
Effects of Class-size Reduction on Student Achievement

This 2010 study, the effects of class-size reduction on student achievement, is a follow-up study of a 1997 evaluation conducted by the Nevada Department of Education. In that study, students enrolled in Nevada in first and second grades in reduced class sizes were compared to students who attended first or second grade outside of Nevada. Nevada students in reduced class sizes showed greater achievement over students who attended first or second grade outside of Nevada.

In this study, CCSD fifth grade students Criterion Reference Test (CRT) scores in reading and mathematics were compared by the year they enrolled. Student enrollment was used as a proxy for student class size. For example, a student who enrolled in a CCSD school in first grade and remained through fifth grade had three years of class size reduction (first, second and third grade). A student who enrolled in a CCSD school for the first time in third grade had one year of class size reduction. A CCSD student who enrolled in fourth grade had no class size reduction.

This group of students comprised of all CCSD fifth grade students who enrolled during first, second, third, fourth, or fifth grade in the 2006/2007 academic year. Both CRT Reading and Mathematics assessments were analyzed. The CRT scale scores for this cohort of students were examined for fifth grade (2006/2007), sixth grade (2007/2008), seventh grade (2008/2009) and eighth grade. Of these five groups, 5,742 students were included in this analysis.

The highlights of this study include:

Student achievement

- Students with three years of class size reduction averaged 26 scale points higher on the fifth grade CRT Reading and 15 points higher on the CRT Mathematics assessment.
- Students with one year of class size reduction averaged 5 points higher in the CRT Reading and 2 points higher in the CRT Mathematics assessment over those students without CSR and one full year in a CCSD school.
- Students with three years of class size reduction maintain significantly higher scores in the sixth, seventh, and eighth grade CRT Reading and Mathematics assessments.
- For the fifth grade CRT Reading assessment 45.9% of students with three years of CSR met the proficiency level, while 34.6% of student with no CSR met the proficiency level.
- For eighth grade CRT Reading assessment, 76% of those students with three years of class size reduction meet the reading proficiency criteria. For students with no class size reduction, 57% meet the reading proficiency criteria.

Specific student population outcomes:

- Asian and Hispanic students received the greatest benefit of class size reduction with students with three years of class size reduction averaging 20 points or more than students from the same ethnic groups without class size reduction.
- By eighth grade, 85.0% of Asian students and 57% of Hispanic students with three years of class size reduction, meet the proficiency level for reading. For eighth grade Asian

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students with no CSR 72.6% meet the proficiency level; for Hispanic students with no CSR 44.5% meet the proficiency level.

- Fifth grade students who were eligible for Free and Reduced Lunch and received three years of class size reduction averaged 26 points higher than those with no class size reduction.
- Fifth grade special education students averaged 13 points in reading and 28 points in mathematics higher with three years of class size reduction compared to no class size reduction.
- Fifth grade students learning English averaged 15 points higher in reading and 13 points higher in mathematics with three years of class size reduction over those with no class size reduction.

Effects of Class-size Reduction on Student Achievement

This study is a follow-up of the 1997 evaluation conducted by the Nevada Department of Education. The purpose of that study was to evaluate the effectiveness of the Class-Size Reduction Act of 1989. In that study, students enrolled in Nevada in first and second grades in reduced class sizes were compared to students who attended first or second grade outside of Nevada. Nevada students in reduced class sizes showed greater achievement over students who attended first or second grade outside of Nevada.

In this study, CCSD fifth grade students Criterion Reference Test (CRT) scores in reading and mathematics were compared by the year they enrolled. Student enrollment was used as a proxy for student class size. For example, a student who enrolled in a CCSD school in first grade and remained through fifth grade had three years of class size reduction (first, second and third grade). A student who enrolled in a CCSD school for the first time in third grade had one year of class size reduction. A CCSD student who enrolled in fourth grade had no class size reduction. Of these five groups, 5,742 students were included in this analysis.

Table 1. Number of 2006/2007 fifth grade student by the grade enrolled

Grade and year enrolled at CCSD	Years of CSR	Number of Students
First (2002)	3	1500
Second (2003)	2	1010
Third (2004)	1	1094
Fourth (2005)	0	1089
Fifth (2006)	0	1049
Total		5742

This group of students comprised of all CCSD fifth grade students who enrolled during first, second, third, fourth, or fifth grade in the 2006/2007 academic year. Both CRT Reading and Mathematics assessments were utilized. The CRT scale scores for this cohort of students was examined for fifth grade (2006/2007), sixth grade (2007/2008), seventh grade (2008/2009) and eighth grade (2009/2010). Comparisons between the fifth grade, sixth grade, seventh grade or eighth grade assessment because these assessments were not vertically aligned.

