21st Century Community Learning Centers 2013

A Quasi-Experimental Investigation of Program Impacts on Student Achievement in Mathematics and Reading/Language Arts

West Virginia Department of EDUCATION
Office of Research

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Executive Summary

This report summarizes an evaluation study investigating the effects of participation in the 21st Century Community Learning Centers (CCLC) program on student achievement in mathematics and reading/language arts, for the cohort of students who participated during the 2012–2013 school year. The report is a supplement to the Office of Assessment, Accountability, and Research's annual evaluation of the CCLC program.

Methods

We conducted a quasi-experimental examination of within- and between-group differences in student assessment outcomes in both mathematics and reading/language arts. The study addressed 10 research questions (RQs). The treatment group consisted of students who participated in at least 30 days of CCLC during the 2012–2013 school year. A control group consisting of demographically similar students who did not participate in CCLC was selected using propensity score matching (PSM).

Findings

Research Questions 1 and 2 (RQ1 and RQ2)

RQ1 and RQ2 sought to determine if CCLC and non-CCLC students' year-to-year gains in mathematics and reading/language arts were significantly different. These questions were addressed using a series of independent samples t-tests. The analyses used group membership as the independent variable and mean WESTEST 2 scale score gains from 2011–2012 to 2012–2013 in mathematics and reading/language arts as the outcome variables. Results showed no significant differences between these groups in either mathematics or reading/language arts scale score gains.

Research Questions 3 and 4 (RQ3 and RQ4)

RQ3 and RQ4 sought to determine if CCLC and non-CCLC students' 2012–2013 end-of-year scores in mathematics and reading/language arts were significantly different. These questions were addressed using a series of independent samples t-tests. The analyses used group membership as the independent variable and mean WESTEST 2 scale score from the 2012–2013 school year in mathematics and reading/language arts as the outcome variables. Results showed no significant differences between these groups in either mathematics or reading/language arts scale scores.

Research Questions 5 and 6 (RQ5 and RQ6)

RQ5 and RQ6 sought to determine if CCLC students experienced statistically significant changes in performance from 2011–2012 to 2012–2013. These questions were addressed using a series of paired t-tests. The analyses used time as the independent variable and CCLC students' mean 2011–2012 and 2012–2013 WESTEST 2 scale scores in mathematics and reading/language arts as the outcome variables. CCLC students exhibited statistically significant mathematics gains in Grades 4, 5, 6, 7, 9 and 11; the students also exhibited statistically significant gains in reading/language arts in Grades 4, 5, 6, 7, 8, and 10.

Research Questions 7 and 8 (RQ7 and RQ8)

RQ7 and RQ8 sought to determine if non-CCLC students experienced statistically significant changes in performance from 2011–2012 to 2012–2013. These questions were addressed using a series of paired t-tests. The analyses used time as the independent variable and non-CCLC students' mean 2011–2012 and 2012–2013 WESTEST 2 scale scores in mathematics and reading/language arts as the outcome variables. Similar to CCLC students, non-CCLC students exhibited statistically significant mathematics gains in several grades (i.e., Grades 4, 5, 6, 7, 8, 9 and 11), and reading/language arts gains in Grades 4, 5, 6, and 7.

Research Questions 9 and 10 (RQ9 and RQ10)

RQ9 and RQ10 sought to determine if student achievement over time differed significantly between groups. These questions were addressed using repeated measures analysis of variance (RM ANOVA) tests. The analyses used two predictor variables, group membership and time, as independent variables predicting the outcome of WESTEST 2 performance in mathematics and reading language arts. We looked for a significant interaction effect to indicate one group scored differently from the other over time. We found significant main effects for time, but there were no statistically significant interaction effects between groups and time. However, in reading/language arts, the interaction effects approached significance in Grades 8 and 10. In both cases, CCLC students outperformed the non-CCLC comparison group.

Conclusions

There were no statistically significant differences between groups. When examining within-group differences, both groups exhibited multiple statistically significant changes in mathematics and reading/language arts performance. However, only in the case of Grades 8 and 10 reading/language arts did the results approach statistical significance in the predicted direction (i.e., with CCLC students outperforming non-CCLC students).

Limitations of study

This study had several important limitations that may limit our ability to draw definitive conclusions about the effectiveness of the CCLC program in producing academic achievement gains. First, this study only encompassed a single year of CCLC intervention. It is likely that academic achievement gains on standardized assessments would not be realized until more time has elapsed. Second, we were able to examine only Grades 4–11 in the study

due to a lack of available achievement data for Grades K-3. This is a significant limitation when one considers the fact that approximately 50% of the 2012–2013 CCLC cohort was enrolled in these grades.

Recommendations

To the extent possible, we will attempt to prepare next year's edition of this report at the outset of the 2014–2015 school year, a time when the data are more actionable for CCLC program staff. Further, we will work with CCLC program staff to plan additional research to be conducted at the conclusion of the 2013-2014 school year to examine the impact of longer-term participation in CCLC on student academic achievement outcomes. The study will examine outcomes for students who participated in CCLC for at least 2 academic years to determine if prolonged participation in the program produces statistically significant gains in achievement.

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Introduction

This year the West Virginia Department of Education Office of Assessment, Accountability and Research is providing two separate evaluation reports for the 21st Century Community Learning Centers Program (CCLC). The first, a descriptive evaluation of the program's implementation and key performance measures, we have provided in the past. This report, the second, employs a quasi-experimental design to evaluate the impact of 21st CCLC program participation on student academic achievement. The new model is being used to extract evidence of the effect of the CCLC program on reliable quantitative academic assessments of participating students that were in the program in 2013.

The explanatory variable for this study was defined as participation in the CCLC program for at least 30 days. Students meeting this criterion were identified by teachers who completed the 2013 CCLC teacher survey. The outcome variables used in this study are derived from the West Virginia Educational Standards Test 2 (WESTEST 2). WESTEST 2 is a summative test consisting of four content areas (mathematics, reading/language arts, science, and social studies); all students in Grades 3–11 take the WESTEST 2. The West Virginia Department of Education administers WESTEST 2 annually. This study examined academic performance at the conclusion of the 2012–2013 school year and academic achievement gains realized from 2011–2012 to 2012–2013 in both mathematics and reading/language arts for Grades 4–11[1]. The treatment group includes students participating in the CCLC program and the control group includes nonparticipating matched students.

To examine the impact of CCLC program participation on 2-year academic gains, the following research questions were posed.

RQ1 Do students participating in the 2013 CCLC exhibit significantly higher mean scale score gains in WESTEST 2 mathematics in each grade, 4–11, than nonparticipating students in each of these grades from 2012 to 2013?

RQ2 Do students participating in the 2013 CCLC exhibit significantly higher mean scale score gains in WESTEST 2 reading/language arts in each grade, 4–11, than nonparticipating students in each of these grades from 2012 to 2013?

To examine the impact of CCLC program participation on end-of-year academic achievement, the following research questions were posed.

RQ3 Do students participating in the 2013 CCLC exhibit significantly higher mean scale scores in WESTEST 2 mathematics in 2013 in each grade, 4–11, than nonparticipating students in each of these grades?

[1] Grades K-2 are excluded due to the lack of a common outcome metric for these students. Grade 3 is excluded because the evaluation design required controlling for prior academic achievement.

RQ4 Do students participating in the 2013 CCLC exhibit significantly higher mean scale scores in WESTEST 2 reading/language arts in 2013 in each grade, 4–11, than nonparticipating students in these grades?

We also examined the year-to-year changes in academic achievement for each group independently. The following research questions were posed.

RQ5 Do students participating in CCLC exhibit significant change in mean scale scores in WESTEST 2 mathematics by grade over time?

RQ6 Do students participating in CCLC exhibit significant change in mean scale scores in WESTEST 2 reading/language arts by grade over time?

RQ7 Do students not participating in CCLC exhibit significant change in mean scale scores in WESTEST 2 mathematics by grade over time?

RQ8 Do students not participating in CCLC exhibit significant change in mean scale scores in WESTEST 2 reading/language arts by grade over time?

Finally, we sought to determine if gains experienced by CCLC students were significantly different from those gains experienced by non-CCLC students. The following research questions were posed.

RQ9 Do students participating in CCLC exhibit significantly higher mean scale scores in WESTEST 2 mathematics than the nonparticipating students by grade over time?

RQ10 Do students participating in CCLC exhibit significantly higher mean scale scores in WESTEST 2 reading/language arts than the nonparticipating students by grade over time?

Methods

We conducted a quasi-experimental examination of existing student assessment data in mathematics and reading/language arts for students who participated in CCLC during the 2012–2013 school year. The treatment group consisted of students who participated in at least 30 days of CCLC intervention as reported by educators. The comparison group was matched using propensity score matching using a variety of demographic and performance covariates. Analyses were conducted to examine both within- and between-group differences in student achievement.

Population Characteristics

The West Virginia Department of Education provided CCLC teachers an online survey to be completed about each student who participated in the program during the 2012–2013 school year. Among other items, the teacher survey asked educators to identify students who met minimum criteria for CCLC program participation. To be selected for inclusion in the treatment group for this study, students had to be enrolled in an assessed grade level during this school year and have participated in the CCLC program for 30 days or

more. A matched comparison group was selected from the population of all non-CCLC students.

Sampling procedures

From the teacher survey, we identified more than 4,000 students who participated in the CCLC program during the 2012–2013 school year. The criteria for inclusion in this study included having (a) a valid unique student identifier, (b) grade level assessment scale scores for the last 2 years in both mathematics and reading/language arts, and (c) having a complete set of demographic covariate variables to be used during matching. After removing students in Grades K-3 and those for whom we did not receive a valid unique student identifier, we were left with a pool of 2,246 potential students. Only 1,671 of these students had test records for the 2 years needed (74%). After removing the remainder of students who did not receive scale scores for both mathematics and reading/language arts and who were retained from one year to the next, we were left with a final sample of 1,648 CCLC students. This represents 73% of the initial pool of valid student records.

We used propensity score matching (PSM) to select a matched comparison group for each grade level. This methodology uses logistic regression to select a comparison group that closely matches the treatment group on a variety of observed covariates. First, a binary indicator was created to indicate whether or not each student in the state participated in CCLC during the 2012–2013 school year. Group 1 was defined as the treatment group (those students who attended 30 or more days in the CCLC program) and Group 0 was defined as the control group (those students who did not participate in the CCLC program during the 2012–2013 school year). We then specified the PSM models, which derived conditional probabilities for each student by regressing the binary group membership variable on the following covariates: (a) prior academic achievement in both mathematics and reading/language arts, (b) gender, (c) race/ethnicity, (d) free/reduced-price lunch eligibility, and (e) special education eligibility. Grade level was held constant by conducting matching independently within each grade. Thus, in this study the propensity score represented the predicted probability that a given student would attend 30 days of CCLC based on this set of pre-intervention covariates. Finally, we used nearest neighbor matching to select the most appropriate match for each CCLC student. Verification analyses revealed that this matching methodology identified an adequately balanced comparison group for hypothesis testing[2].

