

Math Acceleration on Common Learning Assessment 3 in 2011-12 for Students Using EPGY:
An Interim Report

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5/30/12

Introduction

This report presents a quantitative analysis of Math achievement results for students participating in EPGY (Education Program for Gifted Youth) on SFUSD's 2012 Common Learning Assessments (CLAs), comparing these results with the CLA achievement results of non-EPGY participants in SFUSD. A previous analysis of Math achievement outcomes in 2011 on the California Standards Tests (CSTs)¹ found mixed results for EPGY participants, with EPGY participants outperforming a comparison group in some grades and in some district Areas, but scoring lower than the comparison group in other grades and other district Areas. Concerns were raised in the prior report about the need for better data on program implementation. In response, Stanford University's EPGY Office produced a report entitled "Interim Report on Implementation of EPGY Math in SFUSD during the 2011-12 School Year," and this report describes systematic implementation data on schools participating in EPGY. The current study, along with Stanford's implementation report, follows up on the previous report by using data from the 2011-12 school year and examining whether program implementation affected student outcomes.

Method

All analyses were based on academic acceleration on the third round of SFUSD's formative assessments in mathematics, called the Common Learning Assessment3 (CLA 3). The CLAs were designed to be aligned with grade level standards and the California Standards Tests (CSTs), and CLA 3s were administered on approximately 2/26/12. Academic acceleration uses statistical models to compare each student's progress with the progress of similar students by controlling for prior achievement and student demographic characteristics. Acceleration provides a measure of student learning rate within a given period of time. Since last year's CST Math results were the baseline for the acceleration estimate, acceleration estimates for CLA 3 reflect student mathematics learning progress from the end of the 2010-11 school year up to approximately February 26, 2012. Acceleration scores are centered such that a student who has equal progress to the average of similar SFUSD students will have a score of 50. The units of the scale approximate one percentile point of gain or loss², so a score of 40 means that a student scored approximately 10 percentile points lower than similar students (50 minus 40). Scores of 40 and lower reflect substantially low acceleration. Scores from 41 to 45 represent somewhat low acceleration. Scores from 46 to 54 represent average acceleration. Scores ranging from 55 to 59 represent somewhat positive acceleration. Scores 60 and above represent strong positive acceleration.

The charts in this report present the average acceleration scores for EPGY participants compared with all SFUSD students who did not participate in EPGY who took the same CLA 3 Math assessment. EPGY results also include a 95% confidence interval. This interval provides a guide to

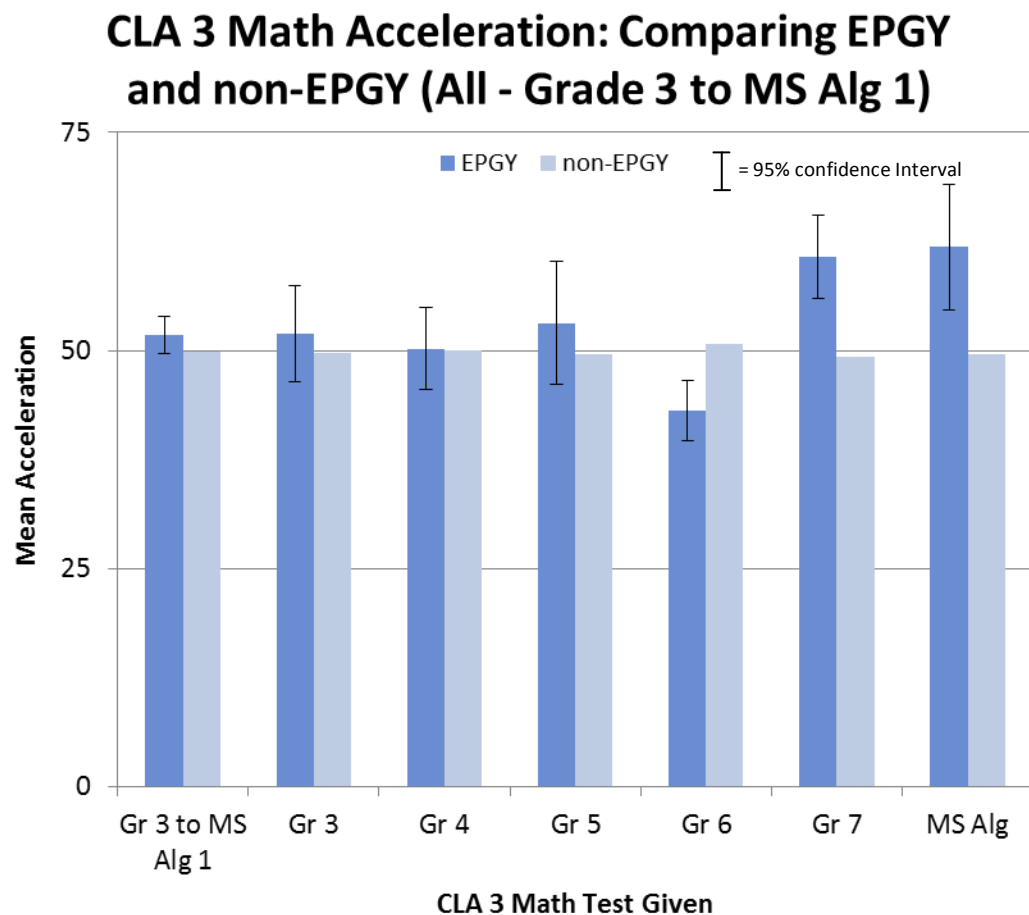
¹ Newton, S. P. (March, 2012) "Math Gains for Students Using EPGY Compared with Matched Students in 2010-11: A Quantitative Brief on the Effects of EPGY on Student Learning." SFUSD Research, Planning, and Accountability Office.

² Test scores cannot be transformed into percentiles in a linear fashion. The transformation used was accurate for students at the middle of the distribution. Students who scored very high or very low on the CSTs will tend to have lower gains or losses than are estimated by the acceleration score.

identifying which results were statistically significant. If the non-EPGY result is outside the range of the interval, the difference between the groups is always statistically significant, while it should also be noted that in some cases results can be statistically significant if the 95% confidence interval is near the non-EPGY mean score.³

Effect of Assignment to EPGY: Comparing All EPGY Participants and non-EPGY Participants

Students using EPGY had positive acceleration on CLA 3 Math assessments overall (Grades 3 to MS Algebra), and for Grade 5, Grade 7, and Middle School Algebra 1. Grade 6 was the only grade in which EPGY participants showed lower acceleration than non-EPGY students. The size of the difference overall was small, as was the difference in Grade 5. All of the middle school gaps were large, however, including the positive results for Grade 7 and Middle School Algebra 1, while the negative results for Middle School Grade 6 was large in favor of non-EPGY students. Thus, EPGY students appeared to benefit overall, but a disaggregation of results by test showed substantial variability for different grades.



³ Statistical significance was determined using a Student's two-sample t-test. In a very few cases, because the t-test uses both groups to infer the sample size, the t-test identified a difference as statistically significant when the 95% confidence interval for EPGY students did not show a significant difference. The 95% confidence interval for EPGY is a more conservative test than the t-test but it is nevertheless a useful indicator of statistical variability and is closely related to the t-test, although it is more conservative at identifying significant results.