Overall Student Achievement

Fifth grade students who attended three years of CCSD schools with class size reduced (CSR) had significantly higher reading scores than those who had one year of CSR or no reduced class-size. Those fifth grade students who attended three years of reduced class size averaged 23.6 points higher in the CRT Reading assessment and 15.3 points higher on the CRT Mathematics assessment over those who had not attended a CCSD reduced size class. Fifth grade students with only one year of reduced class size (third grade) had statistically significant higher mean CRT scores than those students who did not participate in CSR classes. Students with one year of CSR averaged 4.99 points higher on the CRT Reading and 1.86 points higher on

the CRT Mathematics assessments. The difference in mathematics scores between one year of CSR and one year without is not statistically significant.

Table 2. CRT Reading Scores following 5th grade students through middle school assessments.

Years of CSR	5 th grade CRT-R (2006/07)	6 th grade CRT-R (2007/08)	7 th grade CRT-R (2008/2009)	8 th grade CRT-R (2009/10)
Three	290.3	314.5	331.2	322.0
Two	275.9	302.0	317.8	312.0
One	271.7	296.6	314.7	311.4
Zero (full year)	266.7	293.4	313.7	309.5
Zero (partial)	259.4	286.6	304.8	303.9

Following the same students through middle school showed a similar pattern as the fifth grade CRT scores. Students with three years of CSR had significantly higher scores in reading and mathematics than any other fifth grade group. The group with three years of CSR had significantly higher scores in reading and mathematics in sixth, seventh and eighth grade assessments as well. In sixth grade, students with three years of CSR had significantly higher reading and mathematics test scores than those students with one or less of one year without CSR. Students with one year of CSR had significantly higher scores in reading than those students with less than one year in a CCSD elementary school without CSR. In seventh and eighth grades, students with two years of CSR had significantly higher reading scores than those students with less than one year without CSR.

Table 3. CRT Mathematics Scores following 5th grade students through middle school assessments.

Years of CSR	5 th grade CRT-M (2006/07)	6 th grade CRT-M (2007/08)	7 th grade CRT-M (2008/09)	8 th grade CRT-M (2009/10)
Three	315.5	329.9	337.2	324.6
Two	305.5	314.6	320.4	309.6
One	302.0	310.2	317.1	306.9
Zero (full year)	300.2	311.1	316.2	306.3
Zero (partial)	290.5	300.2	308.7	299.9

The number of students meeting the proficiency level increased with years of education, but the years receiving CSR was influential also. For fifth grade CRT Reading assessment, 45.9% of three years of CSR students meet the proficiency level, 63.7% of these students met proficiency on the CRT mathematics assessment. For students with one year of CSR, 34.6% meet the reading proficiency level, while 54.1% meet the mathematics proficiency level. Only 33.6% of students with no CSR classes meet the proficiency level for the fifth grade CRT Reading assessment; for the CRT Mathematics assessment, 52.3% meet the proficiency level.

By seventh grade, the percentage of students that met reading proficiency increased. Of students with three years of CSR, 71.8% were reading at the proficiency level. For those students with one year of CSR, 62.8% meet the reading proficiency level. For students with no

CSR, 64.5% meet the reading proficiency level. The percentages for math were slightly higher, 67.7% for seventh grade students with three years of CSR, 58.6% for students with one year of CSR, and 57.2% for those students in a CCSD school without CSR.

All percentages dropped when the students took the 8th grade CRT assessments. For students with three years of CSR, 68.5% meet the eighth grade reading proficiency level. For students with one year of CSR, 62.7% meet the proficiency level. The percentage of students with no CSR who met the proficiency level was 62.3%. The proficiency levels for the eighth grade CRT Mathematics assessment were similar, three years of CSR, 62.4%, one year of CSR, 55.3%, and no CSR 54.7%.

Student Achievement by Subgroup

Ethnicity. Looking at specific populations, Asian and Hispanic ethnic groups benefited the most from CSR. Asian and Hispanic students who had three years of CSR outscored students from the same populations. For Asian students gains fifth grade CRT Reading scores averaged 20.0 points over Asian students who did not attend CSR classes; for Hispanic students the gains were 25.5 points over their peers. In the fifth grade CRT mathematics assessment, Hispanic students with three years of CSR had gains of 19.3 over Hispanic students who did not attend CCSD CSR classes. For the seventh grade CRT Reading Assessment, students with three years of CSR had greater reading achievement over those without CSR. Differences ranged between 5.4 points (White students) to 13.2 (Hispanic). For seventh grade CRT mathematics, only White and Hispanic students showed significant gains between three years of CSR and no CSR classes. White students with three years of CSR had 10.2 points higher than those students without CSR classes. For Hispanic students, the difference between the two groups was 21.3 points.

Table 4. Fifth grade CRT Reading scores by ethnicity and years in CCSD class.