Measures and Covariates

This study includes an examination of student achievement data. We analyzed individual students' scale scores, and gain scores in both mathematics and reading language arts. Gain scores were operationalized as the change in student scale scores from 2011–2012 to 2012–2013. This time period was selected because the 2012–2013 school year represented the implementation year for the CCLC program. Thus, it was reasonable to expect that stu-

[2] We used chi squared analyses to verify the two groups did not differ on categorical demographic variables. We used independent samples t-tests to verify the two groups did not differ on prior academic achievement in reading/language arts and mathematics.

dents who participated in CCLC during the 2012–2013 school year would experience differential gains when compared with similar students not known to have participated in CCLC.

Covariates utilized in this study include students' gender, race/ethnicity, special education eligibility, free/reduced-price lunch eligibility, and prior academic achievement in mathematics and reading/language arts.

Data collection methods

All data for this study were collected from two sources—the CCLC Teacher Survey and the West Virginia Educational Information System (WVEIS). CCLC Teacher Survey data were collected by the researchers as part of the annual descriptive evaluation of the 21st CCLC Program. WVEIS data were extracted from the annual testing record file collected by the West Virginia Department of Education.

Research Design

RQ1 and RQ2 were addressed using a series of independent samples *t* tests. These analyses used group membership as the independent variable and mean WESTEST 2 scale score gains from 2011–2012 to 2012–2013 in mathematics and reading/language arts as the outcome variables. Each grade level and content area combination was tested independently to estimate impact of the CCLC program. In sum, we conducted 16 tests:

1. Eight tests (one per grade for Grades 4–11) examined the impact of group membership *on* year-to-year WESTEST 2 mathematics gains to determine whether CCLC students (treatment) experienced greater gains than students who did not receive the treatment (control).
2. Eight tests (one per grade for Grades 4–11) examined the impact of group membership on year-to-year WESTEST 2 reading/language arts gains to determine whether CCLC students (treatment) experienced greater gains than students who did not receive the treatment (control).

RQ3 and RQ4 were addressed using a series of independent samples *t* tests. These analyses used group membership as the independent variable and mean 2012–2013 WESTEST 2 outcomes in mathematics and reading/language arts as the outcome variables. Each grade level and content area combination was tested independently to estimate impact of the CCLC program in 2013. In sum, we conducted 16 tests:

3. Eight tests (one per grade for Grades 4–11) examined the impact of group membership on 2012–2013 WESTEST 2 mathematics outcomes to determine whether CCLC students (treatment) scored higher than students who did not receive the treatment (control).
4. Eight tests (one per grade for Grades 4–11) examined the impact of group membership on 2013 WESTEST 2 reading/language arts outcomes to determine whether CCLC students (treatment) scored higher than students who did not receive the treatment (control).

RQ5 and RQ6 were addressed using a series of paired *t* tests. These analyses used time as the independent variable and students' mean 2011–2012 and 2012–2013 WESTEST 2 scale scores in mathematics and reading/language arts as the outcome variables. Each grade level and content area combination was tested independently. In sum, we conducted 16 tests:

5. Eight tests (one per grade for Grades 4–11) examined the impact of time on WESTEST 2 outcomes to determine whether CCLC students exhibited higher achievement in mathematics during the 2012–2013 school year when compared to their own mathematics results for the prior academic year.
6. Eight tests (one per grade for Grades 4–11) examined the impact of time on WESTEST 2 outcomes to determine whether CCLC students exhibited higher achievement in reading/language arts during the 2012–2013 school year when compared to their own reading/language arts results for the prior academic year.

RQ7 and RQ8 were addressed using a series of paired *t* tests. These analyses used time as the independent variable and mean 2011–2012 and 2012–2013 WESTEST 2 scale scores in mathematics and reading/language arts as the outcome variables. Each grade level and content area combination was tested independently. In sum, we conducted 16 tests:

7. Eight tests (one per grade for Grades 4–11) examined the impact of time on WESTEST 2 outcomes to determine whether control group students exhibited higher achievement in mathematics during the 2012–2013 school year when compared to their own mathematics results for the prior academic year.
8. Eight tests (one per grade for Grades 4–11) examined the impact of time on WESTEST 2 outcomes to determine whether control group students exhibited higher achievement in reading/language arts during the 2012–2013 school year when compared to their own reading/language arts results for the prior academic year.

RQ9 and RQ10 were addressed using repeated measures analysis of variance (RM ANOVA) tests. These analyses used two predictor variables, group membership and time, as independent variables predicting the outcome of WESTEST 2 performance in mathematics and reading language arts. In these analyses we looked for a significant interaction effect to indicate one group scored differently from the other over time. In sum we conducted 16 tests:

9. Eight tests (one per grade for Grades 4–11) examined the interaction of group and time on WESTEST 2 mathematics outcomes to determine whether students in the treatment group scored significantly higher than students in the control group over time.
10. Eight tests (one per grade for Grades 4–11) examined the interaction of group and time on WESTEST 2 reading/language arts outcomes to determine whether students in the treatment group scored significantly higher than students in the control group over time.

Results

Results are presented below by research question.

Statistics and Data Analysis

RQ1 and RQ2

Table 1 in Appendix A presents the results of independent *t* tests used to determine the statistical significance of differences in mathematics mean scale score gains between Group 1 (CCLC participants) and Group 0 (nonparticipants) for Grades 4–11. In no case were the observed differences statistically significant, leading us to reject H1–H8. See Figure 1 for a graphical representation of mathematics gains by group and grade level.

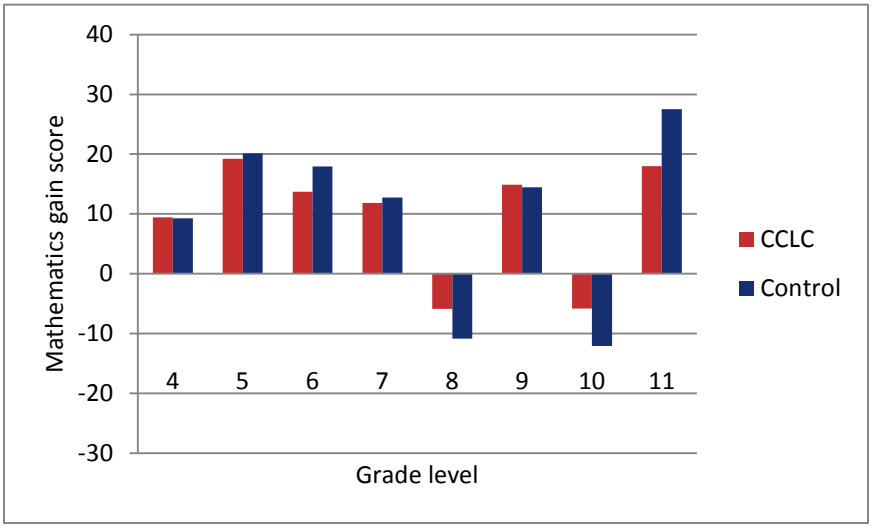

Figure 1. Difference in WESTEST 2 Mathematics Gain Scores by Group and Grade Level

Table 2 in Appendix A presents the results of independent *t* tests used to determine the statistical significance of differences in reading/language arts mean scale score gains between Group 1 (CCLC participants) and Group 0 (nonparticipants) for Grades 4–11. In no case were the observed differences statistically significant, leading us to reject H9–H16. See Figure 2 for a graphical representation of reading/language arts gains by group and grade level.

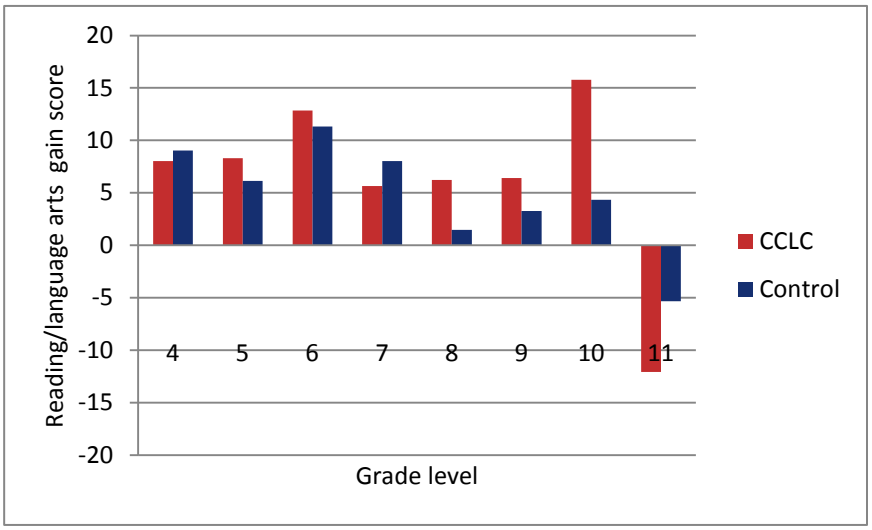

Figure 2. Difference in WESTEST 2 Reading/Language Arts Gain Scores by Group and Grade Level

RQ3 and RQ4

Table 3 in Appendix A presents the results of independent *t* tests used to determine the statistical significance of differences in 2012–2013 mathematics performance between Group 1 (CCLC participants) and Group 0 (nonparticipants) for Grades 4–11. In no case were the observed differences statistically significant, leading us to reject H17–H24. See Figure 3 for a graphical representation of mathematics gains by group and grade level.