CLA 3 Math Acceleration Summary

Test	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
Gr 3 to MS Alg. 1	1,846	22,932	52	50	2.73 ^{**}
Gr 3	463	2,845	52	50	1.62
Gr 4	477	2,649	50	50	0.14
Gr 5	330	2,626	53	50	2.16 [*]
Gr 6	258	2,317	43	51	-4.34 ^{***}
Gr 7	177	2,503	61	49	5.42 ^{***}
MS Alg.	91	2,456	62	50	3.75 ^{***}

^{*}p < 0.05
^{**}p < 0.01
^{***}p < 0.001

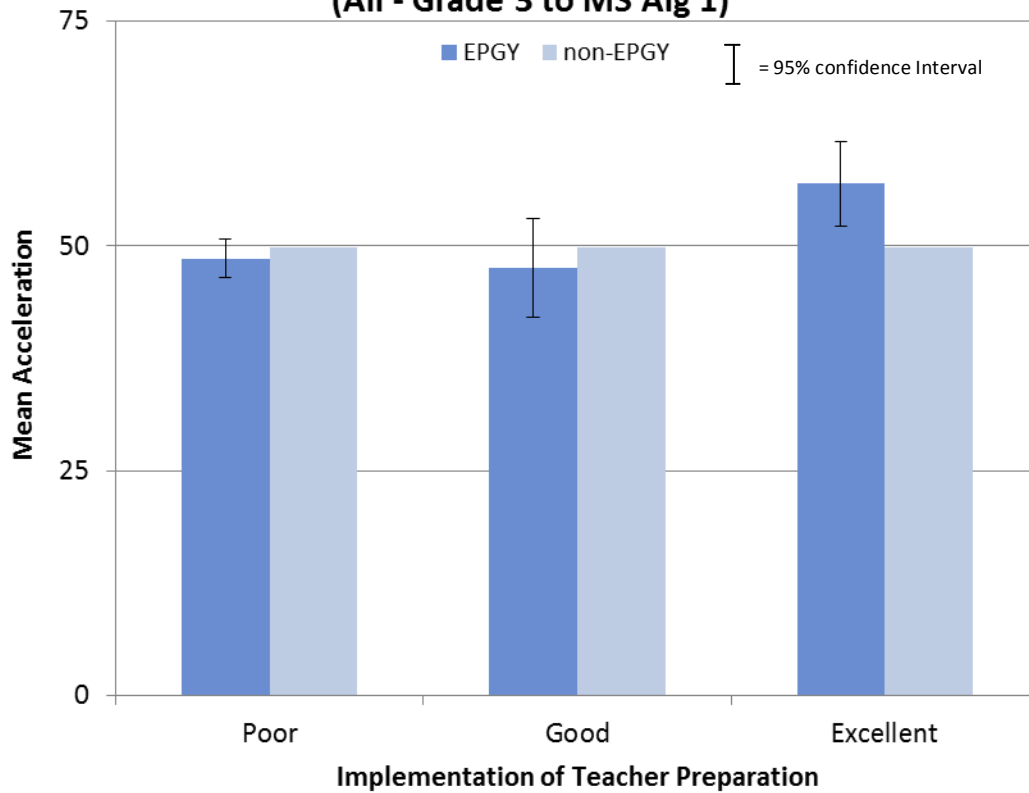
Effect of Implementation EPGY: Comparing EPGY Participants by School Level of Implementation With non-EPGY Participants

Findings in the 2011 evaluation report on EPGY in SFUSD suggested that implementation of EPGY appeared to vary across sites and that this may have affected student outcomes. Based on this concern, the EPGY office rated various implementation factors for SFUSD schools on a three-point rubric as Excellent, Good, or Poor. The following analyses explored whether outcomes varied according to amount of implementation. In each case, the comparison group is the same, consisting of all non-EPGY participants who had acceleration scores on the CLAs.

Implementation of Teacher Preparation

Better preparation of teachers was associated with better results on the CLAs for EPGY students. EPGY participants in schools with Excellent Teacher Preparation had an average acceleration of 57, which was somewhat better than the acceleration of non-EPGY participants. Similar results were also found when disaggregating by school level, with EPGY students showing strong acceleration when teacher preparation was rated as Excellent.

**CLA 3 Math Acceleration and Implementation of
Teacher Preparation: Comparing EPGY and non-EPGY
(All - Grade 3 to MS Alg 1)**

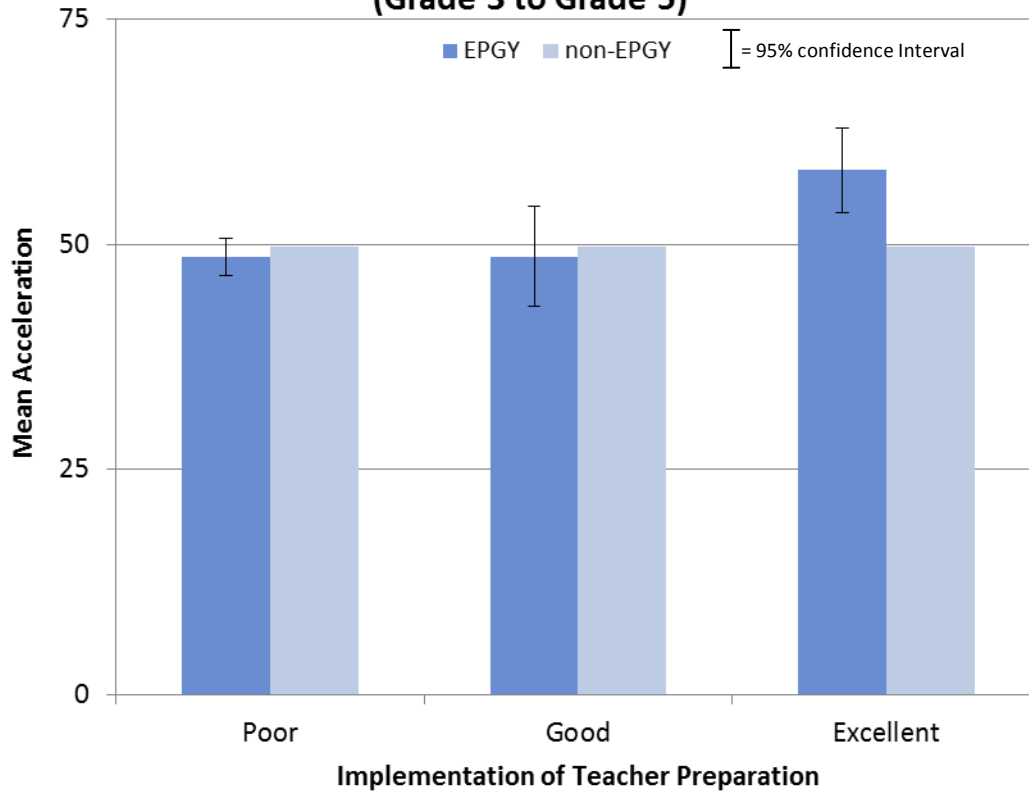


CLA 3 Math Acceleration Summary: Implementation of Teacher Preparation (Gr3-MS Algebra 1)

Implementation	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
Excellent	797	23,048	57	50	6.77 ^{***}
Good	886	23,048	48	50	-2.29 [*]
Poor	47	23,048	49	50	-0.30

