



What's Happening

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# How do Algebra I course repetition rates vary among English learner students by length of time to reclassification as English proficient?

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## Key findings

This report examines how repetition rates in Algebra I vary by four levels of English proficiency for students in a high school district in California and its feeder elementary school districts in 2006/07 to 2011/12. It finds that:

- Long-term English learner students (classified by grade 1 and not reclassified as English proficient by grade 12) had the highest rates of Algebra I repetition, followed by reclassified long-term English learner students (reclassified in any of grades 7–12).
- Repetition rates increased the longer it took a student to be reclassified.
- After repeating Algebra I, all four English learner status groups showed statistically significant improvements in course grades.
- Among students who repeated Algebra I, higher rates of short-term English learner students (reclassified before grade 7) than of students in the other groups improved their grades; similarly, higher rates of short-term English learner students completed Algebra II or a higher math course.

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## Summary

Research has found high repetition rates for students in Algebra I, with one study finding a repetition rate of 44 percent for students in a large urban high school district (Fong, Jaquet, & Finkelstein, 2014). Less is known about how math performance and Algebra I course repetition rates vary among students with different levels of English proficiency. This report examines Algebra I repetition rates of English learner students on the basis of whether these students were reclassified as English proficient and, if so, how long it took them to be reclassified. The report also compares the performance of students in different English learner status groups in repeating Algebra I and in taking higher level math courses in high school. Understanding these patterns can inform decisions about the nature and intensity of support that might be provided to English learner students before and after reclassification.

This report examines students in four English learner status groups in a high school district in California in 2008/09–2011/12 and in five of its seven feeder elementary (K–8) school districts in 2006/07–2007/08. The four groups are:

- Long-term English learner students (classified as English learner students by at least grade 1 and not reclassified as English proficient by grade 12).
- Reclassified long-term English learner students (classified as English learner students by at least grade 1 and reclassified as English proficient at some point in grades 7–12).
- Short-term English learner students (classified as English learner students by at least grade 1 and reclassified as English proficient before grade 7).
- Never–English learner students (never classified as English learner students).

The study found that long-term English learner students had the highest Algebra I repetition rates (68 percent), followed by reclassified long-term English learner students (59 percent), never–English learner students (44 percent), and short-term English learner students (30 percent).

Comparisons between the first and second time that students took Algebra I showed statistically significant improvements in Algebra I course grades and test scores across all four English learner status groups.

Among students who repeated Algebra I, short-term English learner students tended to perform the best: 52 percent earned an average course grade of C or better the second time they took the course, compared with 40 percent of never–English learner students, 39 percent of reclassified long-term English learner students, and 29 percent of long-term English learner students. Among students who repeated Algebra I, short-term English learner students also had the highest percentage of students who completed Algebra II or higher with an average course grade of C or better: 20 percent, compared with 12 percent of never–English learner students and 11 percent of reclassified long-term English learner students. The ranking pattern among English learner status groups was similar for students who did not repeat Algebra I.

The findings suggest that long-term English learner students and reclassified long-term English learner students tend to struggle more with Algebra I than do other students and that short-term English learner students tend to perform better than the other groups,

including never-English learner students. The findings also suggest that additional resources may be needed for long-term English learner students and reclassified long-term English learner students. Such resources might include support differentiated on the basis of student need before students enroll in the course as well as while they are enrolled in the course. These differentiated supports may be particularly valuable for long-term English learner students and reclassified long-term English learner students because of their continuing need to develop English language proficiency along with math proficiency.

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## Why this study?

Research has found that students who complete Algebra I by the end of grade 8 have better math outcomes in high school (see, for example, Smith, 1996; U.S. Department of Education, 2007). Algebra I is thus sometimes referred to as a gateway to advanced high school math and science courses (U.S. Department of Education, 1997). Research has also documented that differences in the ability to meet math course prerequisites are a major factor behind disparities in students' math progress (Schiller, Schmidt, Muller, & Houang, 2010). The sequential nature of math courses means that the timing of when students complete key prerequisites has clear consequences for how far students can progress in high school (Schiller & Muller, 2003; Spielhagen, 2006). Students who repeat Algebra I have dim prospects for completing a sequence of math courses that prepare them for college matriculation and success (Fong et al., 2014).

However, little research has explored how math performance and Algebra I course repetition rates differ among various English learner status groups (see box 1 for definitions of the four groups examined in this study). This study addresses this knowledge gap, and its findings provide information relevant to policies and practices that affect the nature, timing, and availability of support for current and former English learner students.

Research indicates that English learner students are significantly more likely than their non-English learner counterparts to repeat Algebra I (Fong et al., 2014).<sup>1</sup> Research also suggests that academic achievement and progress vary substantially among English learner students. Former English learner students who have been reclassified as English proficient

**Research suggests that academic achievement and progress vary substantially among English learner students**

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### Box 1. Descriptions of English learner status groups

The four English learner status groups in this study are:

- *Long-term English learner students.* Students who were classified as English learner students by at least grade 1 and were not reclassified as English proficient by grade 12.
- *Reclassified long-term English learner students.* Students who were classified as English learner students by at least grade 1 and were reclassified as English proficient at some point in grades 7–12.
- *Short-term English learner students.* Students who were classified as English learner students by at least grade 1 and were reclassified as English proficient before grade 7.
- *Never-English learner students.* Students who were never classified as English learner students, including students who were classified as initially fluent English proficient students in the California classification of English language proficiency applicable during the sample period.

The definitions of long-term English learner students and reclassified long-term English learner students are based on California Assembly Bill 2193 (2012), which defines a long-term English learner student as a student in grades 6–12 who has been in a U.S. school for more than six years. To include as many students as possible, the definitions used in this study differ slightly from the state definition by including students who started in a U.S. school no later than in grade 1 instead of kindergarten. Students defined as long-term English learner students in this study have been in a U.S. school for at least six years. However, 94 percent of the reclassified long-term English learner students and long-term English learner students started in a U.S. school in kindergarten.

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outperform non-reclassified English learner students in standardized tests, on-time grade progression, and graduation rates. Students reclassified in earlier grades also tend to outperform on these same outcomes students who are native English speakers (Flores, Batalova, & Fix, 2012; Gwynne, Pareja, Ehrlich, & Allensworth, 2012; Hill, Betts, Chavez, Zau, & Bachofer, 2014; Hill, Weston, & Hayes, 2014).

As many as 59 percent of English learner students remain classified as such for long periods because of their inability to achieve the English proficiency needed to be reclassified (Olsen, 2010).<sup>2</sup> Little research addresses how well long-term English learner students, including reclassified long-term English learner students, perform in Algebra I and higher math courses.

Long-term English learner students may have weaker English comprehension skills and may face other challenges, such as learning disabilities, low motivation, and low socioeconomic status, that lower their Algebra I performance and impede their reclassification as English proficient. These students—regardless of whether they are eventually reclassified—may be vulnerable to performing poorly in Algebra I and needing to repeat the course. Relative to an English-proficient student, a student who cannot fully understand the teacher’s explanations or assessment questions will benefit less from math instruction and will be unable to demonstrate an understanding of the material (Abedi & Herman, 2010; Beal, Adams, & Cohen, 2010). The impact of these challenges has been intensified by the Common Core State Standards for Mathematics and the accompanying changes in standards in math content and practices that have increased the language skills required to access math content and succeed in math assessments (California Department of Education, 2013a, 2013b, 2015). In addition, English learner students in mainstream classes are often taught by teachers who do not have the preparation, support, or strategies to address those students’ special language and comprehension needs (Maxwell-Jolly, Gándara, & Méndez Benavídez, 2007; Olsen, 2010).