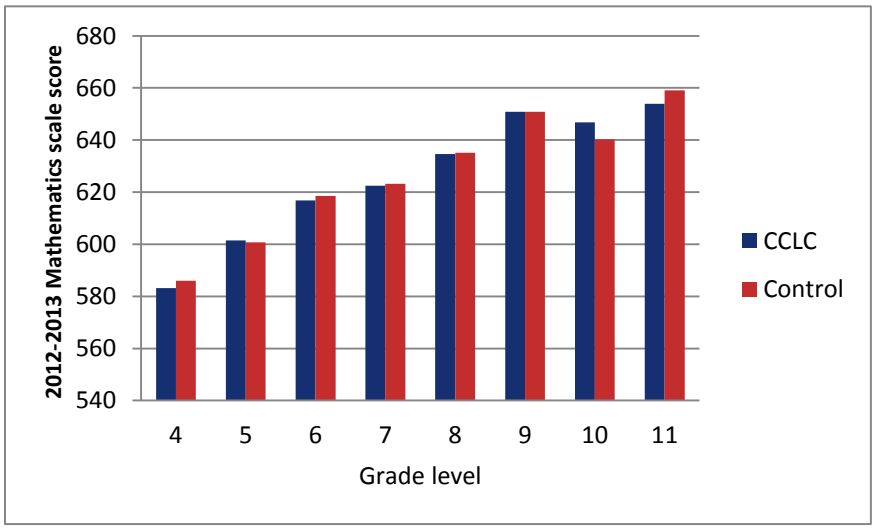

Figure 3. Difference in 2012–2013 Mathematics Performance by Group and Grade Level

Table 4 in Appendix A presents the results of independent samples *t* tests used to determine the statistical significance of differences in 2012–2013 reading/language arts performance between Group 1 (CCLC participants) and Group 0 (nonparticipants) for Grades 4–11. In no case were the observed differences statistically significant, leading us to reject H25–H32. See Figure 4 for a graphical representation of reading/language arts gains by group and grade level.

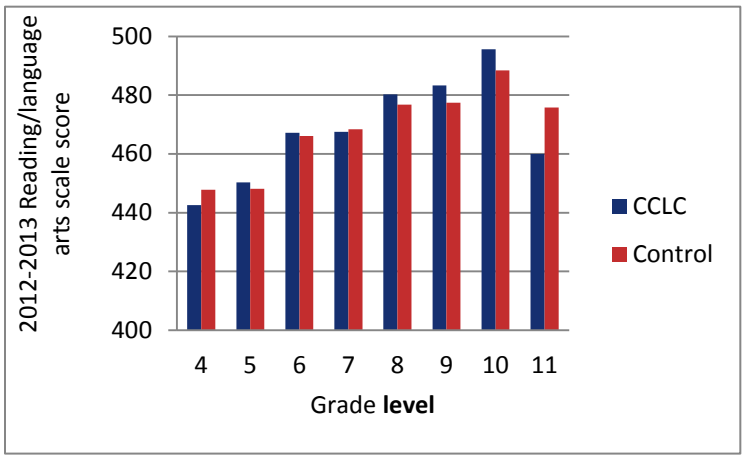

Figure 4. Difference in 2012–2013 Reading/Language Arts Performance by Group and Grade Level

RQ5 and RQ6

Table 5 in Appendix A presents the results of paired *t* tests used to determine the statistical significance of differences in 2011–2012 and 2012–2013 mathematics performance for CCLC participants for Grades 4–11. The results were statistically significant for Grades 4-7, 9 and 11 leading us to accept H33–H36, H38, and H40. However, because results were not significant for Grades 8 and 10, H37 and H39 were rejected. Figure 5 provides a graphical representation of mathematics gains for the CCLC group.

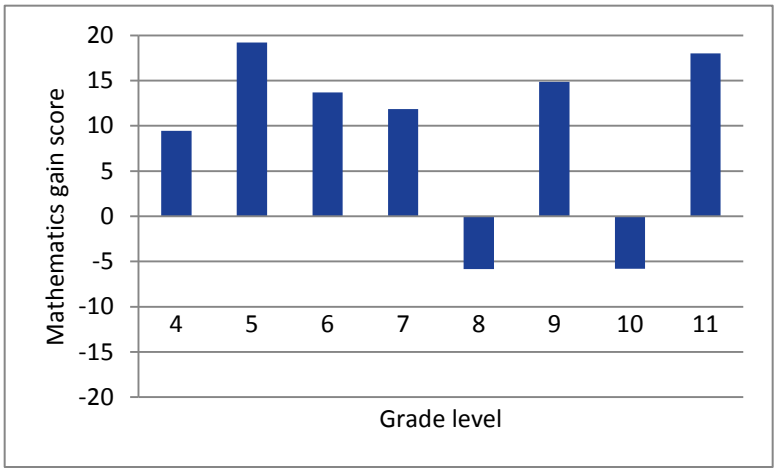

Figure 5. 2011–2012 to 2012–2013 Mathematics Gain Scores for CCLC Students by Grade

Table 6 in Appendix A presents the results of paired *t* tests used to determine the statistical significance of differences in 2011–2012 and 2012–2013 reading/language arts performance for CCLC participants for Grades 4–11. The results were statistically significant for Grades 4–8 and 10 leading us to accept H41–H45 and H47. However, because results were not significant for Grades 9 and 11, we rejected H46 and H48. Figure 6 provides a graphical representation of reading/language arts gains for the CCLC group.

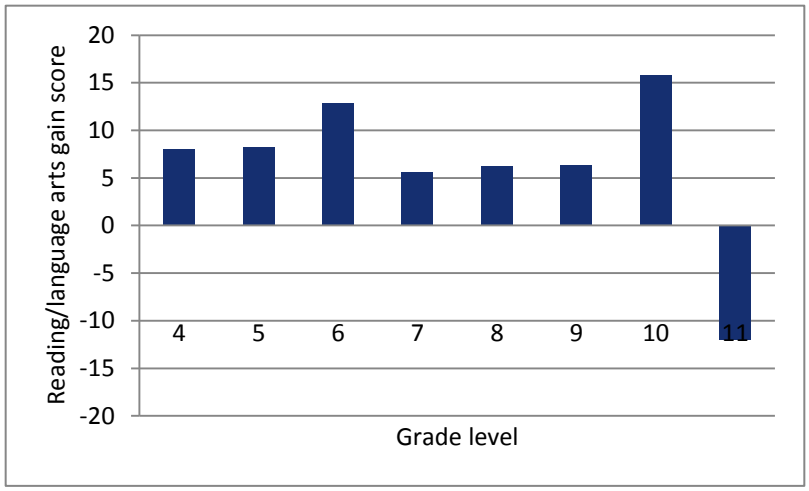

Figure 6. 2011–2012 to 2012–2013 Reading/Language Arts Gain Scores for CCLC Students by Grade

RQ7 and RQ8

Table 7 in Appendix A presents the results of paired *t* tests used to determine the statistical significance of differences in 2011–2012 and 2012–2013 mathematics performance for non-CCLC participants for Grades 4–11. The results were statistically significant for Grades 4-9 and 11 leading us to accept H49–H54 and H56. However, we rejected H55. Figure 7 provides a graphical representation of mathematics gains for the CCLC group.

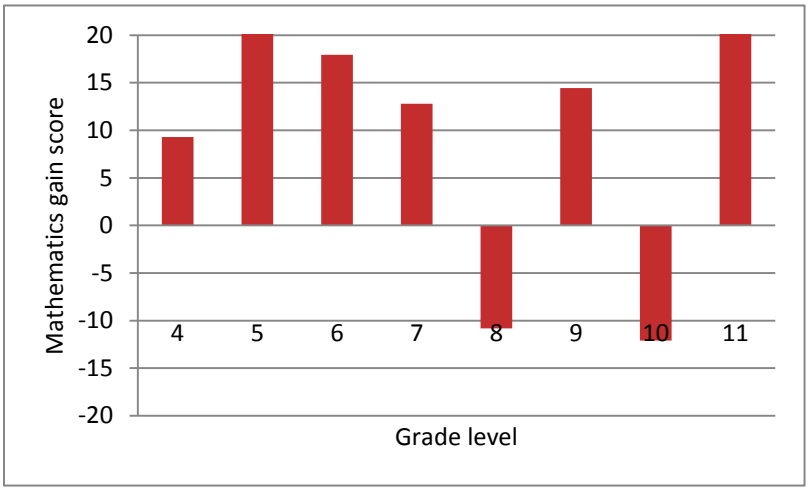

Figure 7. 2011–2012 to 2012–2013 Mathematics Gain Scores for non-CCLC Students by Grade

Table 8 in Appendix A presents the results paired *t* test analysis used to determine the statistical significance of differences in 2011–2012 and 2012–2013 reading/language arts performance for non-CCLC participants for Grades 4–11. The results were statistically significant for Grades 4, 5, 6, and 7 leading us to accept H57–H60. However, we rejected H61–H64. Figure 8 provides a graphical representation of reading/language arts gains for the CCLC group.

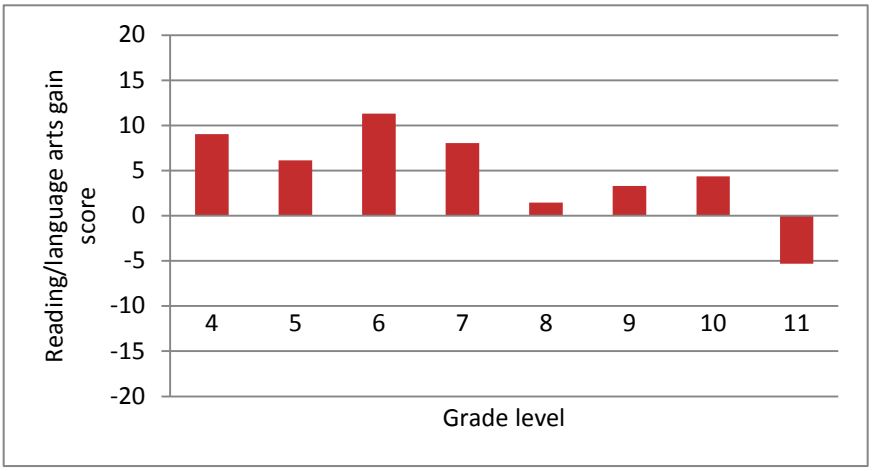

Figure 8. 2011–2012 to 2012–2013 Reading/Language Arts Gain Scores for non-CCLC Students by Grade

RQ9 and RQ10

Table 9 in Appendix A presents the within-subjects effect of time by grade for mathematics analyses. In all grades, there was a statistically significant main effect for time indicating that, irrespective of group membership, all grades experienced statistically significant changes in mathematics performance from one year to the next. However, as indicated in Table 10 in Appendix A, none of the group*time interaction effects were statistically significant leading us to conclude that the two groups' changes in mathematics performance did not differ significantly over time. Thus, we rejected H73–H80. Figure 9–Figure 16 in Appendix B present group differences in mathematics achievement over time by grade level.