^{*} p < 0.05
^{**} p < 0.01
^{***} p < 0.001

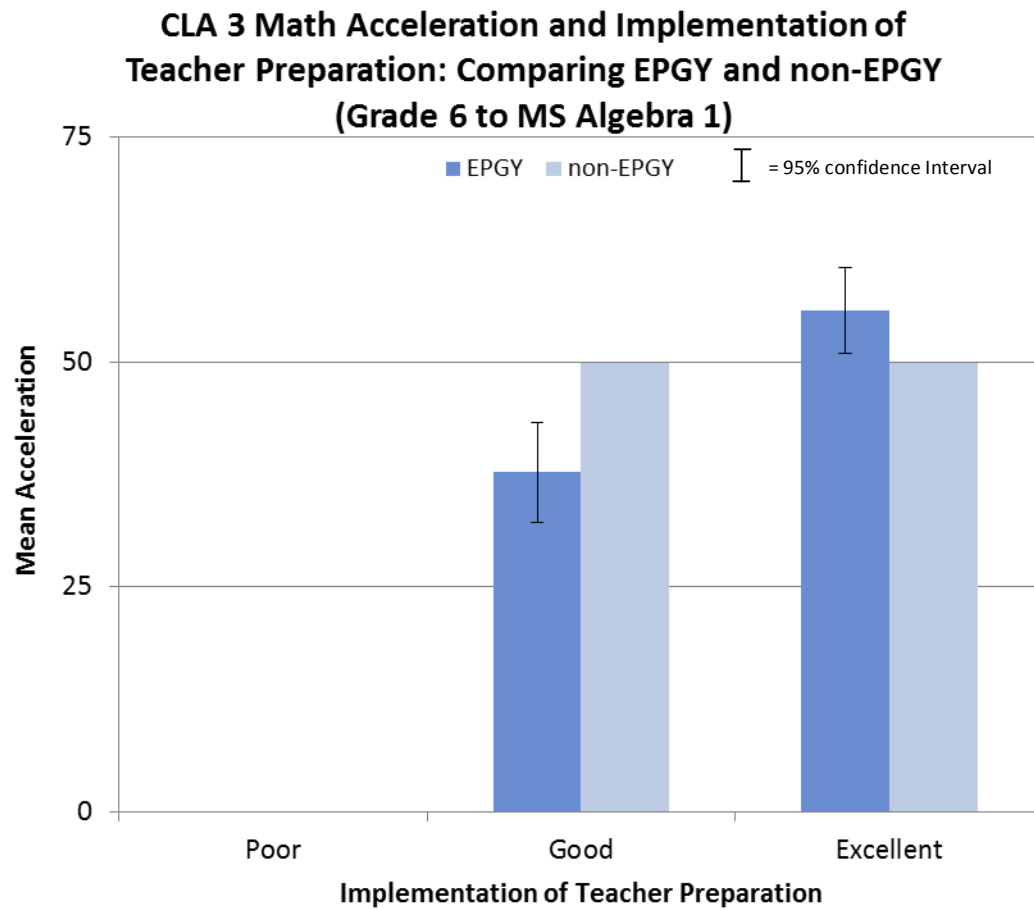
CLA 3 Math Acceleration and Implementation of Teacher Preparation: Comparing EPGY and non-EPGY (Grade 3 to Grade 5)



CLA 3 Math Acceleration Summary: Implementation of Teacher Preparation (Gr. 3-5)

Implementation	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
Excellent	390	8,830	58	50	5.77***
Good	733	8,830	49	50	-1.03
Poor	47	8,830	49	50	-0.28

* p < 0.05
 ** p < 0.01
 *** p < 0.001



CLA 3 Math Acceleration Summary: Implementation of Teacher Preparation (Gr. 6-MS Algebra 1)

Implementation	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
Excellent	407	7,288	56	50	4.05***
Good	107	7,288	38	50	-4.42***
Poor					

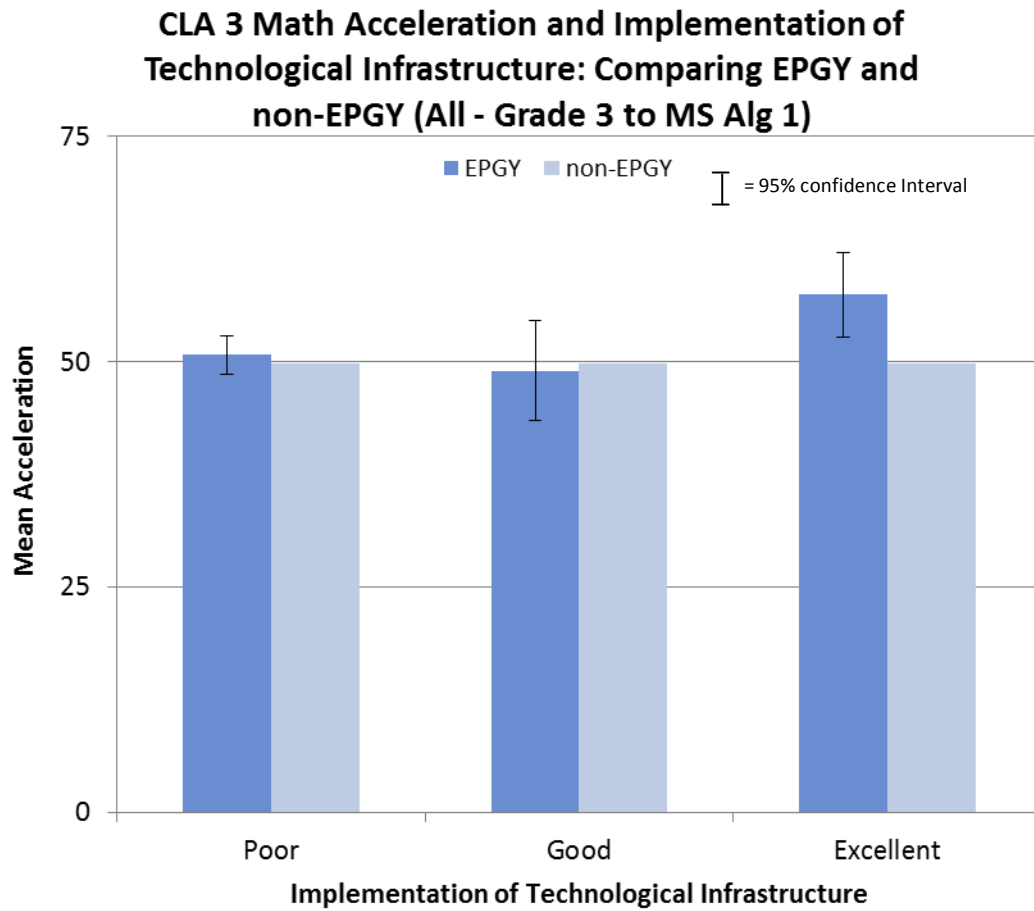
* p < 0.05

** p < 0.01

*** p < 0.001

Implementation of Technological Infrastructure

When Technological Infrastructure was implemented at an Excellent level, students showed moderate positive acceleration (57). A similar pattern was also found when data was disaggregated by school level. Thus, implementation of reliable technology was associated with stronger learning growth of students using EPGY.



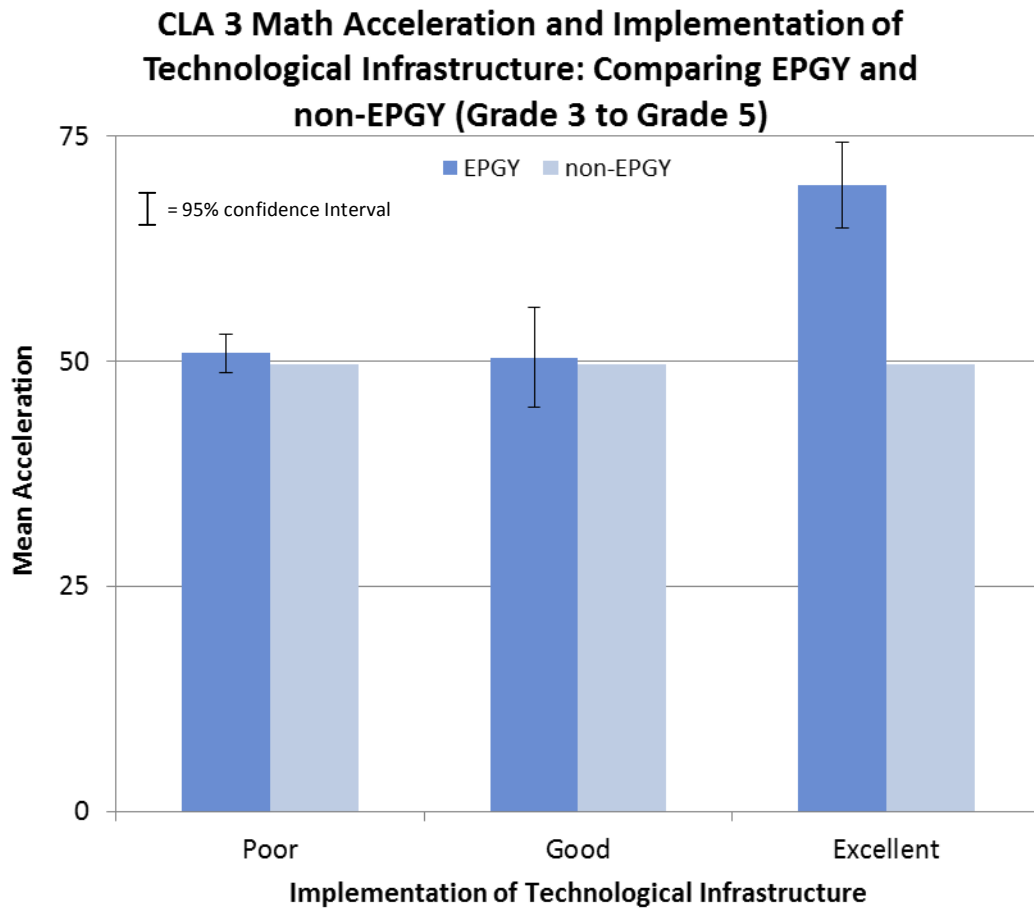
CLA 3 Math Acceleration Summary: Implementation of Technological Infrastructure (Gr. 3-MS Algebra 1)

