
# Evaluation of Extended Learning Opportunities Summer Title I Enrichment Program (ELO-STEP) in 2015–2016

**Office of Shared Accountability**

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# Executive Summary

At the request of the Chief Academic Officer, the Office of Shared Accountability (OSA) conducted an evaluation of Extended Learning Opportunities—Summer Title I Enrichment Program (ELO-STEP) in Montgomery County Public Schools (MCPS) during summer 2015–2016. The program was a new initiative implemented as an equity strategy in Title I schools to close achievement gaps among high achievers. This evaluation report presents the findings associated with the Year One implementation of the ELO-STEP. The overall goal of the evaluation was to examine the nature and extent of benefits to Title I students served by the ELO-STEP.

## Evaluation Design and Methodology

This evaluation was conducted through both formative and outcome studies. The purpose of formative evaluation was to provide information regarding the perspectives or experiences of students, teachers, and parents pertaining to the components of ELO-STEP for the purpose of its improvement. The outcome evaluation, using a non-equivalent control group design, addressed the program's effectiveness by comparing the academic performance of ELO-STEP students (in reading and mathematics) to their peers who were invited to participate in the program but chose not to.

Among 394 invited, 234 students participated in the ELO-STEP and 160 students did not. The program benefitted the participants by providing free breakfast, lunch, transportation, and rigorous learning opportunities for four hours per day for 19 days with a class size of about 20 students. Of 234 participants, 195 students (83%) responded to the pre ELO-STEP survey and 191 students (82%) responded to the post survey. Of 14 teachers, 13 responded to a survey yielding a response rate of 93%. In addition, all parents whose children participated in ELO-STEP were asked to complete the survey. Of 234 parents, 129 responded with a response rate of 55%.

Outcome measures for addressing program's effectiveness included Measures of Academic Progress in Reading (MAP-R) and in Mathematics (MAP-M). Due to small sample sizes (less than 30), only three subgroups (Black or African American, Hispanic/Latino students, and students receiving Free and Reduced-price Meals System services) in addition to the all students group were included in the comparative analyses.

Appropriate analytical procedures, including advanced statistical analyses, were conducted based on the nature of the question and the characteristics of the data. Statistical analyses were supplemented with the computation of effect sizes. A summary of findings for each of the evaluation questions is listed below.

## Findings

### *To what extent did students' perspectives toward mathematics and science change after attending ELO STEP?*

*Positive Perspectives*. Overall, the incoming third graders expressed positive attitudes toward mathematics in both pre and post ELO-STEP program surveys. The survey item, "My math teacher at my school makes math interesting" showed the highest positive change from pre (87%) to post program (91%). The highest decrease (76% post vs. 81% pre) was observed for the item, "Math is easy for me". This decrease was closely followed by the items, "I like math a lot" and "I think I could do more difficult math work" (86% vs. 90%; 78% vs. 82%, respectively). Compared to mathematics, students' attitudes toward science were more positive. A vast majority of ELO-STEP students in their post and pre surveys agreed, "I am good at science" (90% vs. 86%), "I think science is interesting" (94% vs. 91%), and "My science teacher at my school makes science fun" (95% vs. 92%). In both post and pre surveys, about 85% of students agreed, "I like science a lot", "I like conducting science experiments", and "I like conducting science investigations".

Of particular note is: 1) a low participation of ELO-STEP students in after school mathematics or science programs and 2) a low level of desire in having a career in those areas. For both mathematics and science, less than one third of students in the post and pre surveys agreed, "I participate in after school programs in my school". Moreover, the item, "I would like to have a career in math" was agreed by slightly over a half in the post as well as the pre surveys. Parallel to mathematics, less than a half of students agreed, "I participate in after school science programs at my school".

*Negative Perspectives*. The negative attitudes towards mathematics and science was generally low. The statement with the highest level of agreement was, "I expect to have little use for science when I get out of school" in post (47%) and pre-program (53%) surveys. The second highest agreement was observed for the statement, "I often think I can't do it when a math problem seems hard" in both post and pre surveys (35% vs. 31%) followed by, "Math is hard for me, even when I study" (23% vs.19%) and "Science is hard for me, even when I study" (21% vs. 23%). Only about 13% of students in both post and pre surveys agreed, "I would rather someone give me the answer to a hard math problem than work it out for myself" and "I don't do very well in math". The same pattern of finding was observed for the same question in science. Furthermore, only 8% of students in post surveys did "not have much interest in science," compared to 18% in the pre surveys. This decrease was also observed for a similar statement in mathematics (14% vs.17%).