Table 11 in Appendix A presents the within-subjects effect of time by grade for reading/language arts analyses. In all grades, there was a statistically significant main effect for time indicating that, irrespective of group membership, all grades experienced statistically significant changes in mathematics performance from one year to the next. However, as indicated in Table 12 in Appendix A, none of the group*time interaction effects were statistically significant leading us to conclude that the two groups' changes in reading/language arts performance did not differ significantly over time. Thus, we rejected H81–H88. Figure 17–Figure 24 in Appendix B present group differences in reading/language arts achievement over time by grade level.

Discussion

Independent sample *t* tests sought to determine if CCLC students experience higher academic achievement gains in mathematics or reading/language arts than control group students from 2011–2012 to 2012–2013. Results showed no significant differences among these groups in either mathematics or reading/language arts scale score gains. With respect to mathematics, students in the CCLC program exhibited higher mean scale score gains in Grades 4, 8, 9, and 10; but the control group exhibited higher gains in Grades 5, 6, 7, and 11. However, in no case were these differences statistically or practically significant. With respect to reading/language arts, CCLC students exhibited higher mean scale score gains in Grades 5, 6, 8, 9 and 10; but control group students exhibited higher scale score gains in Grades 4, 7, 10 and 11. Thus, we rejected hypotheses H1–H32.

The paired *t-tests* sought to determine if either group of students experienced significant academic achievement gains in mathematics or reading/language arts from 2011–2012 to 2012–2013 when examined independently. CCLC students exhibited statistically significant mathematics gains in Grades 4, 5, 6, 7, 9 and 11; these students also exhibited statistically significant gains in reading/language arts in Grades 4, 5, 6, 7, 8, and 10. These results were similar for control students who exhibited statistically significant mathematics gains in Grades 4, 5, 6, 7, 8, 9 and 11, and reading/language arts gains in Grades 4, 5, 6, and 7. Thus, we rejected hypotheses H61–H64.

Repeated measures analyses of variance (ANOVA) were used to determine if student achievement in mathematics and reading/language arts varied by group over time. While we found significant main effects for time, there were no statistically significant interaction effects among groups and time, indicating the groups did not experience differential gains over time. Thus, we rejected hypotheses H65–H96. However, it should be noted that the interaction effects did approach statistical significance in Grade 8 and Grade 10 reading/language arts. In both cases, the CCLC group experienced stronger gains than the non-CCLC group. This finding may merit additional attention.

Limitations

The study had several important limitations that may limit our ability to draw definitive conclusions about the effectiveness of the CCLC program in producing academic achievement gains. First, the study was limited in that it only encompassed a single year of intervention. While we used baseline academic achievement to control for prior performance, it could be possible that additional time in CCLC is necessary to experience measurable gains. Furthermore, and more problematic, our study was limited by the academic achievement data that were available, which included only Grades 4–11. There is currently no standardized academic achievement measure available for students K-2 and while Grade 3 is a tested grade, prior test scores are not available to determine achievement gains. This is a critical limitation when one considers that 50% of students who participated in CCLC during the 2012–2013 school year were in Grades K-3. It should be noted that the West Virginia

Department of Education is considering developing assessments for K-2 in the future, which may allow for an evaluation study that addresses this deficiency.

Recommendations

To the extent possible, we will attempt to prepare next year's edition of this report at the outset of the 2014–2015 school year, a time when the data are more actionable for CCLC program staff. Further, we will work with CCLC program staff to plan additional research to be conducted at the conclusion of the 2013–2014 school year to examine the impact of longer-term participation in CCLC on student academic achievement outcomes. The study will examine outcomes for students who participated in CCLC for at least 2 academic years to determine if prolonged participation in the program produces statistically significant gains in achievement.

Appendix A

This appendix includes detailed statistical information for all hypotheses tested.

Table 1. H1–H8 Statistical Summary (Mathematics)

Group	Hypotheses	Grade	*N*	Mean	Std. deviation	*t*	*df*	Sig. (2 tail)*
1-CCLC participants	H_1	4	452	9.46	35.32	.074	902	0.941
0-Nonparticipants		4	452	9.30	30.43			
1-CCLC participants	H_2	5	423	19.21	37.92	-.352	844	0.725
0-Nonparticipants		5	423	20.12	37.20			
1-CCLC participants	H_3	6	242	13.69	33.76	-1.277	482	0.202
0-Nonparticipants		6	242	17.93	39.03			
1-CCLC participants	H_4	7	181	11.85	39.06	-.233	360	0.816
0-Nonparticipants		7	181	12.77	36.80			
1-CCLC participants	H_5	8	180	-5.84	40.01	1.191	358	0.234
0-Nonparticipants		8	180	-10.81	39.09			
1-CCLC participants	H_6	9	67	14.87	43.58	.055	132	0.956
0-Nonparticipants		9	67	14.45	44.47			
1-CCLC participants	H_7	10	58	-5.79	55.14	.595	114	0.553
0-Nonparticipants		10	58	-12.09	58.66			
1-CCLC participants	H_8	11	45	18.00	47.47	-.859	88	0.393
0-Nonparticipants		11	45	27.51	57.17			

*p<.05 for significance

Table 2. H9–H16 Statistical Summary (Reading/Langauge Arts)

Group	Hypothesis	Grade	*N*	Mean	Std. deviation	*t*	*df*	Sig. (2 tail)*
1-CCLC participants	H_9	4	452	8.03	28.65	-.535	902	0.593
0-Nonparticipants		4	452	9.03	27.66			
1-CCLC participants	H_{10}	5	423	8.30	24.73	1.199	844	0.231
0-Nonparticipants		5	423	6.14	27.48			
1-CCLC participants	H_{11}	6	242	12.86	31.47	.586	482	0.558
0-Nonparticipants		6	242	11.31	26.67			
1-CCLC participants	H_{12}	7	181	5.64	28.74	-.683	360	0.495
0-Nonparticipants		7	181	8.03	37.50			
1-CCLC participants	H_{13}	8	180	6.22	25.14	1.818	358	0.070
0-Nonparticipants		8	180	1.46	24.56			
1-CCLC participants	H_{14}	9	67	6.40	29.41	.576	132	0.566
0-Nonparticipants		9	67	3.28	33.18			
1-CCLC participants	H_{15}	10	58	15.78	37.07	1.82	114	0.071
0-Nonparticipants		10	58	4.34	30.24			
1-CCLC participants	H_{16}	11	45	-12.07	65.06	-.548	88	0.585
0-Nonparticipants		11	45	-5.33	50.59			

*p<.05 for significance

Table 3. H17–H24 Statistical Summary (Mathematics)

Group	Hypothesis	Grade	*N*	Mean	Std. deviation	*t*	*df*	Sig. (2 tail)*
1-CCLC participants	H17	4	452	583.20	47.30	-.903	902	0.367
0-Nonparticipants		4	452	585.93	43.45			
1-CCLC participants	H18	5	423	601.40	51.08	.194	844	0.847
0-Nonparticipants		5	423	600.72	50.87			
1-CCLC participants	H19	6	242	616.85	49.91	-.394	482	0.694
0-Nonparticipants		6	242	618.53	43.85			
1-CCLC participants	H20	7	181	622.45	51.12	-.134	360	0.893
0-Nonparticipants		7	181	623.15	49.27			
1-CCLC participants	H21	8	180	634.66	55.55	-.068	358	0.946
0-Nonparticipants		8	180	635.08	61.29			
1-CCLC participants	H22	9	67	650.87	53.36	.003	132	0.997
0-Nonparticipants		9	67	650.84	52.75			
1-CCLC participants	H23	10	58	646.72	56.07	.612	114	0.446
0-Nonparticipants		10	58	640.26	57.80			
1-CCLC participants	H24	11	45	653.87	40.96	-.561	88	0.576
0-Nonparticipants		11	45	659.02	46.01			

*p<.05 for significance

Table 4. H25–H32 Statistical Summary (Reading/Language Arts)

Group	Hypothesis	Grade	*N*	Mean	Std. deviation	*t*	*df*	Sig. (2 tail)*
1-CCLC participants	H25	4	452	442.55	41.78	-1.932	902	0.054
0-Nonparticipants		4	452	447.86	40.95			
1-CCLC participants	H26	5	423	450.36	38.03	.807	844	0.420
0-Nonparticipants		5	423	448.17	41.14			
1-CCLC participants	H27	6	242	467.19	45.49	.296	482	0.767
0-Nonparticipants		6	242	466.07	36.90			
1-CCLC participants	H28	7	181	467.50	36.68	-.214	360	0.830
0-Nonparticipants		7	181	468.38	41.66			
1-CCLC participants	H29	8	180	480.23	38.29	.822	358	0.411
0-Nonparticipants		8	180	476.78	41.25			
1-CCLC participants	H30	9	67	483.25	51.48	.576	132	0.565
0-Nonparticipants		9	67	477.39	65.47			
1-CCLC participants	H31	10	58	495.62	51.02	.765	114	0.446
0-Nonparticipants		10	58	488.43	50.21			
1-CCLC participants	H32	11	45	460.02	79.72	-956	88	0.342
0-Nonparticipants		11	45	475.78	76.65			

*p<.05 for significance

Table 5. H33–H40 Statistical Summary

CCLC participants	Hypothesis	Grade	*N*	Mean diff	Std. deviation	*t*	*df*	Sig. (2 tail)*
Mathematics	H33	4	452	9.458	35.31	5.694	451	.000*
Mathematics	H34	5	423	19.21	37.96	10.421	422	.000*
Mathematics	H35	6	242	13.690	33.76	6.307	241	.000*
Mathematics	H36	7	181	11.845	39.06	4.080	180	.000*
Mathematics	H37	8	180	-5.844	40.01	-1.960	179	.052
Mathematics	H38	9	67	14.866	43.58	2.792	66	.007*
Mathematics	H39	10	58	-5.793	55.14	-.800	57	.427
Mathematics	H40	11	45	18.000	47.466	2.54	44	.015*

*p<.05 for significance

Table 6. H41–H48 Statistical Summary

CCLC participants	Hypothesis	Grade	*N*	Mean diff	Std. deviation	*t*	*df*	Sig. (2 tail)*
Reading/language arts	H41	4	452	8.029	28.65	5.957	451	.000*
Reading/language arts	H42	5	423	8.300	24.73	6.903	422	.000*
Reading/language arts	H43	6	242	12.860	31.47	6.357	241	.000*
Reading/language arts	H44	7	181	5.635	28.74	2.638	180	.009*
Reading/language arts	H45	8	180	6.217	25.14	3.318	179	.001*
Reading/language arts	H46	9	67	6.403	29.41	1.782	66	.079
Reading/language arts	H47	10	58	15.776	37.07	3.241	57	.002*
Reading/language arts	H48	11	45	-12.067	65.06	-1.244	44	.220