Years of CSR	Asian American	African American	White	Hispanic
Three	308.1	264.0	310.1	269.3
One	293.5	256.2	301.2	248.2
Zero (full year)	288.1	256.2	301.9	243.7

In addition, more Hispanic and Asian students met the fifth grade proficiency level for reading. Of the fifth grade Asian students with three years of CSR classes 62.5% met the proficiency level compared to 46.0% of Asian students without CSR classes. For Hispanic students, 32.8% meet the reading proficiency level with three years of CSR. Those Hispanic students with no CSR classes, only 21.7% meet the reading proficiency level. This trend continues through eighth grade. In eighth grade, 57.1% Hispanic students with three years of CSR compared to 44.5% for no CSR Hispanic students. Of the Asian students, 85.0% of those students with three years of CSR met the eighth grade reading proficiency, 72.6% of the Asian students with no CSR met the eighth grade reading proficiency.

Free and Reduced Lunch Eligibility Students. Students eligible for Free or Reduced Lunch (FRL) benefited from CSR. Forty percent of the students in this study qualified for Free or Reduced Lunch. Those students with three years of CSR scored 25.6 points higher than those

students without CSR on the fifth grade CRT Reading assessment. The difference between three years of CSR and no CSR for FRL students was 9.4 points for the fifth grade CRT Mathematics assessment. There were no differences between three years of CSR and no CSR in the eighth grade reading assessment. For the eighth grade CRT Mathematics, FRL students with three years of CSR scores 5.4 points higher on average than eighth grade students with no CSR.

In fifth grade, 28.2% of three-year CSR students meet reading proficiency levels, in eighth grade 75.6%. Of those students with no CSR, 24.1% of fifth grade students meet the reading proficiency levels, in eighth grade, 54.5%. For fifth grade mathematics proficiency 47.3% of the three years of CSR meet the proficiency level, for the students with no CSR, 38.9% meet the proficiency level. In eighth grade mathematics assessment, 45.9% of FRL students with three years of CSR meet the proficiency level, for the no CSR FRL students 43.9% meet proficiency.

Table 5. Mean CRT Reading Scores for CCSD FRL students.

Years of CSR	Fifth Grade (2006/07)	Sixth Grade (2007/08)	Seventh Grade (2008/09)	Eighth Grade (2009/10)
Three	265.1	284.6	303.7	337.6
One	252.5	277.4	297.5	299.2
Zero (full year)	248.9	274.9	299.1	299.1

Students with Individual Education Plans. Students with Individual Education Plans (IEP) made large gains with three years CSR. Students with IEPs and no CSR scored 12.7 points lower than those with three years CSR in fifth grade CRT Reading. In the fifth grade CRT Mathematics, the difference increases to 28.4 points. In eighth grade, the difference shrinks to 3.1 points in reading and 8.0 points in mathematics.

Table 6. Mean CRT Reading scores for students with IEP's

Years of CSR	Fifth Grade (2006/07)	Sixth Grade (2007/08)	Seventh Grade (2008/09)	Eighth Grade (2009/10)
Three	210.1	213.2	235.9	250.1
One	195.3	190.4	211.2	239.3
Zero (full year)	197.4	193.6	229.2	247.0

Looking at proficiency levels, 7.1% percent of students with IEPs and three years CSR meet the criteria in reading compared to 6.8% for students with no CSR for the fifth grade CRT. For fifth grade CRT mathematics, students with IEPs and three years of CSR had 21.6% meet the proficiency level. Students with IEPs and no CSR had 15.3% meet the proficiency level in mathematics. In eighth grade CRT Reading assessment, 27.0% three year CSR group met proficiency compared to 17.8% from the no CSR group. Nine percent of the total student population in this study had IEPs.

English Language Learners. Nine percent of these students were English Language Learners (ELL). They started with large gains in fifth grade CRT scores. Fifth grade ELL students with three years of CSR scored 14.9 points higher than ELL students without CSR in reading and 12.9

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points higher in mathematics. In eighth grade, the difference in reading achievement between three years of CSR and no CSR disappears in reading and mathematics.

Proficiency levels do not differ in reading achievement except in eighth grade: 16.7% of the three-year CSR students meet the proficiency levels compared to 21.0% of students without CSR. In mathematics 15.1% of fifth grade ELL students with three years of CSR meet the proficiency level, 10.3% of fifth grade students with no CSR meet the proficiency level. In eighth grade 11.8% of ELL students with three years of CSR meet proficiency, for the no CSR group 22.0% met proficiency.

Table 7. Mean CRT Reading scores for ELL students.

Years of CSR	Fifth Grade (2006/07)	Sixth Grade (2007/08)	Seventh Grade (2008/09)	Eighth Grade (2009/10)
Three	198.2	216.3	229.3	246.0
One	197.4	208.4	227.8	251.0
Zero (full year)	183.3	205.8	240.9	252.8

This study suggests CSR can be equated with higher gains in student reading for CCSD students. There is a relationship between greater gains in reading achievement and the number of years students spend in small classes. Hispanic and Asian students receive the greatest benefit. Students that require additional support such as students with IEPs or English Language Learners, also make substantial gains in reading. This leads to a higher percentage of students reading at grade level. The results of this study parallel other class size reduction initiatives such as Project Prime Time in Indiana, Project Star in Tennessee, and SAGE in Wisconsin.