### *What was teachers' feedback on ELO STEP in its first implementation year?*

Teachers were very positive in their feedback and all either agreed ($n$=12) or were fine ($n$=1) that, a) the instructional components of ELO-STEP supported students' learning need, and b) the ELO-STEP model was successful in helping students engage in enriched & accelerated academic work. Nine of 13 teachers reported that they were provided sufficient time to set up their classes and 10 said that they had enough time for lesson planning. The program strengths, as cited by teachers, were, "Well-designed ELO-STEP curriculum" ($n$=11), "Motivated and engaged students" ($n$=7), and "Supportive parents" ($n$=6). The top areas for improvement included "Lack of sufficient time"

(*n*=10), "Curriculum is difficult to implement in summer schedule" (*n*=6), and the need for "More collaboration with colleagues" (*n*=4).

***What was parents' feedback on ELO STEP in its first implementation year?***

Like teachers, parents were very positive in their responses with at least 95% of them reporting, "My child enjoyed the ELO-STEP this summer" and "My child sees him/herself as a 'smart' kid at school". About 90% of respondents reported that the ELO-STEP information was communicated in an easy language and in a timely manner. When parents were asked, whether or not their children will participate in enrichment opportunities in the future, all of those responding (*n*=121) said "Yes". The most liked feature of the ELO-STEP, as cited by parents, was, "The learning experience and the teachers".

***What were the demographic characteristics of students who participated in the 2015 ELO-STEP by gender, race/ethnicity, and services received?***

The ELO-STEP analytical file (*n*=234) had a higher percentage of Black or African American (30% vs. 24%), Hispanic/Latino (43% vs. 39%), Asian (15% vs. 13%), and Male students (56% vs. 55%) than their counterparts in the comparison group. On the other hand, the percentage of White students in the ELO-STEP was lower than their peers (8% vs. 17%). Moreover, a lower proportion of participants received ESOL (8% vs. 13%) or Special Education services than their counterparts (1% vs. 3%). In contrast, the percentage of ELO-STEP students receiving FARMS was higher than their peers (59% vs. 51%).

***How did the 2015 ELO-STEP participants perform in mathematics and reading in fall of 2015–2016, compared with their peers who were invited but did not participate? Did the benefit of ELO-STEP vary by student groups with regard to race/ethnicity and services received?***

*Mathematics*. After controlling for initial differences on InView, the adjusted mean difference on fall MAP-M for all students between the two groups (participants vs. non-participants) was statistically significant in favor of the ELO-STEP. The magnitude of the difference was close to be practically significant (effect size=.19). The subgroup analysis showed, on average, there was not a statistically significant difference between participants and nonparticipants of Black or African American students. However, the adjusted mean difference was practically significant (effect size=.27), suggesting that the magnitude of difference was meaningful in educational settings. The same analyses revealed that Hispanic/Latino participants performed significantly higher (both statistically and practically) than their nonparticipant peers as measured by fall MAP-M. Likewise, the ELO-STEP FARMS recipients significantly (both statically and practically) outperformed their peers on fall MAP-M.

*Reading*. The comparison of the two groups of students (participants and non-participants) on their fall MAP-R produced mixed results. For all students, on average, ELO-STEP participants performed as well as their counterparts after controlling for students' prior performances. Parallel analyses did not find a statistically or practically significant difference between the two groups of Black or African American students as measured by their fall 2015 MAP-R. On the other hand, on average, the Hispanic/Latino students in ELO-STEP group significantly (both statistically and

practically) outperformed their counterparts. The same analyses did not find a statistically significant difference between ELO-STEP participants who received FARMS services and their counterparts as measured by fall 2015 MAP-R. However, the adjusted mean difference between the two groups of FARM recipients (participants and non-participants) was meaningful in an educational setting (effect size =.27).

**Conclusion**

The formative findings suggested that ELO-STEP students had positive educational experiences with almost all of them reporting that their math and science teachers made those subjects interesting. Teachers communicated that ELO-STEP: a) had a well-designed curriculum, b) encompassed an instructional content that supported students' learning needs, and c) was successful in helping students engage in enriched & accelerated academic work. Similar to teachers, parents provided very positive feedback and conveyed that their child enjoyed the learning experience associated with the program, liked the teachers, and will participate in enrichment opportunities in the future.

The outcome analyses provided empirical evidence indicating that ELO-STEP intervention reinforced the academic achievement of students impacted by poverty. In mathematics, the benefits of the program were evident for all of the four comparisons made, suggesting its effectiveness in improving performance of all students, Black or African American, Hispanic/Latino, and students receiving FARMS beyond that observed in similar peers. In reading, parallel analyses found a benefit for two of four comparisons made, indicating that ELO STEP positively impacted the reading performance of Hispanic/Latino and those students receiving FARMS.

Comparative analyses of effect sizes revealed that the largest ELO-STEP impact was found for Hispanic/Latino students in both reading (effect size=.32) and mathematics (effect size=.40). The second largest impact was detected for Black or African American students in mathematics (effect size=.27). By contrast, the lowest program impact was observed for Black or African American students in reading (effect size=.05). For FARMS recipients, the program impact was the same (effect size=.27) for both reading and mathematics.