*p<.05 for significance

Table 7. H49–H56 Statistical Summary

Non-CLC Participants	Hypothesis	Grade	*N*	Mean diff	Std. deviation	*t*	*df*	Sig. (2 tail)*
Mathematics	H49	4	452	9.296	30.43	6.49	451	.000*
Mathematics	H50	5	423	20.121	37.20	11.12	422	.000*
Mathematics	H51	6	242	17.926	39.03	7.144	241	.000*
Mathematics	H52	7	181	12.773	36.80	4.67	180	.000*
Mathematics	H53	8	180	-10.811	39.09	-3.710	179	.000*
Mathematics	H54	9	67	14.448	44.47	2.659	66	.010*
Mathematics	H55	10	58	-12.086	58.66	-1.569	57	.122
Mathematics	H56	11	45	27.511	57.17	3.23	44	.002*

*p<.05 for significance

Table 8. H57–H64 Statistical Summary

Non-CCLC participants	Hypothesis	Grade	*N*	Mean diff	Std. deviation	*t*	*df*	Sig. (2 tail)*
Reading/language arts	H57	4	452	9.031	27.66	6.94	451	.000*
Reading/language arts	H58	5	423	6.144	27.48	4.60	422	.000*
Reading/language arts	H59	6	242	11.306	26.67	6.59	241	.000*
Reading/language arts	H60	7	181	8.033	37.50	2.88	180	.004*
Reading/language arts	H61	8	180	1.456	24.56	.795	179	.428
Reading/language arts	H62	9	67	3.284	33.18	.810	66	.421
Reading/language arts	H63	10	58	4.345	30.24	1.094	57	.278
Reading/language arts	H64	11	45	-5.33	50.59	-.707	44	.483

*p<.05 for significance

Table 9. Within Subjects Effects for Time (Mathematics Analyses)

Grade	Source		Type III sum of squares	*df*	Mean square	*F*	Sig.*
4th grade **H65**	Time	Huynh-Feldt	39745.315	1.000	39745.315	73.166	.000*
5th grade **H66**	Time	Huynh-Feldt	163587.334	1.000	163587.334	231.931	.000*
6th grade **H67**	Time	Huynh-Feldt	60472.935	1.000	60472.935	90.811	.000*
7th grade **H68**	Time	Huynh-Feldt	27425.326	1.000	27425.326	38.091	.000*
8th grade **H69**	Time	Huynh-Feldt	12483.339	1.000	12483.339	15.957	.000*
9th grade **H70**	Time	Huynh-Feldt	14392.896	1.000	14392.896	14.850	.000*
10th grade **H71**	Time	Huynh-Feldt	4635.211	1.000	4635.211	2.861	.094
11th grade **H72**	Time	Huynh-Feldt	23301.689	1.000	23301.689	16.881	.000*

*p<.05 for significance

Table 10. Interaction Effects for Time*Group (Mathematics Analyses)

Grade	Source	Type III sum of squares	*df*	Mean square	*F*	Sig.*
4th grade **H_{73}**	Time*group	3565.554	1.000	3565.554	1.239	.266
5th grade **H_{74}**	Time*group	543.547	1.000	543.547	.130	.718
6th grade **H_{75}**	Time*group	45.993	1.000	45.993	.012	.912
7th grade **H_{76}**	Time*group	10.696	1.000	10.696	.003	.959
8th grade **H_{77}**	Time*group	1513.800	1.000	1513.800	.302	.583
9th grade **H_{78}**	Time*group	2.149	1.000	2.149	.000	.984
10th grade **H_{79}**	Time*group	638.901	1.000	638.901	.154	.696
11th grade **H_{80}**	Time*group	7.200	1.000	7.200	.002	.961

*p<.05 for significance

Table 11. Within Subjects Effects for Time (Reading/Language Arts Analyses)

Grade	Source		Type III sum of squares	*df*	Mean square	*F*	Sig.*
4th grade	Time	Huynh-Feldt	32886.903	1.000	32886.903	82.937	.000*
H81	Time*group	Huynh-Feldt	113.501	1.000	113.501	.286	.593
5th grade	Time	Huynh-Feldt	22063.889	1.000	22063.889	64.568	.000*
H82	Time*group	Huynh-Feldt	491.574	1.000	491.574	1.439	.231
6th grade	Time	Huynh-Feldt	35329.653	1.000	35329.653	83.035	.000*
H83	Time*group	Huynh-Feldt	146.050	1.000	146.050	.343	.558
7th grade	Time	Huynh-Feldt	8453.972	1.000	8453.972	15.151	.000*
H84	Time*group	Huynh-Feldt	260.160	1.000	260.160	.466	.495
8th grade	Time	Huynh-Feldt	2648.835	1.000	2648.835	8.581	.004*
H85	Time*group	Huynh-Feldt	1020.068	1.000	1020.068	3.305	.070
9th grade	Time	Huynh-Feldt	1571.646	1.000	1571.646	3.198	.076
H86	Time*group	Huynh-Feldt	162.989	1.000	162.989	.332	.566
10th grade	Time	Huynh-Feldt	5870.211	1.000	5870.211	10.260	.002*
H87	Time*group	Huynh-Feldt	1894.694	1.000	1894.694	3.311	.071
11th grade	Time	Huynh-Feldt	3406.050	1.000	3406.050	2.006	.160
H88	Time*group	Huynh-Feldt	510.050	1.000	510.050	.300	.585

*p<.05 for significance

Table 12. Interaction Effects for Time*Group (Reading/Language Arts Analyses)

Grade	Source	Type III sum of squares	*df*	Mean square	*F*	Sig.*
4th grade H89	Time*group	10480.425	1.000	10480.425	3.640	.057
5th grade H90	Time*group	531.149	1.000	531.149	.202	.653
6th grade H91	Time*group	27.785	1.000	27.785	.010	.921
7th grade H92	Time*group	17.950	1.000	17.950	.006	.938
8th grade H93	Time*group	205.868	1.000	205.868	.076	.783
9th grade H94	Time*group	1242.272	1.000	1242.272	.233	.630
10th grade H95	Time*group	126.039	1.000	126.039	.032	.858
11th grade H96	Time*group	6906.806	1.000	6906.806	.900	.345

*p<.05 for significance

Appendix B

This appendix presents graphical representations of the differences observed in student achievement over time by group.