Implementation	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
Excellent	462	23,048	57	50	5.54***
Good	619	23,048	49	50	-0.71
Poor	649	23,048	51	50	0.79

* p < 0.05

** p < 0.01

*** p < 0.001



CLA 3 Math Acceleration Summary: Implementation of Technological Infrastructure (Gr. 3-5)

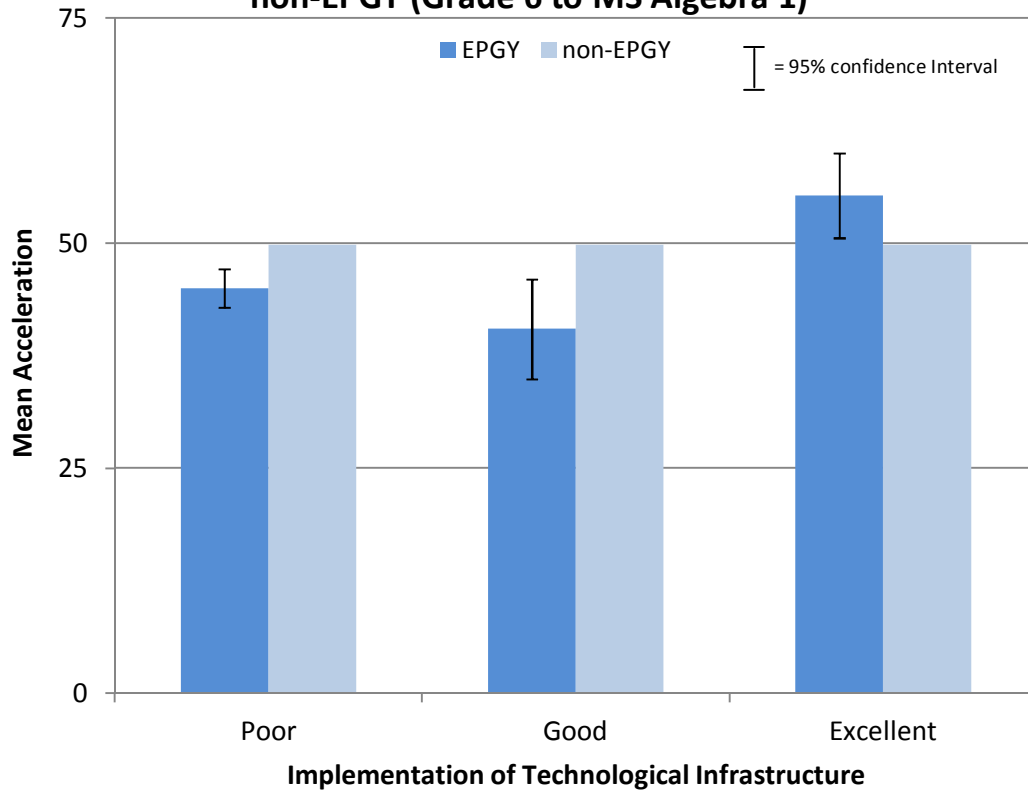
Implementation	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
Excellent	69	8,830	70	50	5.78 ^{***}
Good	470	8,830	50	50	0.50
Poor	631	8,830	51	50	1.00

* p < 0.05

** p < 0.01

*** p < 0.001

CLA 3 Math Acceleration and Implementation of Technological Infrastructure: Comparing EPGY and non-EPGY (Grade 6 to MS Algebra 1)



CLA 3 Math Acceleration Summary: Implementation of Technological Infrastructure (Gr. 6-MS Algebra 1)

Implementation	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
Excellent	393	7,288	55	50	3.71***
Good	103	7,288	40	50	-3.35***
Poor	18	7,288	45	50	-0.73

p < 0.05

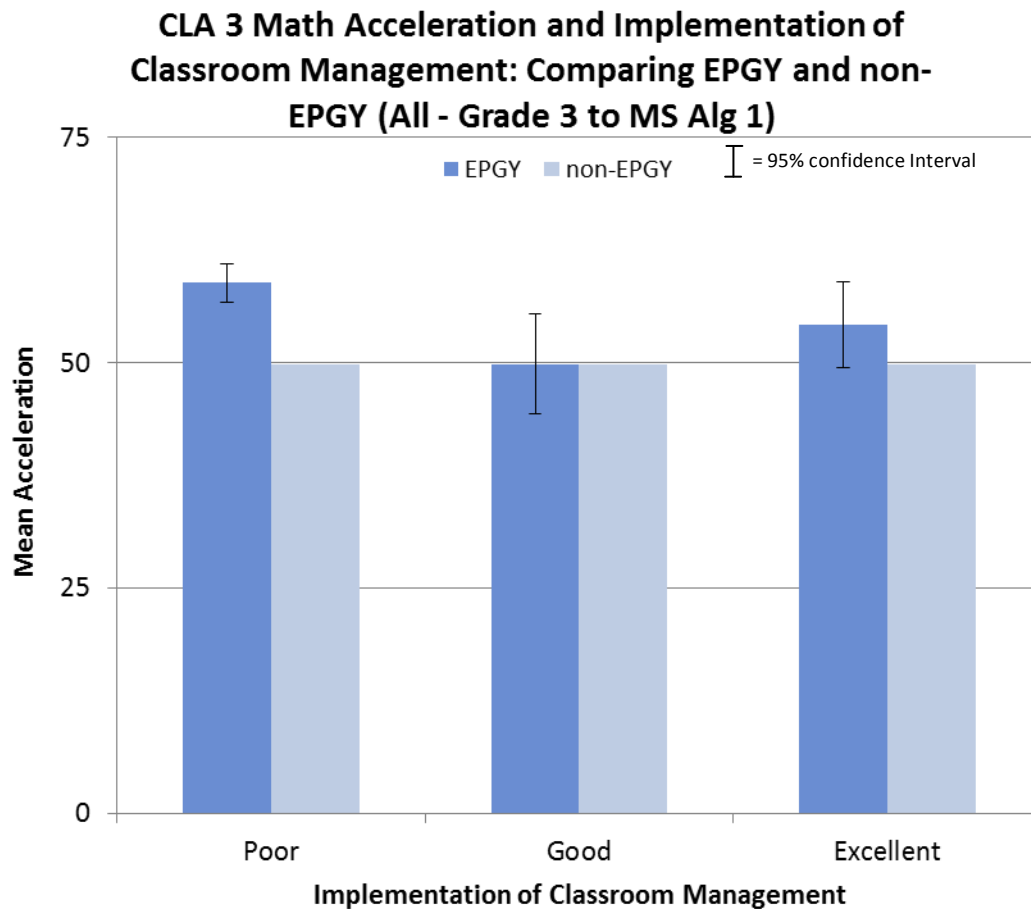
** p < 0.01

*** p < 0.001

Implementation of Classroom Management

Classroom Management implementation had a mixed relationship with student acceleration. Students in schools with Classroom Management rated as Poor had the highest average acceleration (59) while students in schools with Classroom Management rated as Excellent had the next highest (54).

