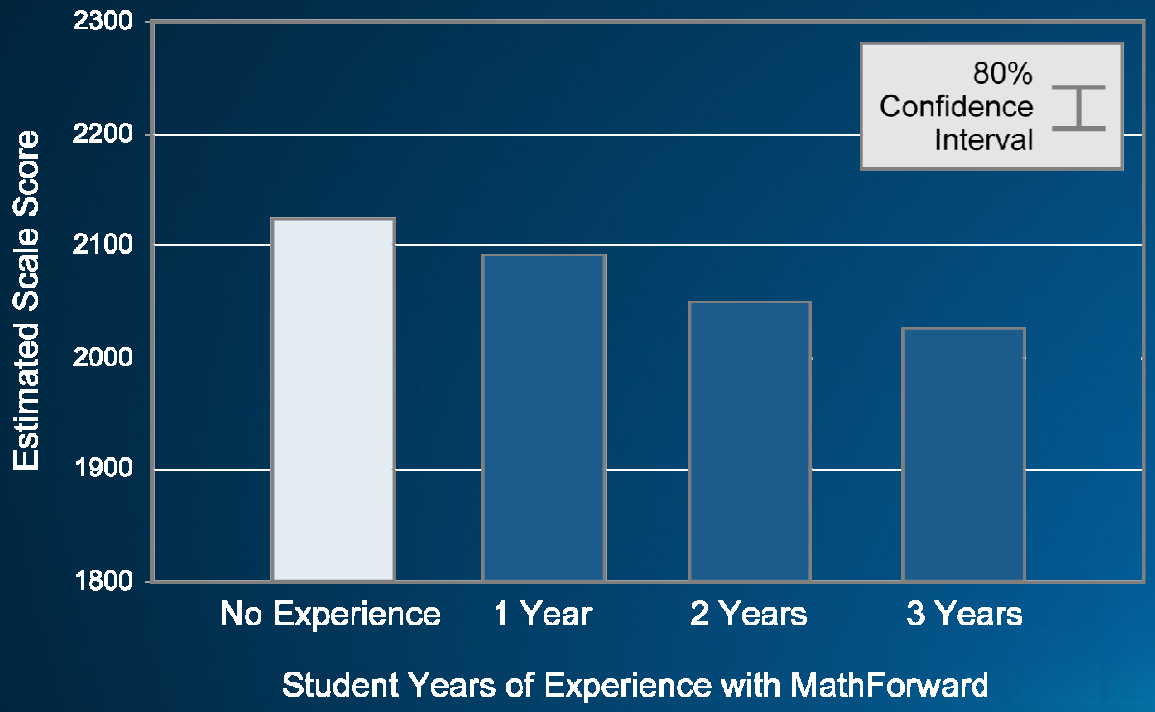
Yes, 9% points higher, p value = .16

Did students in 9th grade achieve higher math scores after the introduction of MathForward than students in similar classes from prior years?



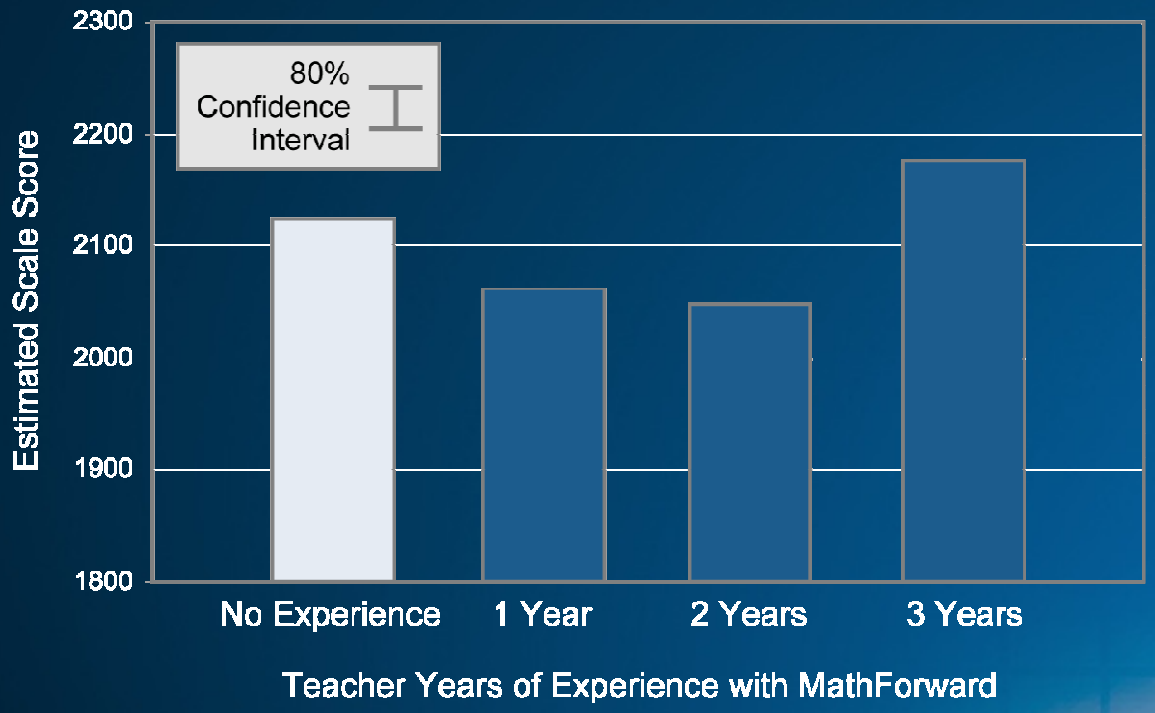
No, 14% points lower, p value = .01

Did 9th grade students who have more years of participation in MathForward outperform students with fewer years of participation?



No, there is no difference.

Did 9th grade students of teachers who have more years experience with MathForward outperform students of teachers who had no or fewer years of experience with the program?



Yes, teachers with 3 yrs experience performed better.

Conclusion

- Positive impact of TI MathForward on raising student general mathematics achievement at grades 7 and 8
- No impact on algebra I mathematics achievement at grades 9
- In 9th grade we do not observe a difference in average performance depending on the number of prior years' exposure students have to the program
- In 9th grade we observe a difference in average performance among students depending on the number of years of exposure that their teachers have had to the program
- **MOST IMPORTANTLY: ITS can be used to measure the rollout of an educational prograsm over multiple years.**

References and Acknowledgements

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