*The findings of this study may inform decisions regarding the extent to which school districts need to continue to receive supplemental funding to support students after they have been reclassified as English proficient*

More comprehensive information on Algebra I repetition patterns, student progress during and after Algebra I repetition, and the variations in these patterns across English learner status groups may inform district and state decisions on the nature and intensity of the support English learner students need before and after reclassification. For example, California school districts receive supplemental funding for English learner students, but the funding ends once an English learner student is reclassified as English proficient (California Legislative Analyst’s Office, 2015). The findings of this study may inform decisions regarding the extent to which school districts need to continue to receive supplemental funding to support students after they have been reclassified as English proficient.

### **What the study examined**

Three research questions guided this study:

- What proportion of long-term English learner students, reclassified long-term English learner students, short-term English learner students, and never-English learner students repeat Algebra I during high school?
- To what extent does the Algebra I performance of long-term English learner students, reclassified long-term English learner students, short-term English learner students, and never-English learner students who repeat Algebra I improve between the first and second time they take the course?



- What is the highest math course completed with an average course grade of C or better by long-term English learner students, reclassified long-term English learner students, short-term English learner students, and never-English learner students who repeat Algebra I and those who do not repeat Algebra I?

Box 2 summarizes the data and methods—including how students who repeated Algebra I in high school were identified and how performance improvements were measured—and appendix A provides more detail. Appendix B presents the results of additional analyses, including the disaggregation of Algebra I repetition rates by student characteristics.

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## **Box 2. Data and methods**

### **Data**

The data used in the study are from one high school district in California and five of its seven feeder elementary (K–8) school districts. The elementary school districts provided data for 2005/06–2008/09, and the high school district provided data for 2007/08–2011/12. Even though the data span 2005/06–2011/12, the analysis examines 2006/07–2011/12. The 2005/06 data were used only to identify any grade 7 repeaters when constructing the cohort of grade 7 students. Unique student identification numbers allowed the study team to link students' data from the feeder elementary school districts to their data from the high school district. The variables in the longitudinal, student-level datasets included race/ethnicity, gender, math course name, final letter grade received for the course, math California Standards Test taken, California Standards Test scale score, California Standards Test performance level, English proficiency, date reclassified as English proficient, and date first enrolled in a U.S. school.

The study sample included all students in grade 7 in 2006/07 who attended one of the five feeder elementary school districts. Students who were missing data in the year before, during, or after taking Algebra I were excluded, as were English learner students who enrolled in a U.S. school for the first time after grade 1 (see box 1). The study sample consisted of 3,094 students, of whom 212 (7 percent) were long-term English learner students, 527 (17 percent) were reclassified long-term English learner students, 827 (27 percent) were short-term English learner students, and 1,528 (49 percent) were never-English learner students.

### **Methods**

To address the first research question, the study team calculated Algebra I repetition rates for each of the four English learner status groups using Fong et al.'s (2014) method (see appendix A). Statistical tests were conducted to determine whether there were significant differences across the different groups.

To address the second research question, the study team calculated the average improvement in Algebra I course grades, in Algebra I California Standards Test scale scores, and in Algebra I California Standards Test performance levels between the first and second time that students who repeated Algebra I took the course. Statistical tests were conducted to determine whether the improvements for each group were significant and whether there were differences in improvement across groups.

To address the third research question, the study team ranked the math courses in the order that students in the study high school district normally take them and then tested for differences in the highest course completed across the four English learner status groups.

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## What the study found

This section details the findings for each of the study’s three research questions.

### Algebra I repetition rates differed across the four English learner status groups

Long-term English learner students had the highest Algebra I repetition rate (68 percent), and short-term English learner students had the lowest (30 percent; table 1). The rates of each of the four groups were significantly different from the rates of each of the other groups.

Analyses of repetition rates based on when English learner students were reclassified show an increase in repetition rates the longer it took for a student to be reclassified (figure 1). Some 51–85 percent of reclassified long-term English learner students repeated Algebra I, compared with 22–40 percent of short-term English learner students.

*Repetition rates increased the longer it took for a student to be reclassified*

### Short-term English learner students who repeated Algebra I improved their grade in the course more than did students in the other English learner status groups who repeated Algebra I

The percentage of students who repeated Algebra I and had an average grade of C or better the second time they took the course was higher among short-term English learner students than among each of the other three English learner status groups (table 2; see appendix A on how average course grades for Algebra I and grade 7 math were calculated). Specifically, 52 percent of short-term English learner students who repeated Algebra I had an average grade of C or better the second time they took the course, compared with 40 percent of never-English learner students, 39 percent of reclassified long-term English

**Table 1. Students in the study sample who repeated Algebra I, by English learner status group, 2007/08–2011/12**

Category	Long-term English learner students (n = 212)		Reclassified long-term English learner students (n = 527)		Short-term English learner students (n = 827)		Never-English learner students (n = 1,528)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Students who repeated Algebra I	143	67.5** †	309	58.6** †	250	30.2** †	675	44.2** †

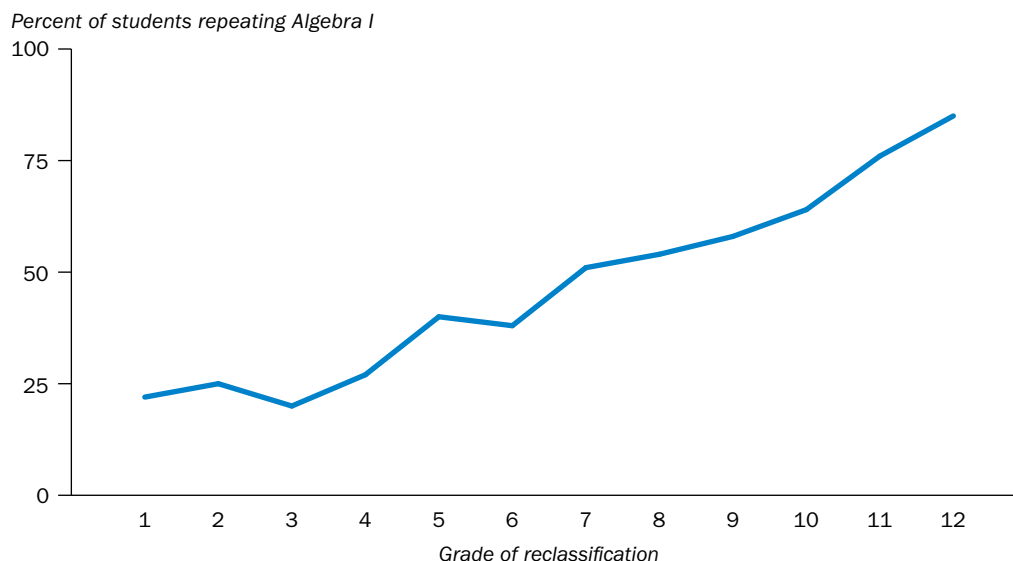
\*\* Significant at  $p < .01$  using Pearson’s chi-squared test of independence, which tests the null hypothesis that there are no differences across the four groups.