Looking at disaggregated data, the pattern in elementary grades was somewhat similar, except that students in schools rated as Excellent had the highest acceleration (60) while schools rated poor had the next highest (59), while students in schools rated as Good had the lowest acceleration, on average (46). In middle school grades, students in schools rated as Good outperformed those in schools rated as Excellent. This mixed picture of results suggests that other factors may be driving the success or lack of success of these students.



CLA 3 Math Acceleration Summary: Implementation of Classroom Management (Gr. 3-MS Algebra 1)

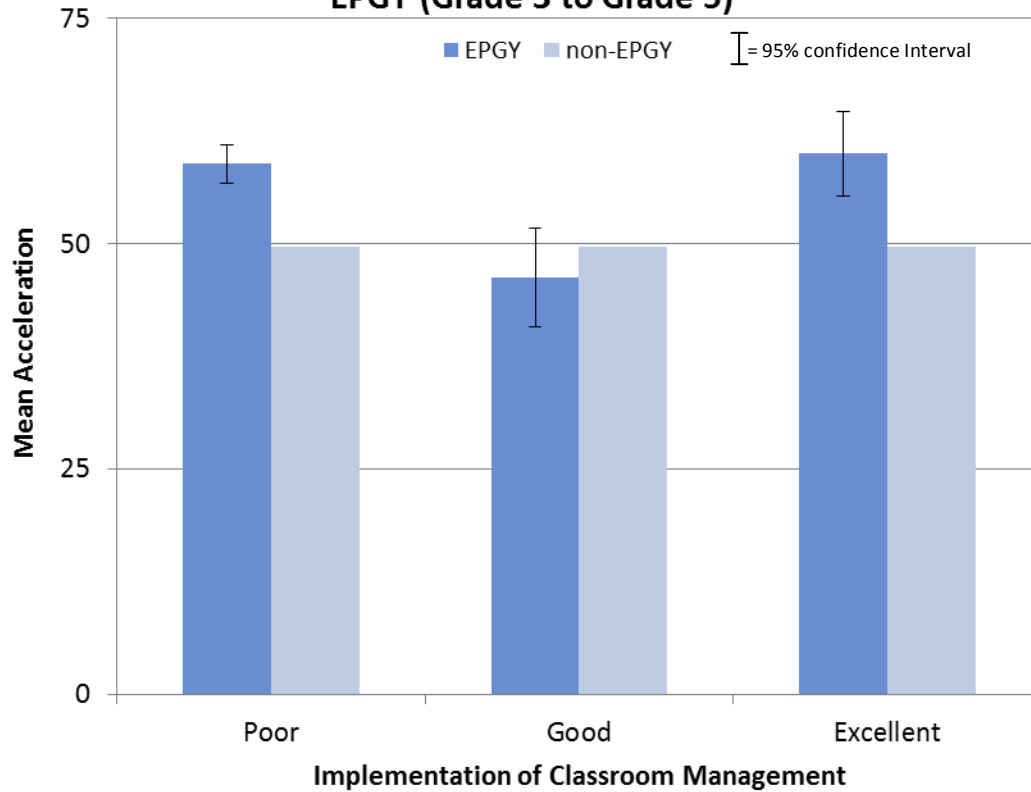
Implementation	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
Excellent	559	23,118	54	50	3.52***
Good	923	23,118	50	50	0.05
Poor	178	23,118	59	50	4.14***

* p < 0.05

** p < 0.01

*** p < 0.001

CLA 3 Math Acceleration and Implementation of Classroom Management: Comparing EPGY and non-EPGY (Grade 3 to Grade 5)



CLA 3 Math Acceleration Summary: Implementation of Classroom Management (Gr. 3-5)

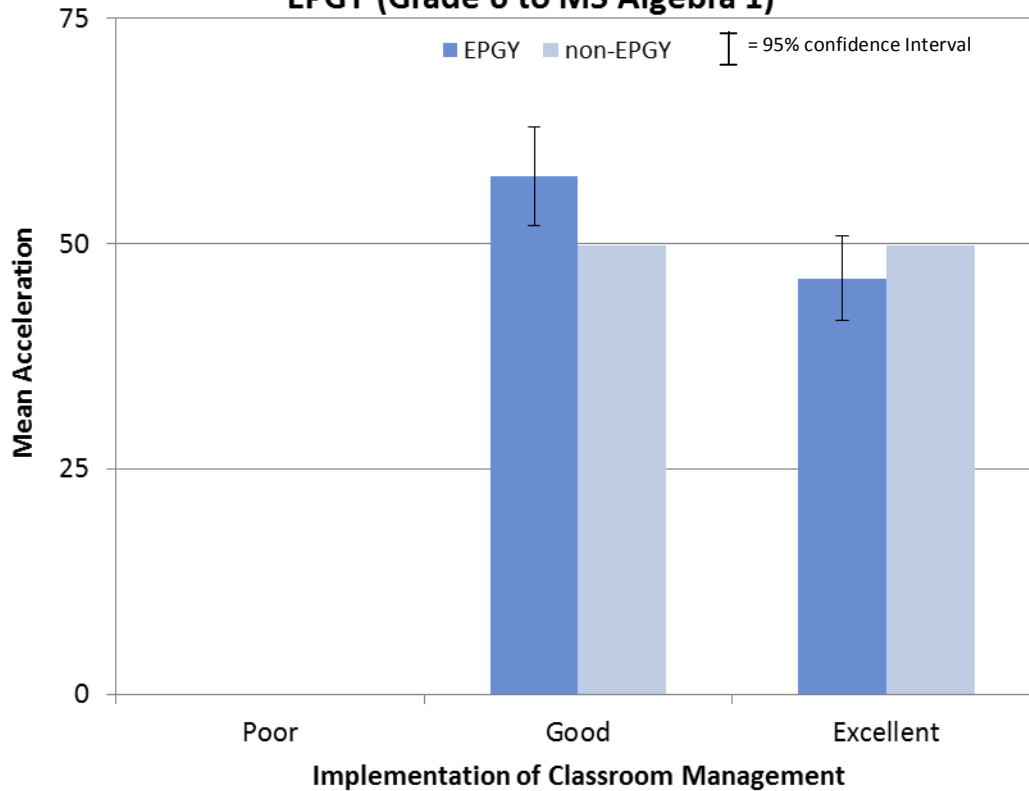
Implementation	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
Excellent	324	8,887	60	50	6.42 ^{***}
Good	611	8,887	46	50	-2.89 ^{**}
Poor	178	8,887	59	50	4.27 ^{***}

^{*}p < 0.05

^{**}p < 0.01

^{***}p < 0.001

CLA 3 Math Acceleration and Implementation of Classroom Management: Comparing EPGY and non-EPGY (Grade 6 to MS Algebra 1)



CLA 3 Math Acceleration Summary: Implementation of Classroom Management (Gr. 6-MS Algebra 1)

Implementation	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
Excellent	235	7,301	46	50	-1.95
Good	266	7,301	58	50	4.33***
Poor					