In closing, the extended learning provided by the ELO-STEP equalized opportunities for low income students to access and receive challenging academic content that historically more affluent families could. As intended, the program: a) served mostly (73%) Black or African American and Hispanic/Latino who were above average; b) provided rigorous and enriching curriculum; c) significantly improved the mathematics performance of all students, Black or African American, Hispanic/Latino, and FARMS recipients; and d) significantly enhanced the reading performance of Hispanic/Latino and FARMS recipients. Lastly, this evaluation found that ELO-STEP consisted of a combination of several best practices similar to those identified in the literature (Olszewski-Kubilius and Clarenbach, 2012) for supporting highly able students in schools impacted by poverty including: 1) the use of multiple measures in selecting the students; 2) the presence of enriched curriculum for nurturing critical and creative thinking skills through engaging, hands-on, and rigorous instruction; 3) the presence of teachers' professional development; 4) the presence expanded learning time outside of the normal school day; and 5) the equalized opportunities

between more affluent and less affluent families by providing summer learning to students impacted by poverty. The use of the above stated practices most likely contributed in the positive educational experience of ELO-STEP students.

**Recommendations**

- Explore reasons why many students are not considering a career in mathematics and science. The survey item, "I would like to have a career in math" was agreed to by slightly over a half in the post and the pre surveys. Parallel to mathematics, less than a half of students agreed, "I would like to have a career in science".

- Explore avenues to encourage Title I students to participate in after school mathematics and science programs. Analyses revealed that only less than a third of students in the pre and post surveys agreed, "I participate in after school programs in my school" for both mathematics and science.

- Continue with the use of the instructional mathematics practices for ELO-STEP. The benefits of the ELO-STEP varied by content area, with more positive findings in mathematics than in reading. In mathematics, the benefits of ELO-STEP were evident for all of four comparisons made. That is, there were significant differences between the two groups of students (participants vs. non-participants) in favor of ELO-STEP for all students, Black or African American, Hispanic/Latino, and FARMS recipients.

- Examine and revise the reading instructional lessons to ensure adequacy in scope and rigor. This study showed a more pronounced positive impact of the ELO-STEP on students' mathematics than on reading performance. In reading, the program benefits were evident for participants in only two of the four comparisons made. Differences between participants and non-participants were significant in reading, in favor of ELO-STEP, for two subgroups, Hispanic/Latino and FARMS recipients.

- Revisit the daily schedule for ELO-STEP classes and allocate more time for literacy activities. During the summer, math instructional practices and activities (75 minutes) were longer than reading (30 minutes on information literacy). The shorter instructional time in literacy may have attributed to less pronounced impact of the ELO-STEP on students' reading performance.

- Explore the possibilities of providing information and/or technical assistance to ELO-STEP teachers to enable them conduct Action Research (AR) in their classrooms. AR can provide an opportunity for teachers to: a) systematically collect data on their students via multiple measures, b) identify patterns in the data, c) think about ways to improve their delivery of instructions, student learning, and student engagement and d) collaborate with colleagues by sharing experiences and best practices.

- Increase the number of students accessing ELO-STEP via outreaching, especially to highly able students in Title I schools so that those students would have more opportunity to be selected for the highly gifted centers in succeeding grades.

- Confirm the patterns of the findings in this report with at least one more cohort of students who attended ELO-STEP.

- Conduct future studies to include the examination of students' instructional experiences as they transition to successive grade levels.

# Evaluation of Extended Learning Opportunities Summer Title I Enrichment Program (ELO STEP) in 2015–2016

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## Background

### Introduction

The divisions of Accelerated and Enriched Instruction (AEI), Consortia Choice and Application Program Services (DCCAPS), and Title I Programs (DTP) provided Extended Learning Opportunities—Summer Title I Enrichment Program (ELO-STEP) in Montgomery County Public Schools (MCPS). ELO-STEP is a new initiative that was instituted to provide opportunities for students in Title I schools for increased access to acceleration and enrichment programs. The program targeted highly-able students impacted by poverty and was first offered in July 2015 to incoming Grade 3 Title I students. The ELO-STEP program aimed to: a) nurture critical and creative thinking skills through engaging hands-on rigorous instruction, and b) develop strong interests in mathematics and sciences among students enrolled in a Title I school.

At the request of the Chief Academic Officer, the Office of Shared Accountability (OSA) conducted an evaluation of ELO-STEP in MCPS. The purposes of the evaluation were to: 1) investigate changes in ELO-STEP students' perspectives toward mathematics and science; 2) examine teachers' and parents' feedback on ELO-STEP; and 3) estimate the immediate program's impact on student academic performance in mathematics and reading. This evaluation report presents the findings associated with the Year One (2014−2015) implementation of the program at MCPS.