† Significant at  $p < .05$  using six Pearson’s chi-squared tests of independence to test for differences between each of the four groups and every other group (for instance, between long-term English learner students and the other three groups). That all the tests of the six possible pairings of the four groups were statistically significant means that each English learner status group had a different Algebra I repetition rate relative to every other group.

**Note:** The study sample includes 3,094 students, 1,377 of whom repeated Algebra I, from one high school district in California and five of its seven feeder elementary (K–8) school districts. Long-term English learner students are students who were classified as English learner students by at least grade 1 and were not reclassified as English proficient by grade 12, reclassified long-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient at some point in grades 7–12, short-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient before grade 7, and never-English learner students are students who were never classified as English learner students.

**Source:** Authors’ analysis of 2006/07–2011/12 data from the California school districts included in the study; see appendix A.

**Figure 1. The longer it took an English learner student in the study sample to be reclassified as English proficient, the more likely the student was to repeat Algebra I, 2000/01–2011/12**



**Note:** The study sample includes 3,094 students, 1,377 of whom repeated Algebra I, from one high school district in California and five of its seven feeder elementary (K–8) school districts. A student may have repeated Algebra I before being reclassified.

**Source:** Authors' analysis of 2006/07–2011/12 data from the California school districts included in the study; see appendix A.

learner students, and 29 percent of long-term English learner students. The percentages were significantly different across the four groups.

The percentage of students who repeated Algebra I and scored proficient or advanced on the Algebra I California Standards Test the second time they took the test was also higher among short-term English learner students than among each of the other three English learner status groups. Specifically, 32 percent of short-term English learner students who repeated Algebra I scored proficient or advanced on the Algebra I California Standards Test the second time they took the test, compared with 12 percent of reclassified long-term English learner students and 21 percent of never–English learner students (see table 2).

The percentage of students who repeated Algebra I and had an average course grade between a D and an F the second time they took the course was higher among long-term English learner students (44 percent) than among never–English learner students (34 percent), reclassified long-term English learner students (31 percent), and short-term English learner students (21 percent; see table 2). Of students who had an average course grade between a D and an F the second time they took Algebra I, 59 percent repeated the course a second time (meaning that they took Algebra I a third time). The percentage of students who repeated the course a second time was higher among short-term English learner students (69 percent) than among reclassified long-term English learner students (68 percent), never–English learner students (56 percent), and long-term English learner students (51 percent).

Short-term English learner students' average course grade in Algebra I improved 0.7 letter grade between the first and second time they took the course, compared with 0.3 letter grade

*The percentage of students who repeated Algebra I and had an average grade of C or better the second time they took the course was higher among short-term English learner students than among each of the other three English learner status groups*

**Table 2. Algebra I performance the second time that students in the study sample took the course, by English learner status group, 2007/08–2011/12**

Algebra I performance	Long-term English learner students (n = 143)		Reclassified long-term English learner students (n = 309)		Short-term English learner students (n = 250)		Never-English learner students (n = 675)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Average course grade								
C or better	42	29.4** †	120	38.8** †	130	52.0** †	272	40.3** †
Between A and B	16	11.2**	43	13.9**	67	26.8**	122	18.1**
Between B and C	26	18.2**	77	24.9**	63	25.2**	150	22.2**
Between C and D	38	26.6**	93	30.1**	68	27.2**	171	25.3**
Between D and F	63	44.1**	96	31.1**	52	20.8**	232	34.4**
California Standards Test performance level <sup>a</sup>								
Below proficient	b	b	277	88.0**	131	68.2**	402	78.8**
Proficient or advanced	b	b	31	12.0**	61	31.8**	108	21.2**

\*\* Significant at  $p < .01$  using Pearson's chi-squared test of independence, which tests the null hypothesis that there is no difference across the four groups.

† Significant at  $p < .05$  using six Pearson's chi-squared tests of independence to test the difference between each group and every other group. The results were statistically significant for four comparisons (long-term English learner students and short-term English learner students, long-term English learner students and never-English learner students, reclassified long-term English learner students and short-term English learner students, and short-term English learner students and never-English learner students). They were not statistically significant for two comparisons (long-term English learner students and reclassified long-term English learner students as well as reclassified long-term English learner students and never-English learner students).

**Note:** The study sample includes 3,094 students, 1,377 of whom repeated Algebra I, from one high school district in California and five of its seven feeder elementary (K–8) school districts. Long-term English learner students are students who were classified as English learner students by at least grade 1 and were not reclassified as English proficient by grade 12, reclassified long-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient at some point in grades 7–12, short-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient before grade 7, and never-English learner students are students who were never classified as English learner students. Percentages may not sum to 100 because of rounding.

a. Data are not available on the Algebra I California Standards Test performance level for some students.

b. Suppressed to reduce risk of disclosure because there were fewer than 10 students.

**Source:** Authors' analysis of 2006/07–2011/12 data from the California school districts included in the study; see appendix A.

among long-term English learner students, 0.4 letter grade among reclassified long-term English learner students, and 0.5 letter grade among never-English learner students (table 3).<sup>3</sup> The improvement in grades was statistically significant for each English learner status group. A comparison of the differences in improvement between the six possible pairings of the four English learner status groups revealed that the only statistically significant difference was between long-term English learner students and short-term English learner students.

California Standards Test scale scores and performance levels showed statistically significant improvement for each of the four English learner status groups. Short-term English learner students and long-term English learner students both improved 0.2 performance level or 12 scale score points on the California Standards Test, compared with 0.3 performance level or 16 scale score points for reclassified long-term English learner students and 0.3 performance level or 15 scale score points for never-English learner students. However, there were no statistically significant differences in improvement in California Standards

**Table 3. Improvement in performance between the first and second time taking Algebra I among students in the study sample who repeated Algebra I, by English learner status group, 2007/08–2011/12**

Area of improvement	Long-term English learner students (n = 143)		Reclassified long-term English learner students (n = 309)		Short-term English learner students (n = 250)		Never-English learner students (n = 675)	
	Number	Mean improvement (standard deviation)	Number	Mean improvement (standard deviation)	Number	Mean improvement (standard deviation)	Number	Mean improvement (standard deviation)
Average course grade	143	0.3** †† (1.1)	309	0.4** † (1.3)	247	0.7** †† (1.3)	673	0.5** † (1.3)
California Standards Test scale score <sup>a,b</sup>	79	12.0* (36.5)	226	15.9** (36.8)	159	12.0** (39.5)	453	14.7** (38.4)
California Standards Test performance level <sup>b</sup>	79	0.2** (0.9)	226	0.3** (0.9)	159	0.2** (0.8)	453	0.3** (0.8)

\* Significant at  $p < .05$  using a paired  $t$ -test to determine whether the improvement was statistically significant within each of the four English learner status groups; \*\* significant at  $p < .01$  using a paired  $t$ -test to determine whether the improvement was statistically significant within each of the four English learner status groups.

† Represents statistical significance at  $p < .05$  using a one-way analysis of variance to determine significance levels in the differences in Algebra I performance between the first and the repeated course across the four groups using all three measures of performance.