* p < 0.05

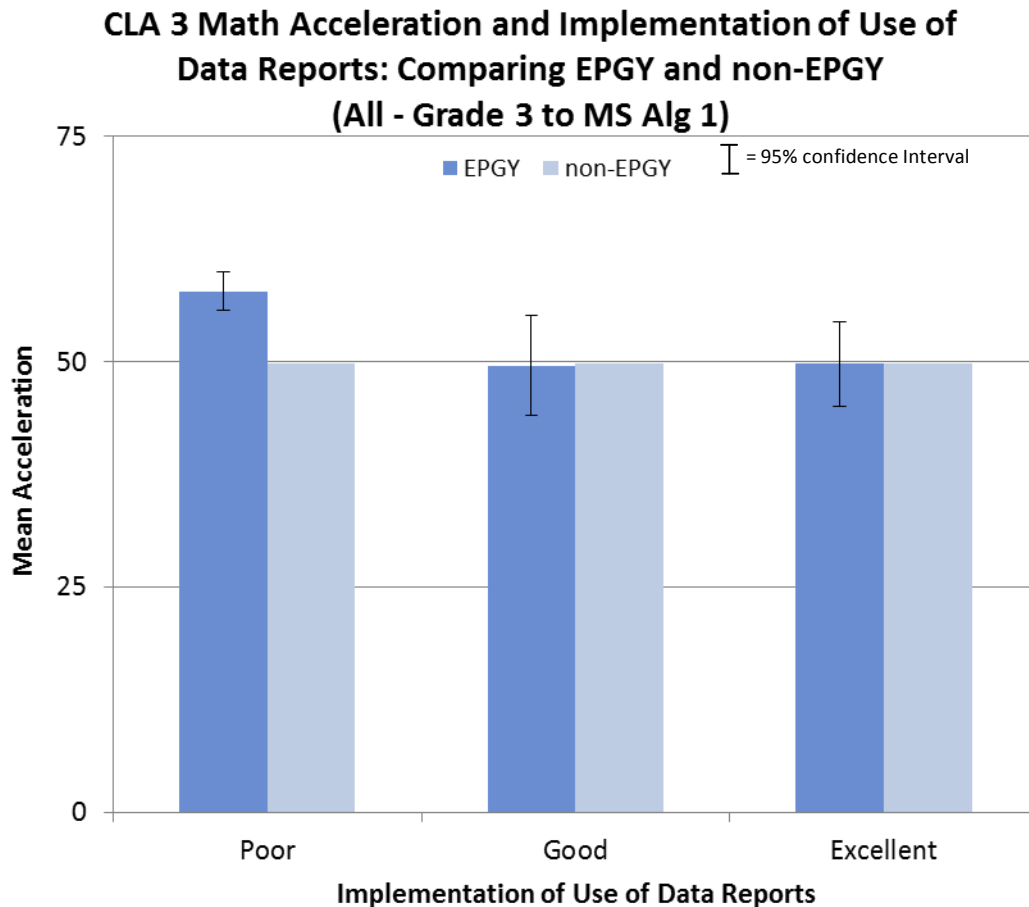
** p < 0.01

*** p < 0.001

Implementation of Use of Data Reports

Implementation of Use of Data Reports had a surprising, and negative, relationship with acceleration. While EPGY students in schools rated Good or Excellent in Use of Data Reports implementation had only average acceleration, students in schools rated with Poor Use of Data Reports had positive acceleration. Examining these results disaggregated by grade showed great differences for different schooling levels. Elementary grades showed positive acceleration for EPGY students when

schools were rated as Excellent (58). In middle school, however, students showed positive acceleration only in schools rated as Poor but negative acceleration in schools rated as Good or Excellent. This suggests that other factors may have been driving the results in middle school more powerfully than Use of Data Reports.



CLA 3 Math Acceleration Summary: Implementation of Use of Data Reports (Gr. 3-MS Algebra 1)

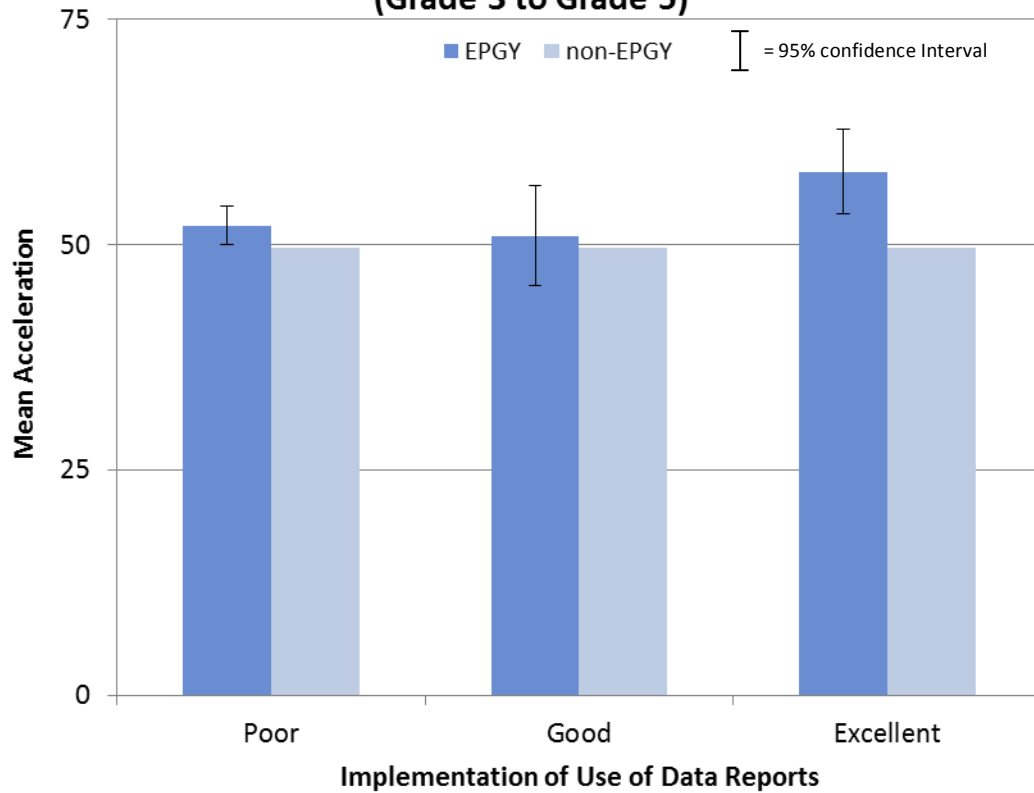
Implementation	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
Excellent	314	23,048	50	50	-0.05
Good	932	23,048	50	50	-0.28
Poor	484	23,048	58	50	5.96 ***