### Problem statement

Wide opportunity gaps persist for many students who maybe qualified but were underrepresented in programs offering challenging academic content. Nationwide, only 26% of American students enrolled in enrichment programs were Hispanic/Latino and Black or African American, while those groups made up 40% of the population in schools (U.S. Department of Education, 2014). Across the country, the gaps between the top-performing disadvantaged students and more affluent peers are evident, as documented in the literature. In their study, Wyner, et al., (2007) found that high-achieving students from low-income families fell out of the high achievement group in elementary and high school faster compared to their higher-income peers. Some years later, using data from both National Assessment of Educational Progress (NAEP) and state assessments, Plucker, Hardesty and Burroughs (2013) reported that despite the emphasis of state and federal policies in closing achievement gaps and inequities among high ability students, those gaps were closing very slowly and in many cases even growing over the past generation. Likewise, Bidwell (2013) provided empirical evidence that achievement gaps among students who perform at an advanced level actually increased during the No Child Left Behind era.

In their analyses of MCPS' student performance data, Bonner-Tompkins, Richards, & Scruggs (2013) reported that sizable achievement gaps existed in above grade level measures (e.g. advanced Maryland State Assessment (MSA) scores) and that, overtime, the achievement gap widened for MCPS students at advanced level on MSA in Grades 3, 5, and 8.

Across the country, summer learning programs have emerged as a promising way to address the achievement gap between students of the poorest families and those of the most affluent. Currently, many school districts offer mandatory summer programs to students at risk of grade retention, but fewer districts offer summer learning programs to a broader population of students as a means in boosting academic performance (Augustine, et. al, 2013). Summer learning programs are also suggested in the literature as effective strategies to bridge the opportunity gap between underprivileged and privileged students since low income parents may not afford any investments in their children's enrichment experiences (Kaushal, et. al., 2011).

## Overview of the ELO STEP in MCPS

In response to nation-wide opportunity gaps for students who are qualified but underrepresented in programs offering challenging academic content MCPS designed and implemented a new initiative (ELO-STEP). The ELO-STEP was implemented as an equity strategy in Title I schools in MCPS to close achievement gaps among high achievers. Title I is one of several grants supervised by the Division of Title I Programs (DTP). The mission of the DTP is to provide customized support to identified schools impacted by poverty for the purpose of implementing and monitoring the requirements of the Elementary and Secondary Education Act.[1]

The ELO-STEP program in Title I schools was designed to offer accelerated and enriched instructional opportunities to students impacted by poverty who may not have had access to enriching summer programs otherwise. The program was first offered in July 2015 to incoming third grade students who were enrolled in a Title I school and met specific selection criteria. ELO-STEP has three long term goals: a) to increase the number of students accessing enrichment and acceleration within grade-level mathematics in Title I schools, b) to increase the number of students in Title I schools meeting the benchmark for compacted mathematics (accelerated mathematics courses), and c) to increase the invitation rate amongst diverse populations in the center program for the gifted students in Title I schools.

*Student Selection Criteria.* Students in Title I schools who met the following criteria on local and national assessments were invited to participate in ELO-STEP in the 2015–2016 school year. The assessments used for selection criteria are discussed in greater detail in the methodology section of this report. Specifically, the ELO-STEP invitees met at least four out of the seven selection criteria listed below.

[1] http://www.montgomeryschoolsmd.org/departments/dtecps/title1/

1. Had access to Grade 2 mathematics enrichment as indicated on the report card for the second quarter
2. Earned a score at or above the 50th percentile on InView Analogies
3. Earned a score at or above the 50th percentile on InView Quantitative
4. Earned a score at or above the 50th percentile on InView Sequencing
5. Earned a score at or above the 50th percentile on InView Verbal Reasoning
6. Attained on-grade-level benchmark on MCPS Assessment Program—Primary Reading (AP-PR) based on 2015 winter administration
7. Earned a score at or above the 50th percentile for the Grade 2 Spring Measures of Academic Progress— Primary Grades (MAP-P)

***Staff and Training.*** AEI hired ELO-STEP professional staff from among teachers in MCPS. The ELO-STEP teachers were expected to work 4.5 hours per day for 19 days. The ELO-STEP teachers received four hours of training and planning. In addition, they participated in a 30–60 minute meeting to review logistics and safety at their own ELO-STEP sites. Substitutes were hired when there was a need due to emergency or illness. The Office of Community Engagement and Partnerships recruited volunteers, and one volunteer was assigned to each ELO-STEP classroom.

***Curriculum and Class Activities.*** ELO-STEP curriculum was designed to nurture critical and creative thinking skills through engaging, hands-on, and rigorous instruction. Students who participated in the ELO-STEP were engaged in mathematics, science investigations, and information literacy via an inquiry project. Specifically, the curriculum included: 1) Mathematics: Project$^{M3}$: Mentoring Mathematical Minds; 2) Science: Project Clarion Science Unit: Dig It! The College of William and Mary Center for Gifted Education curriculum; and 3) Information Literacy: Interdisciplinary Inquiry Project. ELO-STEP students were expected to spend 75 minutes on mathematics, 60 minutes on science investigation and reflection, and 30 minutes on information literacy.