†† Represents statistical significance at  $p < .05$  using a post hoc pairwise comparison (Tukey) test.

**Note:** The study sample includes 3,094 students, 1,377 of whom repeated Algebra I, from one high school district in California and five of its seven feeder elementary (K–8) school districts. Long-term English learner students are students who were classified as English learner students by at least grade 1 and were not reclassified as English proficient by grade 12, reclassified long-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient at some point in grades 7–12, short-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient before grade 7, and never-English learner students are students who were never classified as English learner students. Algebra I California Standards Test performance levels were converted to a numeric scale as follows: far below basic = 1, below basic = 2, basic = 3, proficient = 4, and advanced = 5. Average improvements in performance levels are reported on this scale.

**a.** The mean California Standards Test scale score for Algebra I among high school students in 2008/09 was 306.9, and the standard deviation was 43.3.

**b.** Data are not available on California Standards Test performance level for some students after they repeated Algebra I.

**Source:** Authors' analysis of 2006/07–2011/12 data from the California school districts included in the study; see appendix A.

Test scale score or performance level across the four groups or in each of the six possible pairings of the four groups.

**Among students who repeated Algebra I, the percentage of students who subsequently completed Algebra II or higher with an average grade of C or better was highest among short-term English learner students**

The four English learner status groups include a high percentage of students who repeated Algebra I but who did not complete a subsequent math course with an average grade of C or better. Short-term English learner students had the highest percentage of students who repeated Algebra I and completed a subsequent math course with an average grade of C or better (table 4). Among students who repeated Algebra I, 20 percent of short-term English learner students completed an Algebra II course or higher with an average grade of C or

**Table 4. Highest math course completed with an average grade of C or better among students in the study sample who repeated Algebra I, by English learner status group, 2007/08–2011/12**

Highest math course completed with an average grade of C or better	Long-term English learner students (n = 143)		Reclassified long-term English learner students (n = 309)		Short-term English learner students (n = 250)		Never-English learner students (n = 675)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
None	117	81.8**	235	76.1**	164	65.6**	489	72.4**
Algebra I	13	9.1** †	a	a	a	a	14	2.1** †
Geometry	a	a	a	a	a	a	92	13.6** †
Algebra II or higher	a	a	34	11.0** †	51	20.4** †	80	11.9** †

\*\* Significant at  $p < .01$  using Pearson's chi-squared test of independence, which tests the null hypothesis that there are no differences across the four English learner status groups.

† Significant at  $p < .05$  using six Pearson's chi-squared tests to test the difference between each group and every other group. Results were statistically significant for five comparisons (long-term English learner students and reclassified long-term English learner students, long-term English learner students and short-term English learner students, long-term English learner students and never-English learner students, reclassified long-term English learner students and short-term English learner students, and never-English learner students and short-term English learner students) and were not statistically significant for one comparison (never-English learner students and reclassified long-term English learner students).

**Note:** The study sample includes 3,094 students, 1,377 of whom repeated Algebra I, from one high school district in California and five of its seven feeder elementary (K–8) school districts. Long-term English learner students are students who were classified as English learner students by at least grade 1 and were not reclassified as English proficient by grade 12, reclassified long-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient at some point in grades 7–12, short-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient before grade 7, and never-English learner students are students who were never classified as English learner students. Percentages may not sum to 100 because of rounding.

a. Suppressed to reduce risk of disclosure because there were fewer than 10 students.

**Source:** Authors' analysis of 2006/07–2011/12 data from the California school districts included in the study; see appendix A.

*The findings suggest that long-term English learner students and reclassified long-term English learner students struggle in Algebra I and that repeating the course benefits these students less than it does short-term English learner students and never-English learner students*

better, compared with 11 percent of reclassified long-term English learner students and 12 percent of never-English learner students.

Among students who never repeated Algebra I, the percentage of students who completed Algebra II or higher with an average grade of C or better was higher among short-term English learner students than among long-term English learner students and reclassified long-term English learner students. Specifically, 59 percent of short-term English learner students completed Algebra II or higher with an average grade of C or better, compared with 15 percent of long-term English learner students and 28 percent of reclassified long-term English learner students (table 5). The difference between the percentage of short-term English learner students and the percentage of never-English learner students was not statistically significant.

### Implications of the study findings

The study found that among the four English learner status groups, long-term English learner students had the highest Algebra I repetition rate, at 68 percent, followed by reclassified long-term English learner students, at 59 percent. The study also found that among students who repeated Algebra I, long-term English learner students had the smallest improvement in course grades (0.3 letter grade), followed by reclassified long-term English learner students (0.4 letter



**Table 5. Highest math course completed with an average grade of C or better among students in the study sample who did not repeat Algebra I, by English learner status group, 2007/08–2011/12**

Highest math course completed with an average grade of C or better	Long-term English learner students (n = 69)		Reclassified long-term English learner students (n = 218)		Short-term English learner students (n = 577)		Never-English learner students (n = 853)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
None	52	75.4**	148	67.9**	224	38.8**	388	45.5**
Algebra I	a	a	a	a	a	a	10	1.2** †
Geometry	a	a	a	a	a	a	24	2.8** †
Algebra II or higher	10	14.5** †	60	27.5**	338	58.6** †	431	50.5** †

\*\* Significant at  $p < .01$  using Pearson's chi-squared test of independence, which tests the null hypothesis that there is no relationship across the four English learner status groups.

† Significant at  $p < .05$  using six Pearson's chi-squared tests of independence to test the difference between each group and every other group. Results were statistically significant for five comparisons (long-term English learner students and short-term English learner students, long-term English learner students and never-English learner students, long-term English learner students and reclassified long-term English learner students, reclassified long-term English learner students and short-term English learner students, and never-English learner students and reclassified long-term English learner students) and were not statistically significant for one comparison (never-English learner students and short-term English learner students).

**Note:** The study sample includes 3,094 students, 1,717 of whom did not repeat Algebra I, from one high school district in California and five of its seven feeder elementary (K–8) school districts. Long-term English learner students are students who were classified as English learner students by at least grade 1 and were not reclassified as English proficient by grade 12, reclassified long-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient at some point in grades 7–12, short-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient before grade 7, and never-English learner students are students who were never classified as English learner students.

a. Suppressed to reduce risk of disclosure because there were fewer than 10 students.

**Source:** Authors' analysis of 2006/07–2011/12 data from the California school districts included in the study; see appendix A.

grade). These findings suggest that long-term English learner students and reclassified long-term English learner students struggle in Algebra I and that repeating the course benefits these students less than it does short-term English learner students and never-English learner students.

The struggles of long-term English learner students in Algebra I are particularly concerning given the research showing that students who do not complete Algebra I on time are more likely to experience lower academic outcomes in the future (U.S. Department of Education, 1997). The findings of the current study thus shed light on the struggles of long-term English learner students in Algebra I and in math more broadly. While the study could not determine why long-term English learner students perform poorly in Algebra I or suggest ways to improve those students' performance in the course, other research on the topic is instructive. For instance, Moschkovich (2007, 2012, 2013) suggested that math instruction among English learner students should:

- Address much more than vocabulary by supporting English learner students' participation in math discussions while those students learn English.
- Support the participation of all students, regardless of their proficiency in English, in discussions focusing on key math concepts and reasoning rather than on pronunciation, vocabulary, or low-level linguistic skills.
- Provide opportunities for students to actively use math language to communicate and negotiate meaning for math situations.