* p < 0.05

** p < 0.01

*** p < 0.001

**CLA 3 Math Acceleration and Implementation of Use of
Data Reports: Comparing EPGY and non-EPGY
(Grade 3 to Grade 5)**



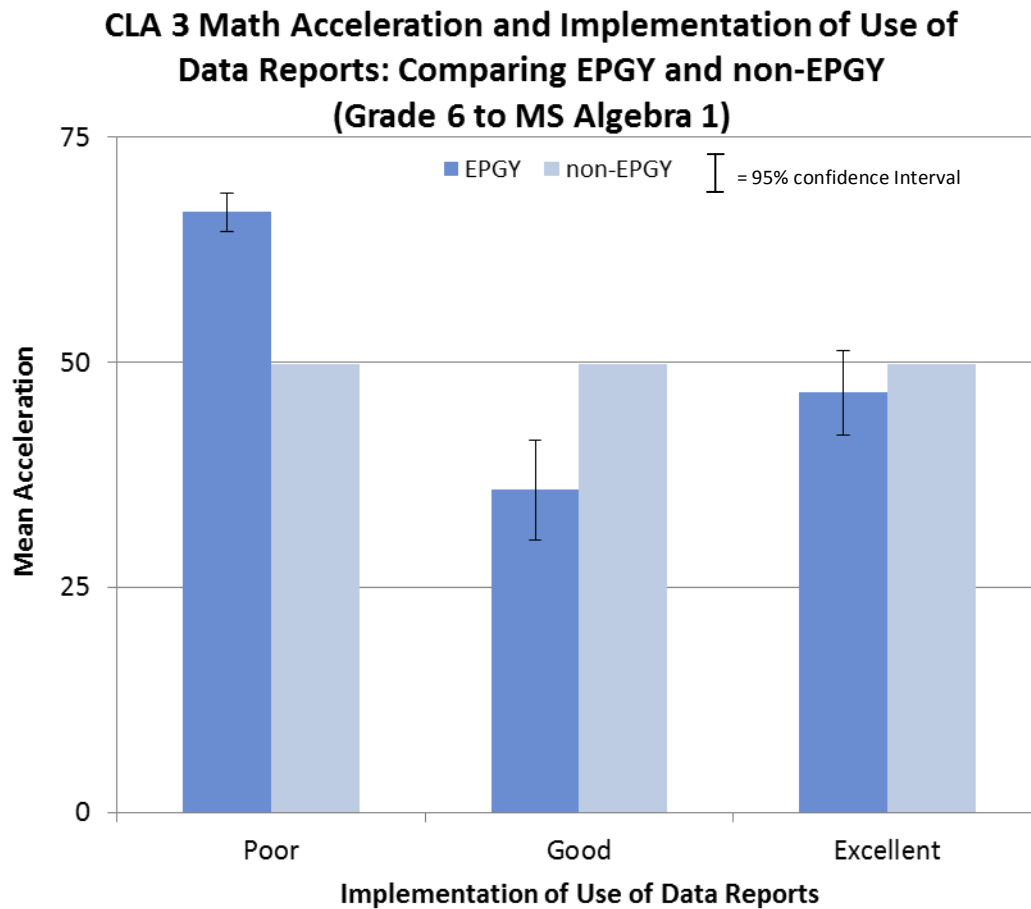
CLA 3 Math Acceleration Summary: Implementation of Use of Data Reports (Gr. 3-MS Algebra 1)

Implementation	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
Excellent	86	8,830	58	50	2.72**
Good	789	8,830	51	50	1.20
Poor	295	8,830	52	50	1.41

* p < 0.05

** p < 0.01

*** p < 0.001



CLA 3 Math Acceleration Summary: Implementation of Use of Data Reports (Gr. 6-MS Algebra 1)

Implementation	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
Excellent	228	7,288	47	50	-1.70
Good	97	7,288	36	50	-4.85***
Poor	189	7,288	67	50	8.08***

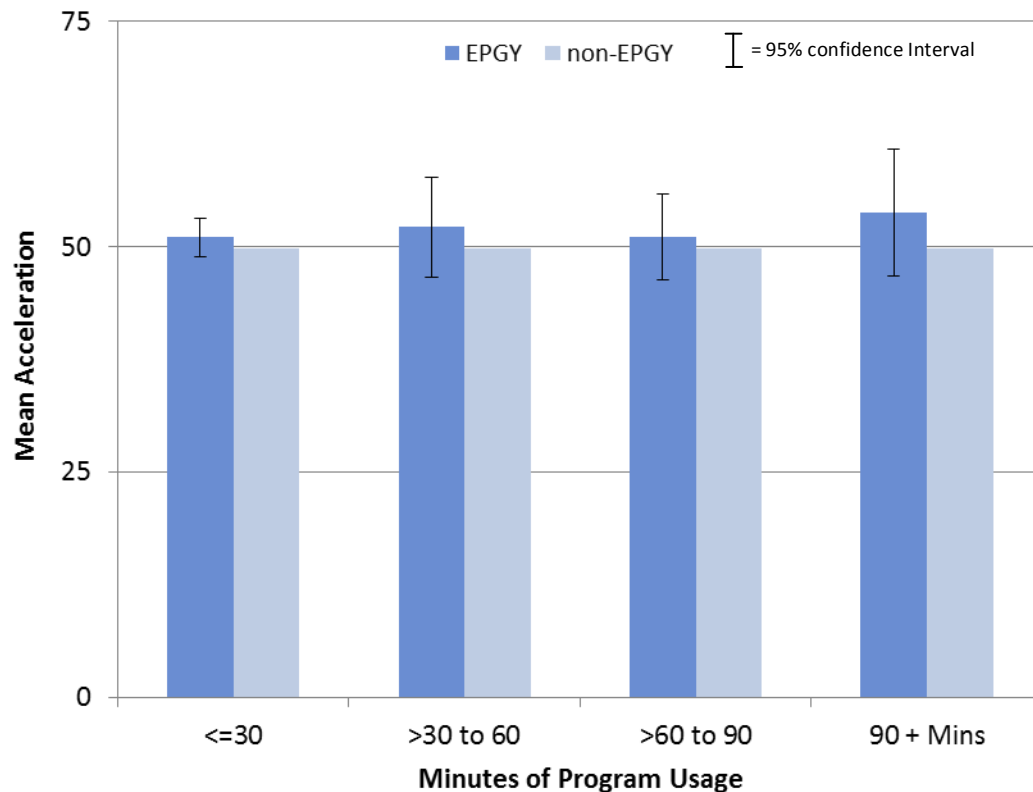
^p < 0.05
^{**} p < 0.01
^{***} p < 0.001

Effect of Dosage: Comparing EPGY Participants by Individual Minutes of Use With non-EPGY Participants

In addition to implementation, we also analyzed results by amount of student participation in EPGY. Overall, students who used EPGY more than 90 minutes per week showed the most positive acceleration, and they scored higher than non-EPGY users at a statistically significant level. Disaggregating these results by school level, the pattern of positive results was quite striking at the

elementary school level, with students who used the program at the recommended amount (60 or more minutes per week) showing acceleration that was very strongly positive. At the middle school level, however, the picture was much more mixed, with students with the lowest usage scoring the highest followed by those who used EPGY the most. Students with lower or moderate use scored the lowest.

CLA 3 Math Acceleration and Minutes of Program Usage: Comparing EPGY and non-EPGY (All - Grade 3 to MS Alg 1)

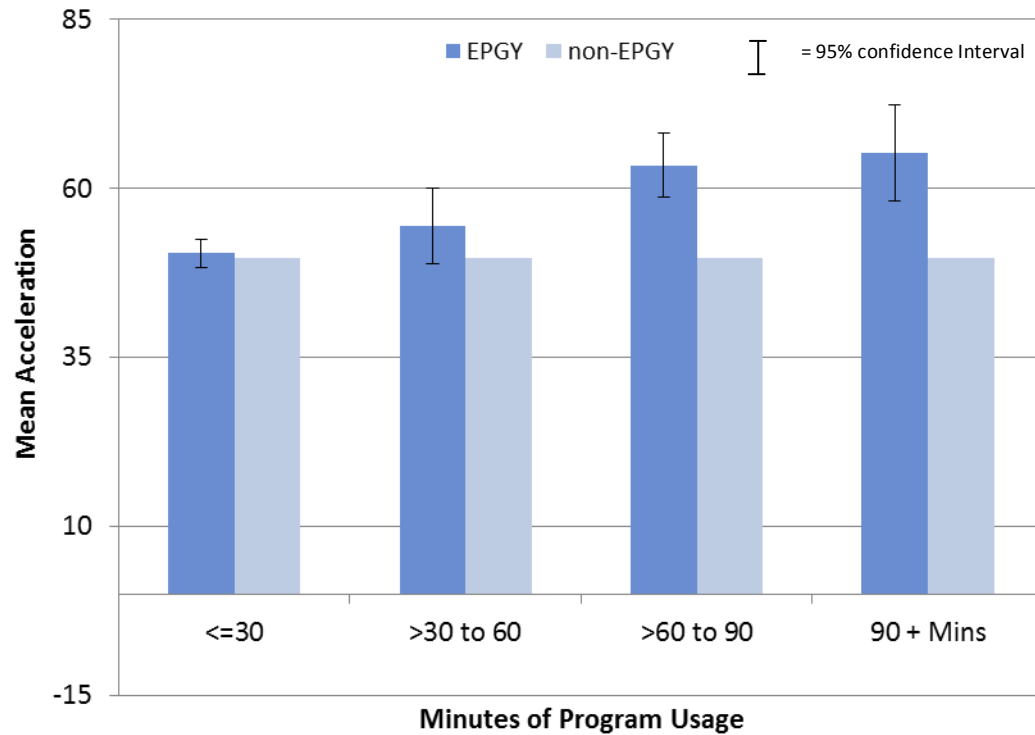


CLA 3 Math Acceleration Summary: Dosage (Gr. 3-MS Algebra 1)