***Program Operation and Cost.*** In summer of 2015, ELO-STEP was operated by three MCPS offices: Accelerated and Enriched Instruction (AEI), Consortia Choice and Application Program Services, and Title I Programs. Students participated in the ELO-STEP program four hours per day for 19 days. The participants received free breakfast, lunch, and transportation. According to AEI, the program cost $70,133 including teachers' salaries, meetings, instruction materials, and supplies. This excluded transportation and meal cost (Appendix A).

***Participating Students and Schools.*** In the 2015–2016 school year, 394 students were invited to participate in ELO-STEP. Among them, 234 students actually participated and 160 students did not. A class of about 20 students for the 234 was housed in each of 14 sites. The ELO-STEP Elementary School Sites included: Bel Pre; Brookhaven; Brown Station; Burnt Mills; Capt. James E. Daly; Gaithersburg; Jackson Road; Kemp Mill; New Hampshire Estates; Rolling Terrace (housed at Sligo Creek); Sargent Shriver; Summit Hall (housed at Rosemont); Watkins Mill; and Weller Road.

## Literature Review[2]

Although there is a large amount of literature on achievement gaps among subgroups in student academic performance, fewer studies examine the outcome of interventions in place for narrowing the achievement or opportunity gaps among racial/ethnic groups. A summary of empirical studies that examined the benefits of summer programs targeting low-income, high ability students to identify best practices in addressing the gaps is discussed in the paragraphs below.

At a national level study, Wyner, et al., (2007) tracked the performance of high-achieving students from lower and higher income families. They found more students from lower-income families fell out of the high achieving group in elementary and high schools than their peers from higher-income families despite the fact that, as first graders, they were demographically and geographically very similar to all U.S. first graders. For instance, about 56% of the first graders in the top achievement quartile from low-income families remained in the top quartile by Grade 5, compared to 69% of higher-income children. In another study, Reardon (2008), using data from a nationally representative sample, found that the Black–White gap grew faster between kindergarten and Grade 5 for students who started kindergarten with above average skills in reading and mathematics than among students with below average skills in kindergarten.

The existing research, according to Plucker, Burrough, & Song (2010), provides evidence that American educational system shortchanges certain student populations capable of reaching high academic performance levels. In their analyses of NAEP data for Grades 4 and 8 from 1998 to 2007, the authors identified gaps in advanced level every year for both mathematics and reading, with lower performance by English Language Learners (ELLs) vs. non-ELLs, students eligible for FARMS vs. non-eligible students, males vs. females, Blacks vs. Whites, and Hispanics vs. Whites. These gaps persisted or widened over the years under study. A few years later, Plucker, Hardesty and Burroughs (2013a) reported that the highest-performing American students were disproportionately White and wealthy, and the gap between White, relatively affluent students and their poorer, non-White classmates had widened over the years. For instance, the percentage of White students scoring at the advanced level in Grade 4 mathematics increased from 2.9% to 9% between 1996 and 2011, while the percentage of Black or African American students at the advanced level barely reached 1.1% in 2011. The changes in mathematical scores based on economic background were even more dramatic, with students who were ineligible for free and reduced-price meals services improving from 3.1% in the advanced range in 1996 to 11.4% in 2011. On the other hand, less affluent students eligible for free and reduced-price meals services went from 0.3% scoring in the advanced range to only 1.8%.

Xiang, et al (2011) studied high achieving students who scored at or above the 90$^{th}$ percentile rank on the Measures of Academic Progress in Mathematics (MAP-M) or Reading (MAP-R) by following two cohorts. These authors examined one cohort at Grade 3 and Grade 8, and the other at Grade 6 and Grade 10. They found that students in high poverty schools were underrepresented among high achievers and the proportions of high achievers in high-poverty schools declined over time. In third-grade math, 19.4 percent of high achievers attended high poverty schools; that

[2] Review was developed with assistance from Dr. Elizabeth Cooper-Martin

proportion declined to 16.1 percent by eighth grade. In elementary/middle school reading, the proportion declined slightly from13.5 to 13.4 percent.

State level studies mostly mirror the trends in national studies revealing that gaps increased over time more for advanced students than for those with lower levels of achievement. Based on data from Texas public schools, Hanushek and Rivkin (2006) found the increase in the Black–White achievement gap was largest for the students who in Grade 3 had the highest levels of reading. By comparison, for students with the lowest levels of reading in Grade 3, the increase in the Black–White achievement gap from Grade 5 to Grade 8 was smaller or negative. Similarly, Clotfelter, et al., (2009) found that racial achievement gaps between low-performing students tended to get smaller as students progressed through school, while the racial achievement gaps between high-performing students increased. The observed gaps were between White students and American Indian, Black, and Hispanic students. The study's sample was students who attended North Carolina public schools in Grade 3 and for five years subsequently, including students who repeated a grade.