*The struggles of long-term English learner students in Algebra I are particularly concerning given the research showing that students who do not complete Algebra I on time are more likely to experience lower academic outcomes in the future*

- Recognize the complexity of language in math classrooms and support students in engaging in this complexity.

Additionally, prior research suggests that support from teachers should follow a developmental process that focuses on comprehension and on communication that combines language development with math content (Heritage, Walqui, & Linqunti, 2015). Specifically, with the adopted Common Core State Standards for Mathematics, students are expected to engage in math content through more dialogue and writing in English (California Department of Education, 2013a).

Guidelines such as those for instructing English learner students could be followed in students' regular math courses, but they could also be followed when English learner students receive math support, such as during additional math support classes, one-on-one tutoring, and summer school. The findings of the current study reinforce the potential importance of these supports and suggest that long-term English learner students, even after they are reclassified, may need these supports. This suggests that states such as California might need to examine policies for supplemental and concentration funding for English learner students to provide support after students are reclassified.

*The findings of the current study suggest that long-term English learner students, even after they are reclassified, may need additional math support*

Future potential topics of research on this subject are wide-ranging. For instance, after implementation of the Common Core State Standards for Mathematics, standardized assessments began including constructed response questions that require students to explain how they arrived at their answers. Given that English learner students struggle with mastery of the English language, the inclusion of constructed response questions may put English learner students at a disadvantage in these standardized assessments. One potential area of research would assess how long-term English learner students perform on the constructed response questions relative to other students.

### Limitations of the study

This study has five main limitations.

First, the study focuses on only one cohort of students. The study sample also has a higher proportion of English learner students than does the state as a whole; findings therefore may be generalizable only to districts that are similar to the study sample (see appendix B for more information about the demographic characteristics of the sample).

Second, the Algebra I course examined in this study is not the same as the Algebra I course currently offered in California; the latter is aligned with the Common Core State Standards. However, regardless of the content of the course, educators still need to make decisions about how to appropriately place students into math courses and, in some instances, when to have students repeat the course. Additionally, California adopted English Language Development Standards in 2012, which are recommended to be used in tandem with the Common Core State Standards to promote the ability of English learner students to develop English skills and content knowledge (California Department of Education, 2014). As a result of the new English Language Development Standards, repetition rates may have changed among the English learner status groups, and fewer English learner students may be repeating math courses.



Third, other factors could be affecting Algebra I repetition rates, such as learning disabilities, poverty, and even motivation. This study is unable to disentangle all those factors.

Fourth, the data include math course enrollment data, but not school enrollment data, and the data cover only one California high school district. This means that students who were not enrolled in a math course either before or after taking Algebra I are not included in the sample because these students could have taken another math course in another district or may not have taken a math course each year. This affects about 14 percent of the original sample. The lack of school enrollment data on the high school district may distort the representativeness of the sample, which includes only students who have normal patterns of taking math courses—that is, students who take at least one math course a year. Some of the excluded students may have been part of the group of students who repeated Algebra I or the group of students who did not repeat Algebra I.

Fifth, the data do not indicate the reason that each student repeated Algebra I. The measures used to determine whether a student repeats Algebra I might include course grade, California Standards Test math score, teacher recommendations, or participation in summer intervention programs (Flamm et al., 2011). Although most students likely repeated the course because of poor initial course performance, some students repeated the course even though they had earned an average grade better than a C. Students who earned a high course grade may not necessarily score high on the Algebra I California Standards Test. Even if they do, the teacher might not recommend advancing the student to the next math course. Administrators are rarely required to formally document why a particular student is asked to repeat Algebra I, so that information is unavailable in the dataset. As a result, the study team could not address why students repeat Algebra I.

*The study could not address why students repeat Algebra I because administrators are rarely required to formally document why a particular student is asked to repeat Algebra I, so that information is unavailable in the dataset*

## Appendix A. Data, sample construction, and methodology

This appendix includes information and analysis about the study data, the sample, the identification of students who repeated Algebra I, and the calculation of average grades and California Standards Test performance levels.

### Data

The study data were provided by a high school district in California and five of its seven elementary feeder school districts. One of the elementary school feeder districts that did not take part did not have the necessary data, and the other did not want to participate in the study.

The elementary school feeder districts cover kindergarten through grade 8. They supplied data on all students in grades 6–8. Four of the feeder school districts provided data for the 2005/06–2008/09 school years, and one feeder school district provided data for the 2006/07–2008/09 school years. The high school district covers grades 9–12, and it supplied data for the 2007/08–2011/12 school years.

The California Department of Education assigns a unique identification number to each student in the state’s traditional public, alternative, and charter schools. The study team used that number to link students from the feeder elementary school districts to the high school district.

The datasets contained demographic information, including race/ethnicity, gender, English learner status, the date English learner students were reclassified as English proficient, the date of first enrollment in a U.S. school, eligibility for the federal school lunch program, special education status, and grade level. They also contain math course information, including course name, California Basic Educational Data System (CBEDS) course number (a standardized four-digit code used by all public schools in California to reflect the curriculum covered in each course), course letter grade for each term in the school year, math California Standards Test (CST) taken, CST scale score, CST performance level, and the school year in which each CST was administered. The dataset also contained behavioral data, such as the number of days absent in the school year and whether the student was suspended.

Some data elements were not provided because the data did not exist during the school years requested or could not be located:

- Two feeder elementary (K–8) school districts did not provide CBEDS course numbers for 2005/06–2007/08.
- Two feeder elementary (K–8) school districts did not provide suspension data or CBEDS course numbers for any years requested.
- One feeder elementary (K–8) school district did not provide data for 2005/06 or CBEDS course numbers or course grades for 2006/07.
- One feeder elementary (K–8) school district did not provide data on special education status or suspension data for any years requested, data on eligibility for the federal school lunch program in 2005/06 and 2006/07, or CST information for 2005/06.

Because so few districts provided data on suspension, the study team was unable to include suspension information as a control variable.

## Sample construction

Although the dataset spans the school years 2005/06–2011/12, the analysis examines only 2006/07–2011/12. The 2005/06 data were used to identify any grade 7 repeaters. The sample follows one cohort of first-time grade 7 students in 2006/07 who were enrolled in one of the five feeder elementary school districts and subsequently attended one of the comprehensive high schools in the high school district. These students would normally have been in grade 1 in the 2000/01 school year. The sample started with 5,391 first-time grade 7 students in 2006/07. (Four grade 7 students in the 2006/07 school year who were repeating the entire grade level were not included.)

The study team excluded students for one of four reasons:

- Student did not have a state identification number, had multiple identification numbers, or did not have math course grade data.
- Student was missing data on English learner status or date of first enrollment in a U.S. school.
- Student did not take an Algebra I math course in any middle school or comprehensive high school.
- Student had no data on math course enrollment for the years before and after taking Algebra I.

The final analytic sample included 3,094 students (table A1).