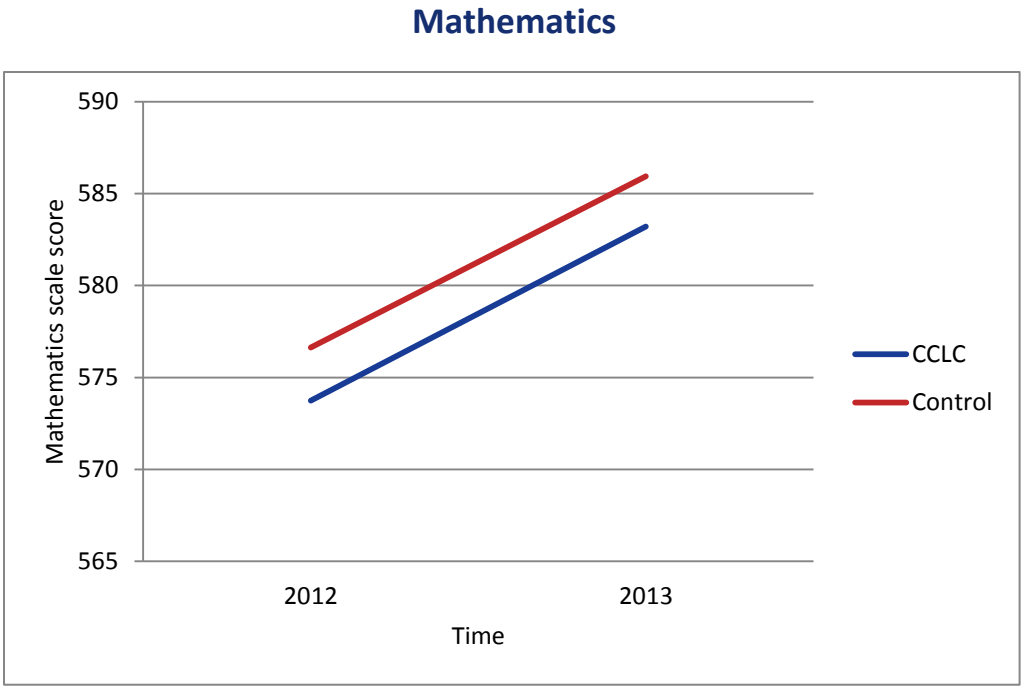

Figure 9. Fourth Grade Year-to-Year Mathematics Achievement by Group

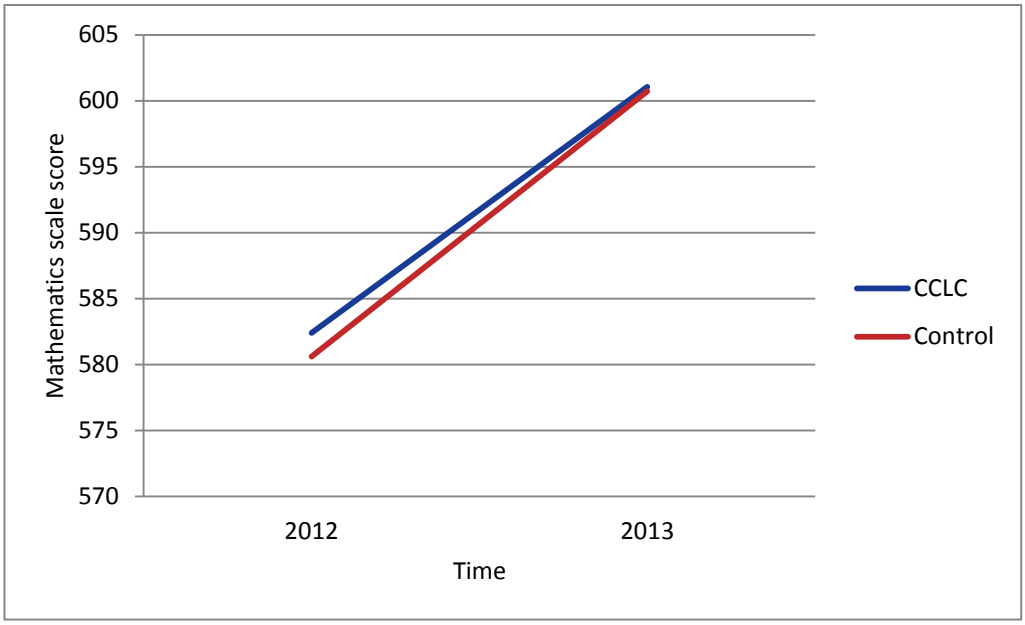

Figure 10. Fifth Grade Year-to-Year Mathematics Achievement by Group

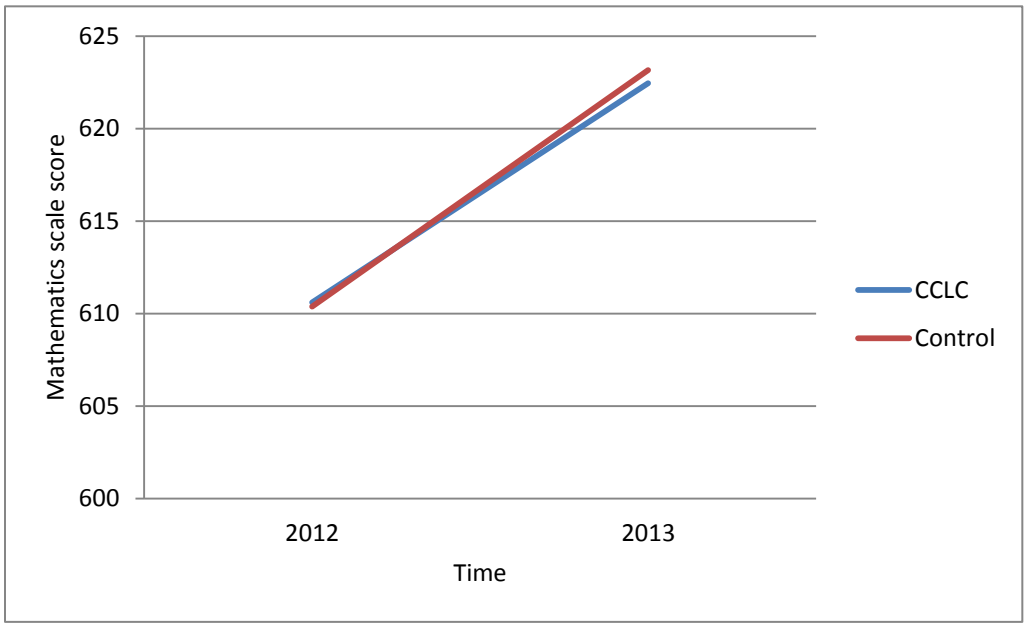

Figure 11. Sixth Grade Year-to-Year Mathematics Achievement by Group

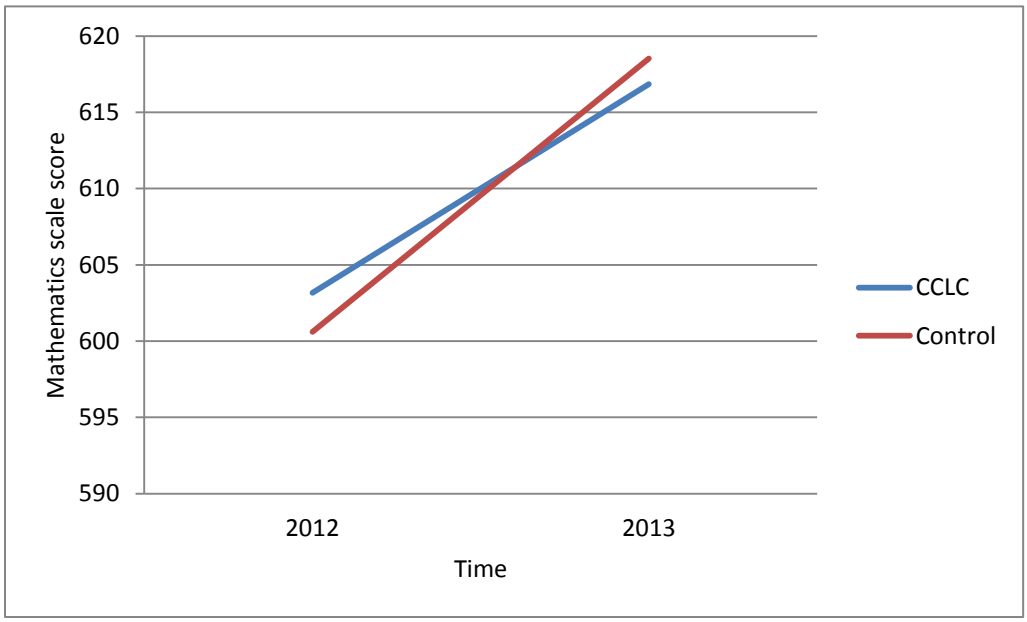

Figure 12. Seventh Grade Year-to-Year Mathematics Achievement by Group

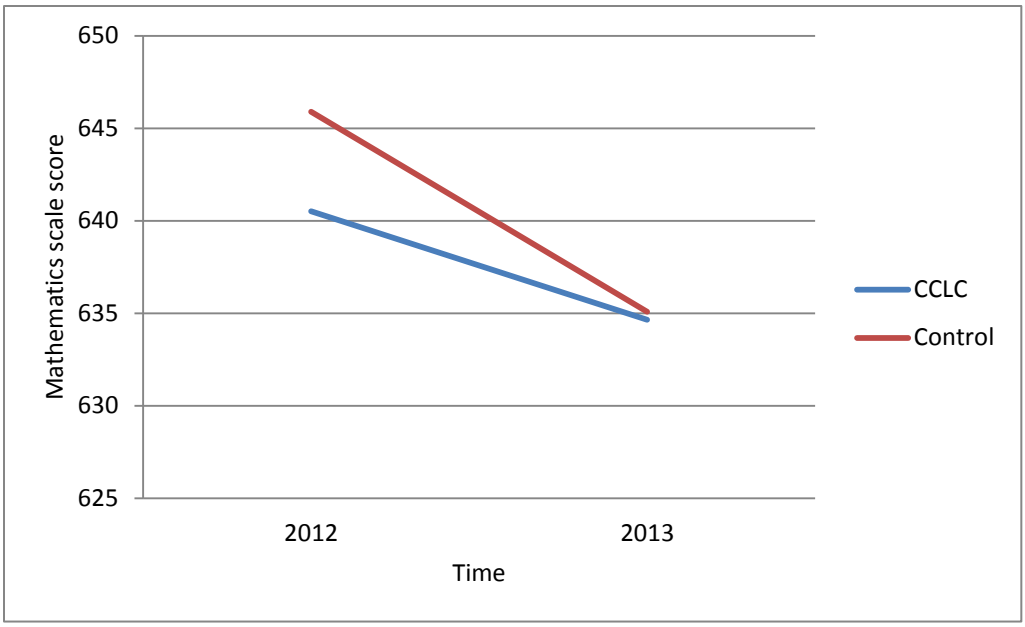

Figure 13. Eighth Grade Year-to-Year Mathematics Achievement by Group

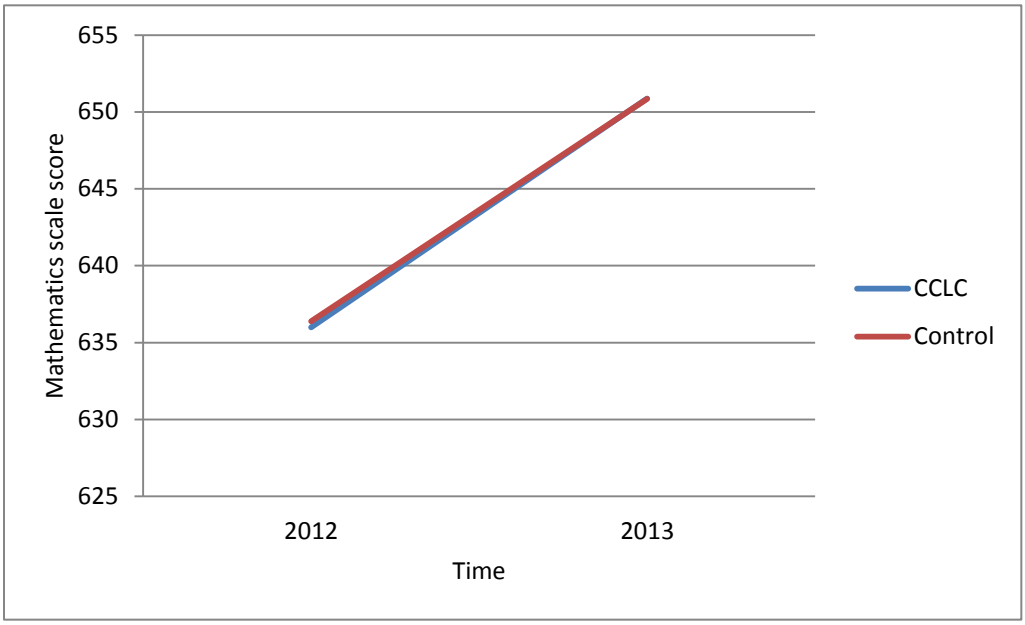

Figure 14. Ninth Grade Year-to-Year Mathematics Achievement by Group