Plucker, Hardesty, and Burroughs (2013b) provided profiles of the gap in achievement at the advanced level for each state. In Maryland, they found relatively few students with advanced scores on NAEP for 2003, 2007, or 2011. Nonetheless, based on NAEP scores, there were gaps of 5–16 percentage points every year in the advanced level in favor of non-ELL vs. ELL students, non-FARMS vs. FARMS students, White vs. Black students, and White vs. Hispanic students. In a more recent study, Plucker, Giancola, Healey, Arndt, and Wang (2015) conducted state-level analyses of the performance of America's high-ability students, especially those from a low-income background. They found that students from low-income families were less likely than other students to reach advanced levels of academic performance, even when demonstrating the potential to do so. These income-based excellence gaps appeared in elementary school and continued through high school. The authors argued, there were very few states with comprehensive policies in place to address the education of talented students, let alone the education of high-performing students from low-income families. High-achieving students from low-income households were lagging far behind their wealthier peers in schools across the United States. The authors concluded that opportunities for low-income students to develop their abilities and talents were restricted and limited, and the excellence gap was robbing the country of talent, undermining low-income students' chances for social mobility, and impacting the nation's future economic prosperity.

In MCPS, Cooper-Martin et al., (2016) conducted an outcome evaluation of Extended Learning Opportunities Summer Adventures in Learning (ELO-SAIL). The program operated in all Title I schools and targeted students who would enter kindergarten, Grade 1 or, Grade 2 in the fall following the program. Focusing on summer 2012, 2013, and 2014, the authors examined the impact of the program on academic performance of participants, compared to similar non-participants at two points in time, fall following the program and at the end of the school year. The analyses found mixed results with a stronger positive academic impact of ELO-SAIL on targeted population in the fall than at the end of the school year. The authors reported that the academic benefits of ELO-SAILvaried by content area, with more positive findings in mathematics than in reading, and varied by grade level, such that positive gains in reading mainly were for kindergarteners, while positive gains in mathematics were limited mainly to first and second graders.

### Recommended Strategies and Programs for Closing the Gaps

Starting in 2001, Fairfax County Public Schools (FCPS) developed a young scholar model nurturing intelligent behaviors of students from diverse cultural, ethnic, and linguistic backgrounds. The model was developed out of a growing concern that Black or African American and Hispanic/Latino students and students who receive ESOL services were underrepresented in programs for gifted students (Horn, 2015). The components of young scholar model included: principal/teacher leadership, non-traditional assessment, intervention, and professional development for teachers with strong outreach to parents. In an outcome study, the program success was shown by a 565 percent increase in the number of Black or African American and Hispanic/Latino students receiving gifted services from 2003 to 2014 (Horn, 2015).

Olszewski-Kubilius and Clarenbach (2012) examined several programs that targeted low-income, high ability students and identified the following best practices or features that benefitted those students. 1) Gateway programs focusing on preparation of students for advanced courses or programs at the next level of schooling to equip them in making critical transitions; 2) Program's selection criteria that are based on multiple measures; 3) High-powered curriculum that are both challenging and enriched with teachers providing scaffolding for advanced thinking not remediation; 3) Extensive professional development of teachers focusing on changing teacher expectations away from a deficit viewpoint; 4) Significantly expanded learning time usually outside of the normal school day, such as after school or during summer; 5) Programs that equalize opportunities among student groups (for example, providing services that more affluent families could access); 6) Augmenting student support networks.

In their study, Augustine, et al. (2013) reported that effective programs providing high-quality academic opportunities share a number of features. 1) Structured instruction in reading, writing, or mathematics consistent with state and local content standards and matched with students' academic needs; 2) Adequate intensity and duration of instruction. For example, providing academic instruction for three hours a day, five days per week, for five to six weeks; 3) Teachers with appropriate certification who are selected because of their interest in summer instruction of low-achieving students; 4) Lower student-to-adult ratios than those observed in the regular school year; 5) Academic content that is supplemented with enrichment activities. According to the authors, enrichment activities attract students to attend voluntary programs regularly and help bridge the "opportunity gap" that exists between low-income and higher-income students during the summer; 6) Consistent daily attendance of students in the program.

## Evaluation Design

This evaluation employed a multimethod design to conduct both formative and outcome studies. The purpose of formative evaluation was two-fold. First, to provide information on the degree to which ELO-STEP students' perspectives toward mathematics and science changed after attending the program. Second, to provide information pertaining to the reflection of various ELO-STEP stakeholders for the purpose of its improvement. The outcome evaluation addressed the program effectiveness by comparing the academic performance of ELO-STEP students (in reading and mathematics) to their peers who were invited to participate in the program but chose not to.

## Organization of the Report

This report is divided into four additional sections. Section I presents the formative evaluation of ELO-STEP. Section II describes the outcome evaluation. Section III details discussion and study conclusions followed by recommendations. Finally, Section IV discusses strengths and limitations associated with the study.