Of the 763 students with incomplete data on math course enrollment for the year before or after taking Algebra I, 54 did not have data for the year before taking Algebra I, 571 did not have data for the year after taking Algebra I, and 138 did not have data for both the year before and the year after taking Algebra I. The last category includes some students with no data for the first year, Algebra I in the second year, Algebra I in the third year, and no data for the fourth year. Furthermore, 43 of the 54 students who did not have data for the year before taking Algebra I repeated the course, 220 of the 571 students who did not have data for the year after taking Algebra I repeated the course (for instance, they took Algebra I, then Algebra I again the following year, and then had no data for the year after that), and 66 of the 138 students who did not have data for both the year before and the year after taking an Algebra I course repeated Algebra I. A student who took Algebra I in

**Table A1. Sample construction**

Sample element	Number of students	Percent of original sample
Initial sample	5,391	
<i>Excluded from the sample</i>		
No state identification number, multiple identification numbers, or no math course data	220	4.1
Missing English learner status or missing date of first enrollment in a U.S. school	1,070	19.8
No Algebra I math course	244	4.5
No data on math course enrollment for the years before and after taking Algebra I	763	14.2
Final analytic sample	3,094	57.4

**Source:** Authors' analysis of 2006/07–2011/12 data from the California school districts included in the study.

grade 7 and a non–Algebra I math course in grade 8 was included in the sample, regardless of whether the student was observed in any comprehensive high school in grade 9.

Including the 329 students with incomplete data on math course enrollment for the years before and after taking Algebra I who repeated the course in the analytic sample increases the Algebra I repetition rate from 45 percent to 50 percent. However, that rate is artificially inflated because it does not take into account all students with incomplete data. Including all 763 students with incomplete data in the analytic sample decreases the Algebra I repetition rate from 45 percent to 44 percent. Because it cannot be ascertained whether many of the students with incomplete data repeated Algebra I and because one of the main goals of the study was to calculate the Algebra I repetition rate as accurately as possible, all 763 students with incomplete data were excluded from the analytic sample.

The final analytic sample has a higher proportion of Asian students (37 percent) than did the overall population of California (10 percent) in school year 2000/01 (table A2). The sample also has a higher proportion of grade 1 English learner students (51 percent) than the state as a whole (36 percent). The two feeder elementary school districts that were not included in the study sample had higher proportions of Asian students (60 percent) and lower proportions of Hispanic students (21 percent) than did the study districts and the state as a whole.

### Identifying students who repeated Algebra I

The identification of students who repeated Algebra I followed the three steps outlined by Fong et al. (2014):

- Identify which courses are considered Algebra I.
- Define Algebra I enrollment.
- Identify instances of Algebra I repetition.

**Table A2. Characteristics of grade 1 students in California, 2000/01 school year**

Characteristic	Students in California as a whole (n = 487,058)		Students in the study districts (n = 3,094)		Students in the two feeder elementary school districts excluded from the study (n = 972)	
	Number	Percent	Number	Percent	Number	Percent
<b>Race/ethnicity</b>						
American Indian/Alaska Native	3,730	0.8	a	a	14	1.4
Asian	48,277	9.9	1,147	37.1	582	59.9
Black	39,647	8.1	a	a	55	5.7
Hispanic	238,389	48.9	1,484	48.0	203	20.9
White	153,639	31.5	340	11.0	118	12.1
Two or more races or no response	3,376	0.7	0	0	0	0
<b>English language status in grade 1</b>						
English learner students	174,661	35.9	1,566	50.6	545	56.1

a. Suppressed to reduce risk of disclosure because there were fewer than 10 students.

**Source:** Authors' analysis of 2000/01 data from the California Department of Education for 2000/01 and 2006/07–2011/12 data from the California school districts included in the study.

**Identify which courses are considered Algebra I.** CBEDS numbers were used to identify courses. For instance, 2403 identifies the Algebra I (one-year) course, and 2428 identifies the beginning algebra part 1 course (the first year of a two-year course). In the data from the high school district, 95 percent of the math courses included a CBEDS number. Courses that did not have a number but that were identified with a name that included algebra were defined as Algebra I courses, except in cases where the course name also included II, geometry, analysis, or intermediate. In the data from the feeder elementary school districts, most of the math courses did not include a CBEDS number. The study team consulted the instructional services division or the educational services department in each district to identify the Algebra I courses based on course names. One- and two-year algebra courses were distinguished.

One school district had a class titled Algebra Basic that the district had identified as the first year of a two-year Algebra I sequence (the district's one-year Algebra I course was titled Algebra Advanced). Students who completed the Algebra Basic course in this district were expected to take a one-year Algebra I course in grade 9. Among the 570 students who took Algebra Basic in the district, 568 took the grade 8 general math CST, and 2 took the Algebra I CST. However, 37 students in the district who took Algebra Basic in grade 8 took Geometry rather than Algebra I in grade 9. To include these 37 students in the analytic sample, the study team would have had to define Algebra Basic as a full-year Algebra I course for all students. This option did not seem correct, given that the district had identified the course as year one of a two-year Algebra I sequence and that almost all the students who took the course took the grade 8 general math CST. If the Algebra Basic course in this district had been defined as a full-year Algebra I course, the overall Algebra I repetition rate would have increased approximately 7 percentage points, to 52 percent.

The final analytic sample included 819 students who took a course that included the word algebra in the title but that the study team did not consider a full-year Algebra I course. Among these 819 students, 801 took the grade 8 general math CST, 14 took the Algebra I CST, and 4 did not take any math CST. All 819 students took the full-year Algebra I course the following year in grade 9, and 215 of them earned an average course grade of a B or better and scored either proficient or advanced on the Algebra I CST. The fact that these 215 students did well in the course with the word algebra in the title but still needed to take a full-year Algebra I course the following year provides assurance that courses with the word algebra in the title were correctly coded as not being full-year Algebra I courses.

The study high school district offered a regular Algebra I course for all students, regardless of English proficiency, based on the California 1997 Mathematics Content Standards. The textbook used for the course was McDougal Littell Algebra I California Edition (2007 edition). The study K–8 feeder elementary school districts also offered a regular Algebra I course for all students, regardless of English proficiency, based on the California 1997 Mathematics Content Standards, but the curriculum or textbook varied. Depending on the number of English learner students, these students could attend a sheltered Algebra I course, which was based on the same California 1997 Mathematics Content Standards as an Algebra I course but involved slightly smaller class sizes and greater focus on content vocabulary and language.

**Define Algebra I enrollment.** A student who completed a one-year Algebra I course was considered to have taken Algebra I. A student enrolled in the first year of a two-year

Algebra I sequence was not considered to have taken Algebra I in that year, but a student enrolled in the second year of a two-year Algebra I sequence was considered to have taken Algebra I in that year. The study team confirmed with each district whether successful students in each course with “algebra” in the title were appropriately promoted to geometry. Algebra I courses that did not allow students to be promoted to geometry the following year, even if the students performed well, were not defined as Algebra I and were assumed to be part of a two-year Algebra I sequence.

Because students sometimes enrolled in a math course for only a portion of the school year, a student was defined as having taken Algebra I if he or she received a letter grade for the course for some portion of the second half of the school year (for example, the third or fourth quarter in a quarter system or the second semester in a semester system). For instance, a student who received a letter grade in Algebra I for the third quarter (out of a possible four quarters) was defined as having taken Algebra I in that school year. However, a student who received a letter grade in Algebra I for the second quarter before dropping out (and then, for example, enrolling in a different math course for the rest of that school year) was defined as not having taken Algebra I in that school year. These students were likely placed inaccurately in the first half of the school year and so should not be considered as having taken Algebra I or as having repeated Algebra I if they took it the following year. Because Algebra I is a cumulative course, a student who took only the first half of the course did not experience the full course of Algebra I.