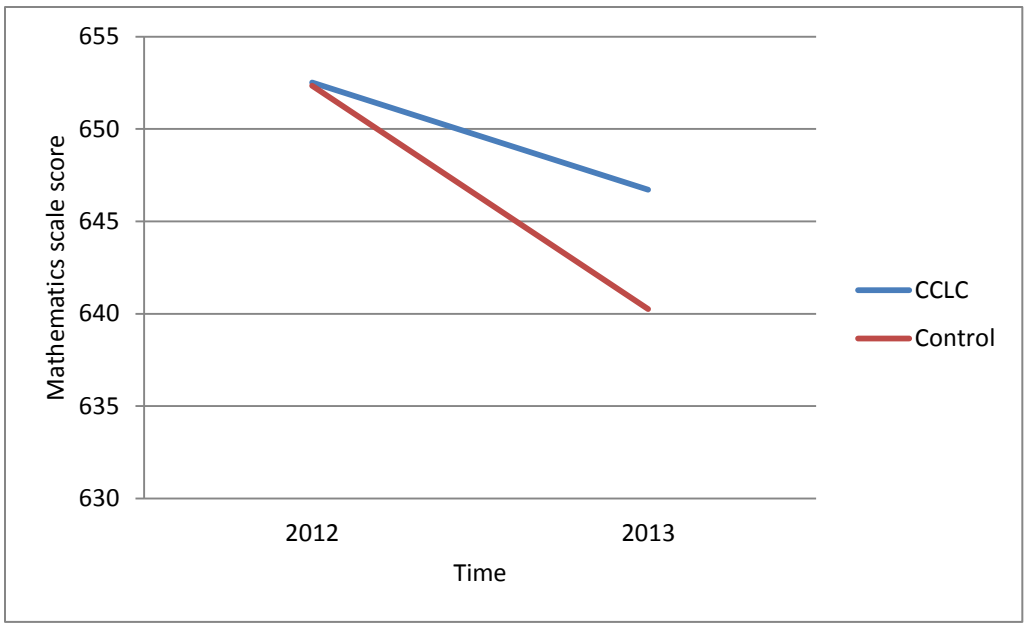

Figure 15. Tenth Grade Year-to-Year Mathematics Achievement by Group

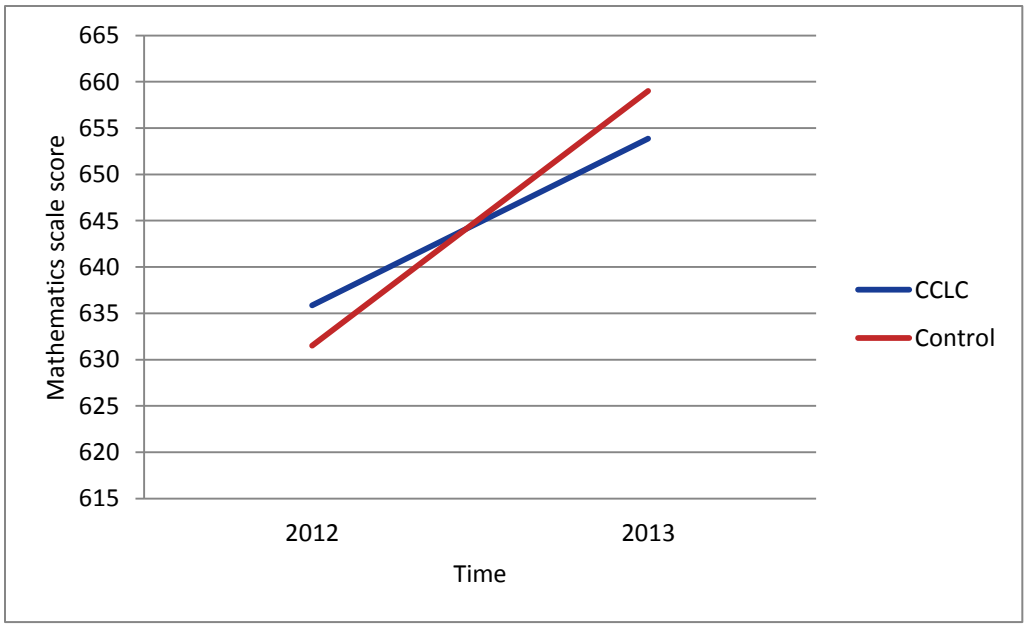

Figure 16. Eleventh Grade Year-to-Year Mathematics Achievement by Group

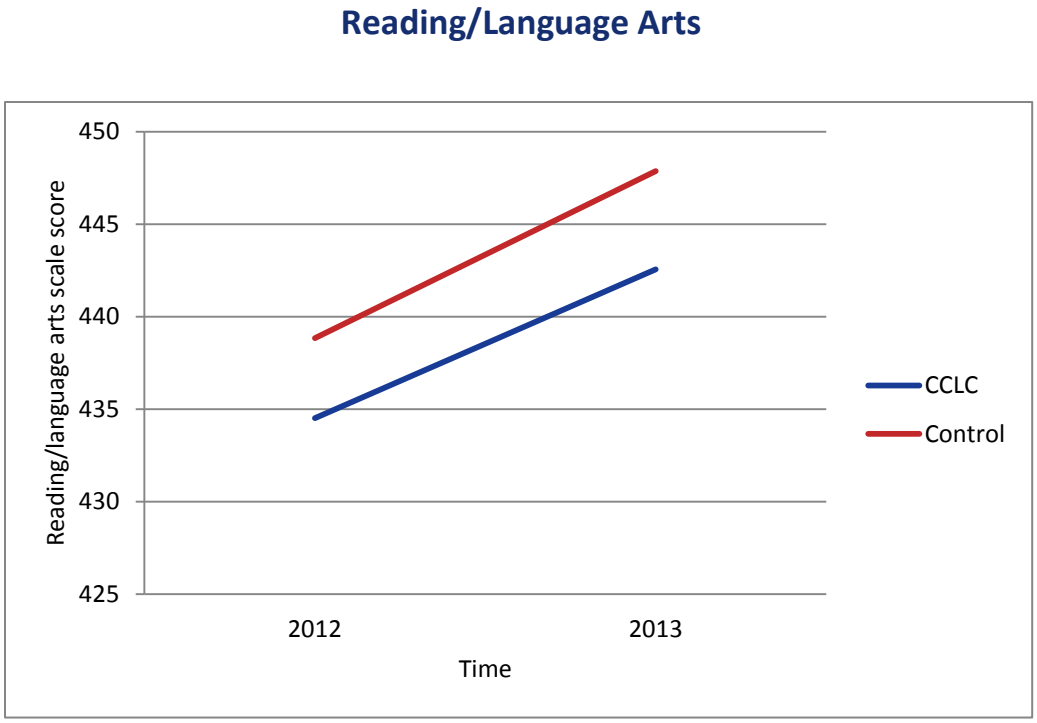

Figure 17. Fourth Grade Year-to-Year Reading/Language Arts Achievement by Group

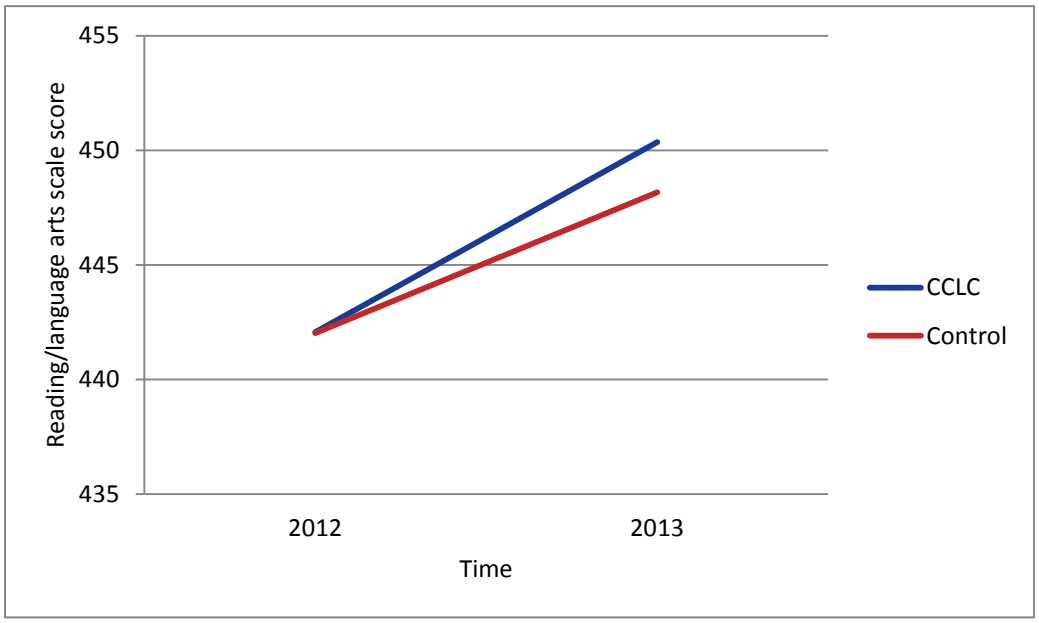

Figure 18. Fifth Grade Year-to-Year Reading/Language Arts Achievement by Group

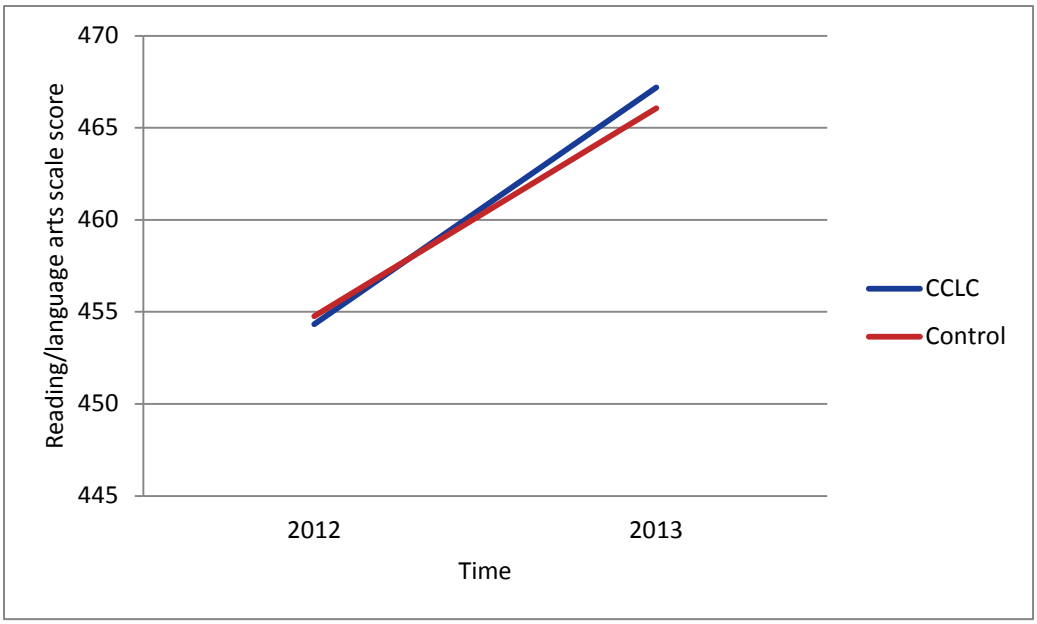

Figure 19. Sixth Grade Year-to-Year Reading/Language Arts Achievement by Group

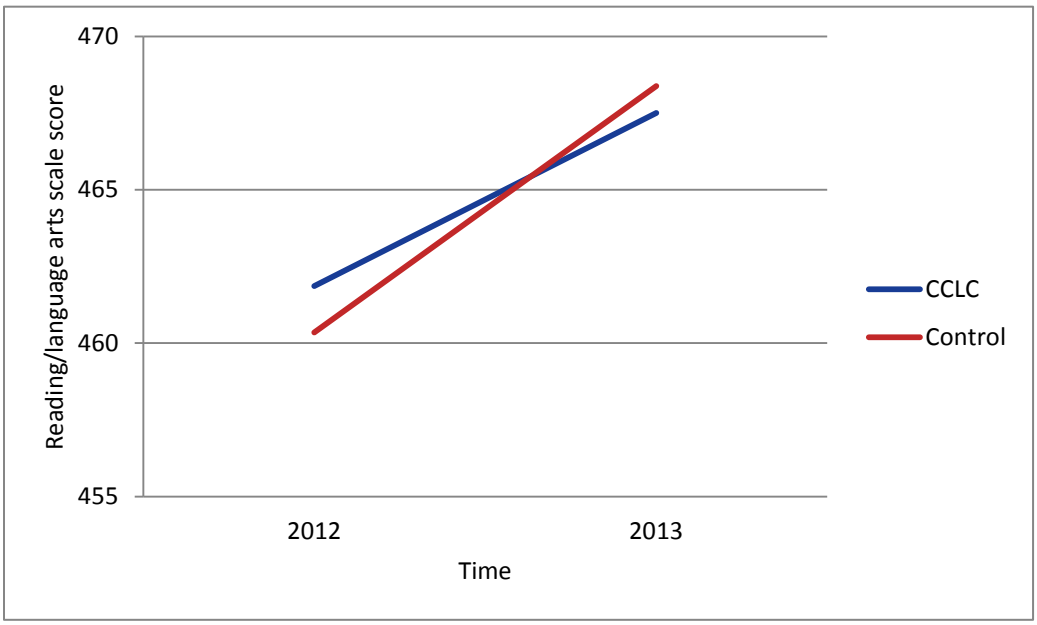