## SECTION I: Formative Evaluation

This Section describes the evaluation questions, data collection strategies, analytical procedures and findings organized by evaluation question.

### Evaluation Purposes and Questions

The objectives of the formative evaluation were to: 1) examine the ELO-STEP stakeholders' experiences pertaining to implementation of the program's practices and components and 2) provide feedback to the program staff on the status of program implementation for the purpose of its improvement. The formative evaluation was guided by the following questions:

*Evaluation Question 1. To what extent did students' perspectives toward mathematics and science change after attending ELO-STEP?*

*Evaluation Question 2. What was teachers' feedback on ELO-STEP in its first implementation year?*

*Evaluation Question 3. What was parents' feedback on ELO-STEP in its first implementation year?*

### Data Collection Strategies, Samples, and Analytical Procedures

The formative evaluation used a survey design to collect data via surveys of students, teachers, and parents.

*Student Survey***.** The survey was originally developed for an evaluation of the George B. Thomas, Sr. Learning Academy Young Scholars program in MCPS (Addison-Scott, 2011). The items in the questionnaire examined students' interests in mathematics and science, their self-perceived performance, classroom experience and their future career plans. A 5-point Likert scale was used to measure the degree to which students agreed with 30 statements on the survey. The reported reliability coefficient as measured by Cronbach's alpha was 0.85 for the pre-program survey and 0.81 for the post-program survey, indicating high internal consistency of the survey items. The survey was administered by program staff to those students who attended ELO-STEP in the summer of 2015 in two points in time: the first week of ELO-STEP and again in the last week of the program in July. Of 234 participants, 195 students (83%) responded before ELO-STEP and

191 students (82%) responded after ELO-STEP. Because the surveys were administered anonymously, there was no link of a student responses in two points in time. As a result, respondents for the pre-program survey might be slightly different from students who completed the post-program surveys. Student responses, as a group, on the pre- and post-program survey were analyzed to examine changes in students' perspectives towards mathematics and science.

*Teacher Survey.* An online survey was sent to all ELO-STEP teachers at the end of the program in July 2015. The teacher survey examined their experiences pertaining to program implementation in several aspects: a) sufficient time for lesson planning; b) adequate supplies; c) The ELO-STEP lessons, d) students engagement in accelerated academic work in mathematics and science and e) the ELO-STEP strengths, and its areas in need of improvement. There were seven survey items in a 5-point Likert scale format to measure the degree to which teachers agreed with the statements addressing various aspects of the program. The open-ended questions asked for teachers' comments on the ELO-STEP program implementation. The survey targeted the 14 teachers who taught ELO-STEP in summer of 2015. Of 14 teachers, 13 responded, yielding a 93% response rate. Among the respondents, six (46%) teachers taught in a Title I school in spring 2015, 12 teachers (92%) taught Grades K–Grade 5 students in spring 2015, and 11 (85%) participated in ELO-STEP teacher training.

*Parent Survey.* Program staff also administered a paper-and-pencil survey to parents in the last week of the 2015 ELO-STEP program for their feedback. The survey targeted 234 parents whose children participated in ELO-STEP in summer 2015. The parent survey examined: a) Timeliness of communication of the program information; b) the ease of program information, c) the impact of the program on their child, d) their child's future participation in the program; and finally, e) ELO-STEP strengths and its areas in need of program improvement. All parents whose children participated in ELO-STEP were asked to complete the survey. Of 234 parents, 129 responded (55%). The parent survey had 10 items or statements. For the first four items, parents were asked to report their extent of agreement with the statements using a five-point Likert-type scale. For the last six survey items, parents were asked to provide open-ended responses.

## Analytical Procedures

Descriptive analyses were used to address the formative evaluation questions. Responses to closed-ended survey questions were analyzed and summarized using frequency distribution and percentages. Responses to open-ended survey questions were reviewed, categorized and analyzed using counts of emerging categories.

## Formative Evaluation Findings

A summary of findings organized by evaluation question are presented below.

***Evaluation Question 1. To what extent did students' perspectives toward mathematics and science change after attending ELO-STEP?***

To address changes in ELO-STEP students' perspectives toward mathematics and science, the evaluators grouped survey responses into two categories: 1) items reflecting positive attitude toward mathematics and sciences, and 2) items reflecting negative attitude toward mathematics and science. The desirable changes in perspective refer to an increase of positive attitude and a decrease of negative attitude. Appendix B provides results for the pre-and post-program student surveys in the order of survey items.

*Attitudes Towards Mathematics.* Table 1a shows percentages of students who agreed or strongly agreed with the statements related to mathematics before and after exposure to ELO-STEP.