**Identify instances of Algebra I repetition.** A student could be considered to have repeated Algebra I in any of grades 8–12. A student who enrolled in Algebra I in two different school years (where Algebra I course enrollment in a given year was defined as above) was considered to have repeated Algebra I. A student who enrolled in the second year of a two-year Algebra I sequence in one year and then enrolled in a one-year Algebra I course the following year was considered to have repeated Algebra I. A student who enrolled in Algebra I in one year and then enrolled in both Algebra I and geometry concurrently the following year was also considered to have repeated Algebra I, as was a student who enrolled in Algebra I in one school year, then enrolled in Algebra I the following summer.

### Calculating average course grades for Algebra I and Algebra II

Most school districts provided a grade for each student for each term of the school year. To determine a student’s grade for an entire course, the study team averaged the student’s term grades. The procedure for calculating an average course grade for an entire group of students was:

1. Student letter grades were converted to a numeric scale: A = 4.0, A- = 3.67, B+ = 3.33, B = 3.0, B- = 2.67, C+ = 2.33, C = 2.0, C- = 1.67, D+ = 1.33, D = 1.0, D- = 0.67, F+ = 0.33, F = 0.0.
2. Each student’s grades from multiple terms for each course were averaged to produce a single numeric course grade for the student. A grade averaging between an A and a B is equivalent to a grade average between 3.0 and 4.0 on the numeric scale; a grade averaging between a B and a C is equivalent to a grade average of 2.0 to less than 3.0; and so on.
3. Student course grades were averaged to calculate group course grades.

### Methodology used to answer the three research questions

To address the first research question (What proportion of long-term English learner students, reclassified long-term English learner students, short-term English learner students, and never-English learner students repeat Algebra I during high school?), the study team calculated Algebra I repetition rates for each of the four English learner status groups using Fong et al.'s (2014) method. Differences in rates were tested using a Pearson's chi-squared test of independence, and six Pearson's chi-squared tests of independence were performed to test for statistically significant differences in each of the six possible pairings of the groups.

To address the second research question (To what extent does the Algebra I performance of long-term English learner students, reclassified long-term English learner students, short-term English learner students, and never-English learner students who repeat Algebra I improve between the first and second time they take the course?), the study team calculated the average improvement in Algebra I course grades, in Algebra I California Standards Test scale scores, and in Algebra I California Standards Test performance levels between the first and second time that students who repeated Algebra I took the course. Paired *t*-tests were conducted to determine whether the improvement that each English learner status group achieved was statistically significant. The differences in average improvement across the four English learner student groups were tested using a one-way analysis of variance, followed by a post hoc pairwise comparison Tukey test to determine which groups differed from each other.

To address the third research question (What is the highest math course completed with an average course grade of C or better by long-term English learner students, reclassified long-term English learner students, short-term English learner students, and never-English learner students who repeat Algebra I and those who do not repeat Algebra I?), the study team ranked the math courses in the order that students in the study high school district normally take them and then used a Pearson's chi-squared test to test for statistically significant differences across the four English learner status groups in terms of the highest course completed. Six Pearson's chi-squared tests of independence were also performed to test for statistically significant differences in each of the six possible pairings of the groups.



## **Appendix B. Disaggregation by English learner status group and additional analyses**

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This appendix presents the results of additional analyses, including Algebra I repetition rates disaggregated by English learner status and by student characteristics such as race/ethnicity, eligibility for the federal school lunch program, special education status, and performance when the student first took the course.

### **Selected demographic characteristics in the data analyses**

In addition to carrying out the main analyses reported in the body of this report, the study team also carried out analyses that disaggregated the dataset by student demographic and performance characteristics. Additional rules for defining student demographic characteristics were as follows:

- The Asian race/ethnicity category includes Filipino students.
- Students eligible for the federal school lunch program include all students who were eligible in any of the school years under observation.
- Students in special education include all students who were in special education in any of the school years under observation.

### **Repetition rates by selected demographic characteristics**

The Algebra I repetition rates varied by student characteristics and were highest among students with more than 18 absences in the school year in which they first took Algebra I (table B1). Some 76 percent of long-term English learner students with more than 18 absences repeated Algebra I. Algebra I repetition rates were also higher among students in special education than among students who were not in special education and among Hispanic students than among students in other race/ethnicity groups.

The lowest average repetition rates were among Asian students and among students with no more than one absence in the year that they took Algebra I (see table B1). Even though these categories of student characteristics showed the lowest rates overall, the rates were significantly different across English learner status groups. The percentage of students who repeated Algebra I was higher among long-term English learner students than among reclassified long-term English learner students, short-term English learner students, and never-English learner students.

Across all four English learner status groups, students with a low average course grade in Algebra I or a low performance level on the Algebra I CST were most likely to repeat the course (table B2). Students with an average grade between a D and an F or scoring far below basic on the Algebra I CST were more likely to repeat Algebra I relative to those with an average course grade between an A and a B or scoring advanced on the Algebra I CST. Among reclassified long-term English learner students, the repetition rate was 95 percent among students with an average course grade between a D and an F and 88 percent among students scoring far below basic, compared with 20 percent of students with an average course grade between an A and a B and 0 percent of students who scored advanced on the Algebra I CST. Among short-term English learner students, the repetition rate was 93 percent among students with an average course grade between a D and an F and 82 percent among students scoring far below basic, compared with 8 percent among students with an average course grade between an A and a B and 2 percent among students scoring advanced on the Algebra I CST.



**Table B1. Percentage of students in the study sample who repeated Algebra I, by student characteristic and English learner status group**

Student characteristic	Long-term English learner students who repeated Algebra I (n = 143)		Reclassified long-term English learner students who repeated Algebra I (n = 309)		Short-term English learner students who repeated Algebra I (n = 250)		Never-English learner students who repeated Algebra I (n = 675)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<b>Race/ethnicity</b>								
American Indian/Alaska Native	a	a	a	a	a	a	a	a
Asian	17	56.7**	59	40.1**	85	17.1**	113	23.9**
Black	a	a	0	0.0	a	a	a	a
Hispanic	124	68.9**	246	66.3**	160	51.5**	384	61.7**
White	0	0.0	a	a	a	a	116	36.4
<b>Eligibility for the federal school lunch program</b>								
Eligible	129	69.0**	268	60.0**	204	36.2**	393	55.1**
Not eligible	14	56.0**	41	51.3**	46	17.4**	282	34.6**
<b>Special education status</b>								
In special education	43	74.1	20	62.5	a	a	75	67.6
Not in special education	100	64.9**	289	58.4**	241	29.5**	600	42.3**
<b>Number of absences when the student first took Algebra I</b>								
0 or 1	15	57.7**	57	52.3**	47	16.2**	54	18.9**
2–4	38	74.5**	67	55.4**	68	32.7**	154	37.8**
5–9	24	58.5*	75	70.8*	66	49.3*	190	56.7*
10–18	19	63.3	46	59.7	34	49.3	149	62.1
More than 18	25	75.8	26	78.8	15	60.0	82	67.8
No data	22	71.0**	38	46.9**	20	20.0**	46	33.3**

\* Significant at  $p < .05$  using Pearson's chi-squared test of independence, which tests the null hypothesis that there are no differences across the four groups; \*\* significant at  $p < .01$  using Pearson's chi-squared test of independence, which tests the null hypothesis that there are no differences across the four groups.