Figure 20. Seventh Grade Year-to-Year Reading/Language Arts Achievement by Group

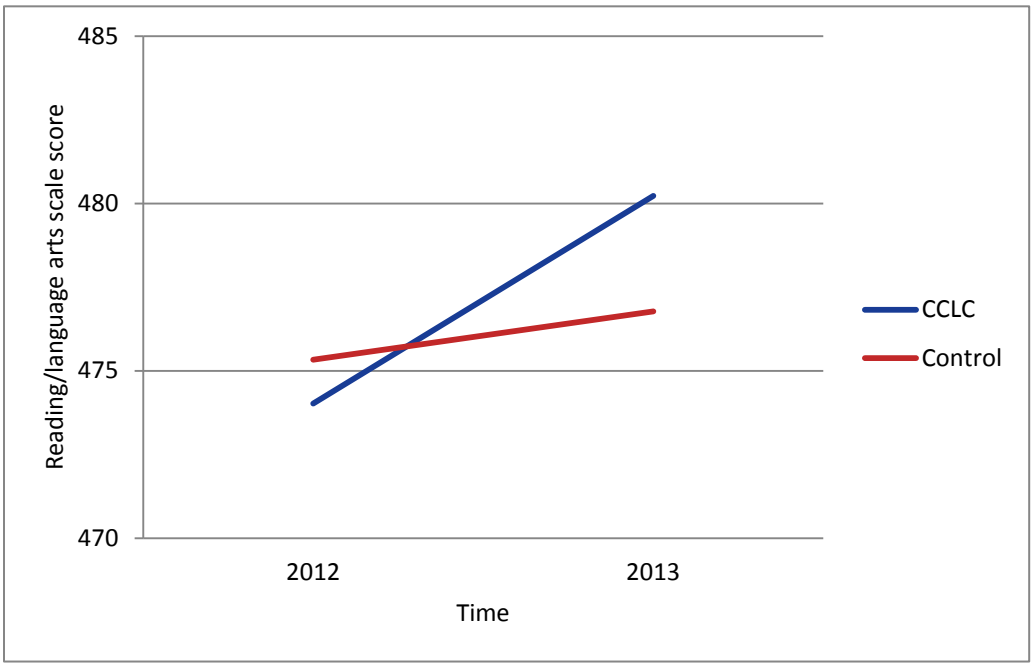

Figure 21. Eighth Grade Year-to-Year Reading/Language Arts Achievement by Group

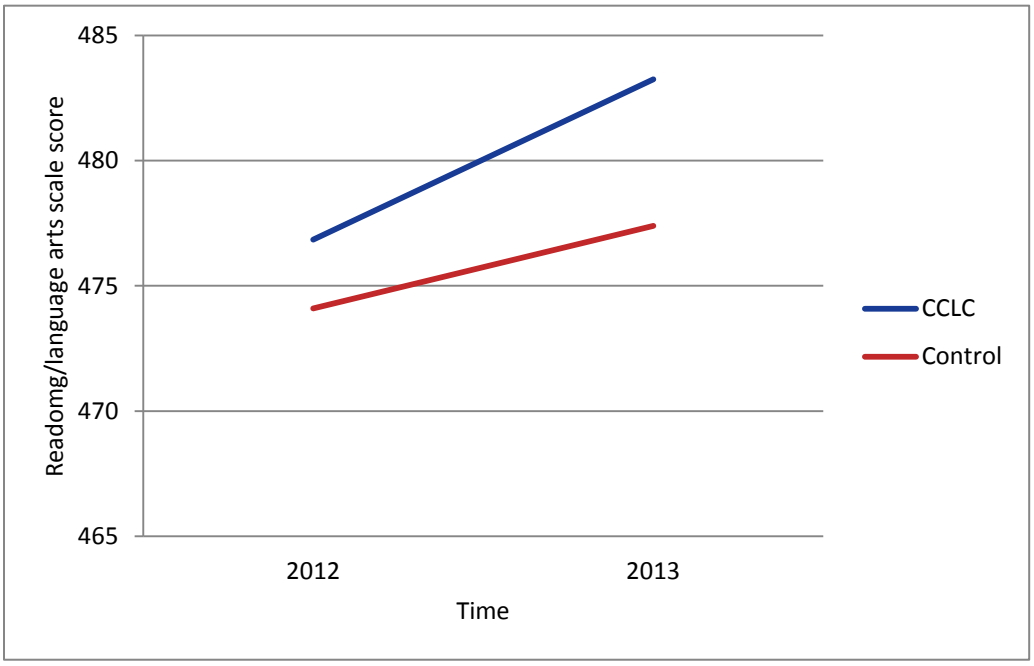

Figure 22. Ninth Grade Year-to-Year Reading/Language Arts Achievement by Group

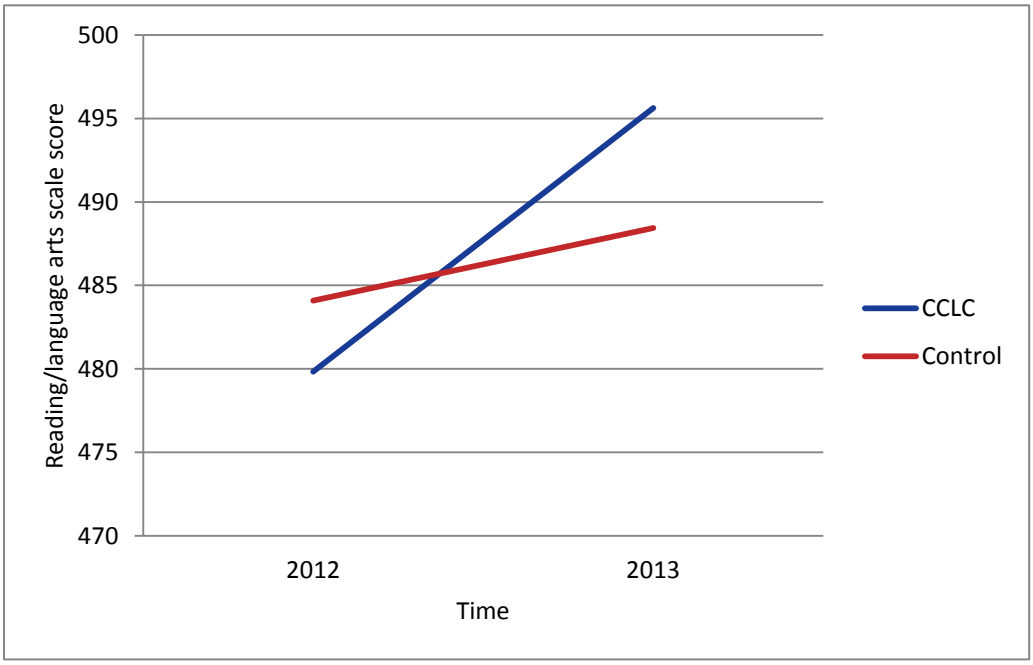

Figure 23. Tenth Grade Year-to-Year Reading/Language Arts Achievement by Group

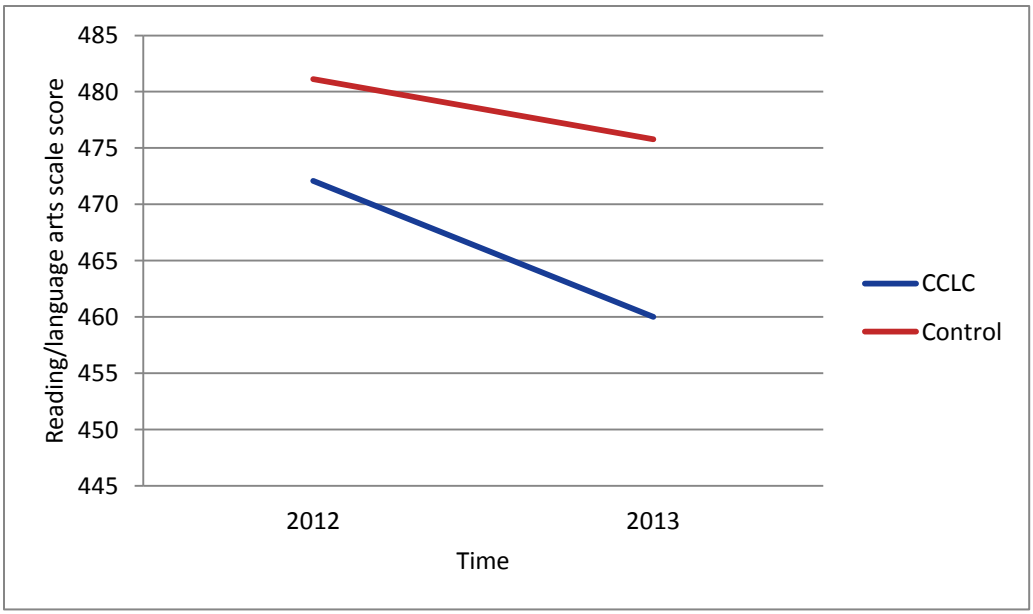

Figure 24. Eleventh Grade Year-to-Year Reading/Language Arts Achievement by Group

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