Usage (Mins./week)	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
90 + Mins.	376	22,932	54	50	2.62**
>60 to 90	87	22,932	51	50	0.40
>30 to 60	236	22,932	52	50	1.23
<=30	1,147	22,932	51	50	1.39

* p < 0.05
 ** p < 0.01
 *** p < 0.001

CLA 3 Math Acceleration and Minutes of Program Usage: Comparing EPGY and non-EPGY (Grade 3 to Grade 5)



CLA 3 Math Acceleration Summary: Dosage (Gr. 3-5)

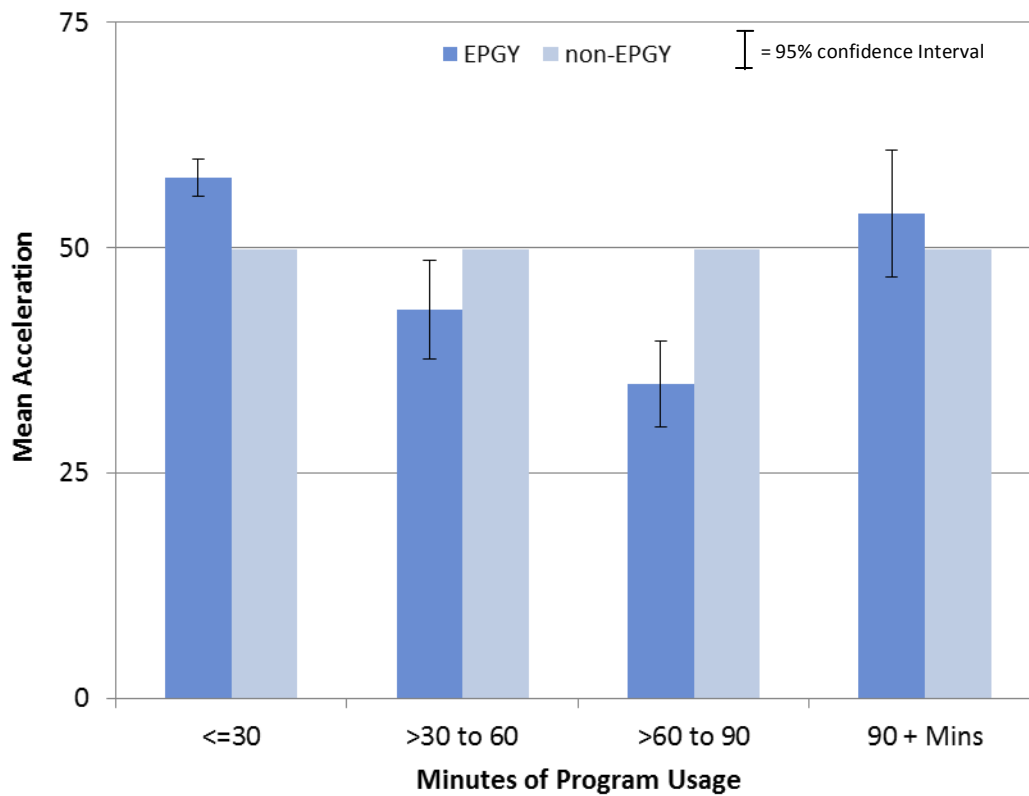
Usage (Mins./week)	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
90 + Mins.	7	8,727	65	50	1.44
>60 to 90	41	8,727	63	50	3.07**
>30 to 60	182	8,727	54	50	2.19*
<=30	1,043	8,727	50	50	0.73

* p < 0.05

** p < 0.01

*** p < 0.001

CLA 3 Math Acceleration and Minutes of Program Usage: Comparing EPGY and non-EPGY (Grade 6 to MS Algebra 1)



CLA 3 Math Acceleration Summary: Dosage (Gr. 6-MS Algebra 1)

Usage (Mins./week)	# of Students		Average Acceleration		t
	EPGY	non-EPGY	EPGY	non-EPGY	
90 + Mins.	345	7,276	54	50	2.56*
>60 to 90	38	7,276	35	50	-3.25**
>30 to 60	45	7,276	43	50	-1.58
<=30	98	7,276	58	50	2.77**

* p < 0.05
 ** p < 0.01
 *** p < 0.001

Conclusion

In summarizing the results, quite different patterns were seen at the elementary and middle school levels.

Elementary Summary

- Overall, acceleration results for students using EPGY were slightly better than results for students not using EPGY.
- When elementary students used EPGY at the recommended dosage (60+ minutes), students had average acceleration of 63, which is a very strong positive acceleration.
- Better implementation was consistently related with better student outcomes.
- However, usage tended to be very low for most students. Only 4% of elementary students using EPGY averaged the recommended 60+ minutes of use per week.
- Conclusion: The program had strong positive results when used as frequently as intended, but the program was underutilized by most elementary students.

Middle School Summary

- Results varied dramatically for students at different grades, with students using EPGY in 7th Grade and Middle School Algebra showing strong positive acceleration, and students using EPGY in 6th grade showing strong negative acceleration.
- Dosage was not consistently related with acceleration results.
- Implementation of the program was inconsistently related with results. Better implementation of Teacher Preparation and Technological Infrastructure were related with better results, but other implementation factors did not show a consistent relationship with results.
- The wide variability of results in middle school raised the concern, which was identified in the previous study, that not all schools were using EPGY as a supplement to a regular math curriculum. Program staff at Stanford reported that one school was using EPGY as its regular Math curriculum.
- Conclusion: EPGY showed potential for supporting strong acceleration when used as intended, as indicated by strong acceleration in Grade 7 and Middle School Algebra. However, when it is used in place of a regular Math curriculum, students showed very low achievement growth.

Overall Summary

- When schools implemented the program as intended and students used it for the recommended minutes, students using EPGY showed strong positive academic acceleration on the CLAs.
- At the elementary level (including grades 3-5 at K8 schools), the overall results were only mildly positive. However, the vast majority of students (96%) used the program less than the recommended 60 minutes per week, and much stronger results were found for students who used the program the recommended amount.
- At the middle school level (including grades 6-8 at K8 schools), the results were strongly positive in Grade 7 and Middle School Algebra, but strongly negative in Grade 6. The EPGY program reports that at least one school used EPGY in place of its regular math curriculum in Grade 6. Thus, EPGY was not serving as a supplement to regular math instruction, as intended, at this school, and student results appeared to suffer because of this.

- Thus, EPGY supported small positive improved student achievement results in SFUSD in 2012, but large positive results were seen when it was implemented as intended. The following factors appeared especially important for schools to achieve good results with EPGY:
 - Strong participation in teacher preparation, preferably early in the school year.
 - Strong technological infrastructure to assure functioning computers and reliable Internet access.
 - Consistent student participation of 60 or more minutes per week.
 - Assuring that EPGY is used solely as a supplement to regular classroom instruction in math rather than being used in place of regular math instruction.