**Note:** The study sample includes 3,094 students, 1,377 of whom repeated Algebra I, from one high school district in California and five of its seven feeder elementary (K–8) school districts. Long-term English learner students are students who were classified as English learner students by at least grade 1 and were not reclassified as English proficient by grade 12, reclassified long-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient at some point in grades 7–12, short-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient before grade 7, and never-English learner students are students who were never classified as English learner students.

a. Suppressed to reduce risk of disclosure because there were fewer than 10 students.

**Source:** Authors' analysis of 2006/07–2011/12 data from the California school districts included in the study. See appendix A.

**Table B2. Percentage of students in the study sample who repeated Algebra I after the first time they took the course, by student characteristic and English learner status group**

Student characteristic	Long-term English learner students who repeated Algebra I (n = 143)		Reclassified long-term English learner students who repeated Algebra I (n = 309)		Short-term English learner students who repeated Algebra I (n = 250)		Never-English learner students who repeated Algebra I (n = 675)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Grade level the first time the student took Algebra I								
7	0	0.0	0	0.0	c	c	c	c
8	c	c	c	c	c	c	295	38.8**
9	119	68.4**	181	60.3**	108	43.4**	373	57.0**
10	c	c	c	c	0	0.0	c	c
Average course grade the first time the student took Algebra I <sup>a,b</sup>								
Between A and B	c	c	20	19.6**	29	7.5**	32	6.5**
Between B and C	c	c	46	34.3**	50	26.9**	102	31.0**
Between C and D	31	58.5*	102	72.9*	70	57.4*	202	62.9*
Between D and F	83	80.6**	141	95.3**	98	92.5**	337	89.9**
Performance level on the Algebra I CST the first time the student took Algebra I <sup>a</sup>								
Far below basic	38	77.6	51	87.9	22	81.5	96	87.3
Below basic	51	66.2	137	74.1	65	62.5	255	71.2
Basic	14	60.9	68	43.9	77	49.7	155	51.3
Proficient	0	0.0	17	22.7	45	19.7	83	23.6
Advanced	0	0.0	0	0.0	4	1.8	11	4.3
Passing status the first time the student took Algebra I								
Passed Algebra I with a C or better	29	51.8**	66	28.0**	79	13.7**	134	16.4**
Course grade and Algebra I CST performance level the first time the student took Algebra I								
Had an average grade of C or better and scored proficient or advanced on the Algebra I CST	0	0	c	c	24	6.4	29	5.8
Had an average grade of C or better and scored below proficient on the Algebra I CST	29	51.8*	61	35.9*	55	27.5*	105	33.0*
Had an average grade below a C and scored proficient or advanced on the Algebra I CST	0	0	12	60.0	25	48.1	64	66.7

\* Significant at  $p < .05$  using Pearson's chi-squared test of independence, which tests the null hypothesis that there are no differences across the four English learner status groups; \*\* significant at  $p < .01$  using Pearson's chi-squared test of independence, which tests the null hypothesis that there are no differences across the four English learner status groups.

CST is the California Standards Test.

**Note:** The study sample includes 3,094 students, 1,377 of whom repeated Algebra I, from one high school district in California and five of its seven feeder elementary (K–8) school districts. Long-term English learner students are students who were classified as English learner students by at least grade 1 and were not reclassified as English proficient by grade 12, reclassified long-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient at some point in grades 7–12, short-term English learner students are students who were classified as English learner students by at least grade 1 and were reclassified as English proficient before grade 7, and never-English learner students are students who were never classified as English learner students.

a. See appendix A for details on how letter grades were converted to a numeric scale.

b. Data are not available on course grades or California Standards Test performance level for some students in grade 7 math or when they first took Algebra I.

c. Suppressed to reduce risk of disclosure because there were fewer than 10 students.

**Source:** Authors' analysis of 2006/07–2011/12 data from the California school districts included in the study. See appendix A.

Although the pattern is similar among the English learner status groups (poorer performing students have higher repetition rates, and better performing students have lower repetition rates), repetition rates differ significantly across the English learner status groups, specifically across students with higher average course grades (see table B2). Some 20 percent of reclassified long-term English learner students who received an average grade between an A and a B in Algebra I repeated the course, compared with 8 percent of short-term English learner students and 7 percent of never-English learner students.

Other factors may also be at play, such as performance on the Algebra I CST, that account for the differences in Algebra I repetition rates after student grades are controlled for. For example, none of the long-term English learner students who repeated Algebra I and had an average course grade of C or better when they first took the course scored proficient or advanced on the Algebra I CST (see table B2). Among students who repeated Algebra I, who had an average course grade of C or better the first time they took the course, and who scored proficient or advanced on the Algebra I CST, the repetition rate was 6 percent among short-term English learner students and 6 percent among never-English learner students. However, even after Algebra I course grades and CST performance level were controlled for, there was still a statistically significant difference in repetition rates across the four English learner status groups. Among students who repeated Algebra I, who had an average course grade of C or better the first time they took the course, and who scored below proficient on the Algebra I CST, the repetition rate was 52 percent among long-term English learner students, 36 percent among reclassified long-term English learner students, 33 percent among never-English learner students, and 28 percent among short-term English learner students. As a result, in addition to the Algebra I course grade and Algebra I CST score, other factors that are not analyzed in this study could affect the decision to repeat Algebra I, such as teacher recommendations, parent recommendations, and participation in summer enrichment programs. This could be a topic for future research.

## Notes

1. Fong et al. (2014) define an English learner student as anyone who was an English learner student at any point in grades 7–12.
2. Olsen (2010) defines a long-term English learner student as an English learner student in grades 6–12 who has been enrolled in a U.S. school for more than six years without meeting the criteria for reclassification.
3. One possible concern is that the results were driven by regression to the mean, a statistical phenomenon where unusually high or low scores tend to be followed by scores closer to the mean. However, short-term English learner students did not improve the most on course grades because they had the lowest course grades on their initial Algebra I attempt, which might be expected if regression to the mean were occurring. Short-term English learner students who repeated Algebra I actually had the highest average course grade when they initially took the course relative to the other three English learner status groups. The ranking by average course grade on the initial Algebra I attempt among students who repeated the course across the four English learner status groups, from highest to lowest, was short-term English learner students, reclassified long-term English learner students, never-English learner students, and long-term English learner students. This shows that the biggest improvement in course grades between the first and second time taking Algebra I occurred among the group with the highest initial performance, while the smallest improvement occurred among the group with the lowest initial performance. In addition, regression to the mean estimates were calculated using the method described in Linden (2013). Tests for regression to the mean were not found to be statistically significant for each of the four English learner status groups on all three outcome measures—average course grades, California Standards Test scale scores, and California Standards Test performance levels.

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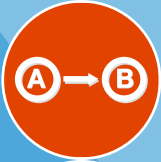
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