Table 1a. Students' Post- and Pre-ELO-STEP Attitude towards Mathematics (Positive)

| | | Strongly Agree + Agree | Strongly Agree + Agree | Strongly Agree + Agree | Strongly Agree + Agree | Post-Pre Diff in % points |
|---|---|---|---|---|---|---|
| *Math items reflecting positive attitude* | | Post n | Post % | Pre n | Pre % | % |
| 1 | My math teacher at my school makes math interesting. | 183 | 90.7 | 180 | 86.7 | 4.0 |
| 2 | I like to play games that use numbers. | 181 | 82.9 | 185 | 84.9 | -2.0 |
| 3 | I would like to have a career in math. | 164 | 53.7 | 171 | 56.1 | -2.5 |
| 4 | I am good at working math problems. | 187 | 87.7 | 195 | 90.8 | -3.1 |
| 5 | I think math is interesting. | 182 | 85.7 | 193 | 89.1 | -3.4 |
| 6 | I participate in after school math programs at my school. | 166 | 25.3 | 160 | 29.4 | -4.1 |
| 7 | I think I could do more difficult math work. | 176 | 77.8 | 185 | 82.2 | -4.3 |
| 8 | I like math a lot. | 191 | 85.9 | 195 | 90.3 | -4.4 |
| 9 | Math is easy for me. | 191 | 75.9 | 190 | 80.5 | -4.6 |

Of nine survey statements or items measuring positive perspectives towards mathematics (Table 1a), one item, "My math teacher at my school makes math interesting" showed a positive change with 87% of the pre-program respondents strongly agreed or agreed with the statement, while 91% of the post-program respondents believed so, with an increase of four percentage points. The remaining eight items showed a decrease, ranging from -4.6 to -2.5 percentage points. The highest decrease (-4.6 percentage points) from pre (81%) to post (76%) was observed for the statement, "math is easy for me". This decrease was closely followed by the statements, "I like math a lot", "I think I could do more difficult math work", and "I participate in after school math programs in my school" (a decrease of -4.4, -4.3, -4.1 percentage points, respectively). The gap between the pre and post responses was 3 percentage points for the statements, "I think math is interesting" and "I am good at working math problems".

Of particular note is the low participation of ELO-STEP students in after school math program. Only less than one third of students in the post (25%) and pre (29%) surveys strongly agreed or agreed, "I participate in after school math program at my school". Moreover, the item "I would like to have a career in math" was only agreed (strongly agreed and agreed) by about half of ELO-STEP students (56% in the post and 54% in the pre surveys). Further analyses indicated that the percentage of students who agreed with the statement "I like to play games that use numbers" was 2 percentage points lower after exposure to ELO-STEP compared with before (83% v. 85%).

Table 1b. Students' Post- and Pre-ELO-STEP Attitude towards Mathematics (Negative)

| *Math items reflecting negative attitude* | | Strongly Agree + Agree Post n | Strongly Agree + Agree Post % | Strongly Agree + Agree Pre n | Strongly Agree + Agree Pre % | Post-Pre Diff in % points % |
|---|---|---|---|---|---|---|
| 1 | I do not have much interest in math. | 179 | 14.0 | 191 | 17.3 | -3.3 |
| 2 | I would rather someone give me the answer to a hard math problem than work it out for myself. | 188 | 12.2 | 189 | 12.7 | -0.5 |
| 3 | I don't do very well in math. | 184 | 13.6 | 190 | 12.6 | 1.0 |
| 4 | I often think "I can't do it" when a math problem seems hard. | 188 | 34.6 | 186 | 31.2 | 3.4 |
| 5 | Math is hard for me, even when I study. | 177 | 23.2 | 182 | 19.2 | 3.9 |

Overall, the percentage of students expressing negative attitudes towards math was low in both pre- and post-surveys. Of five survey items measuring negative attitude (Table 1b), only one item showed a decrease of three percentage points (17% vs. 14%) in regard to statement, "I don't have much interest in math".

Further comparisons showed, a higher percentage of students in post survey when compared with their pre survey responses (23% vs.19%) strongly agreed or agreed (Table 1b) with the statement, "Math is hard for me, even when I study". The same level of agreement was found in students' post program responses for the statement "I often think 'I can't do it' when a math problem seems hard" compared with their pre responses (35% vs. 31%). Only about 13% of students in both pre and post survey agreed with the statements, "I don't do very well in math" and "I would rather someone give me the answer to a hard math problem than work it out for myself." (See Table 1b). It is worth noting that a large percentage of participants already had a positive attitude toward mathematics at both points (before and after exposure to the ELO-STEP). Conversely, a lower percentage of participants expressed negative attitudes toward mathematics both before and after exposure to ELO-STEP.

*Attitudes Towards Science.* Overall, the second graders had positive attitudes toward science (Table 1c). Analyses showed an increase of students' positive attitude toward science on seven of 10 survey items (Table 1c). A comparative analyses revealed, a higher percentage of students in their post than pre surveys strongly agreed or agreed with the statement, "I am good at science" (90% vs. 86%), "I think science is interesting" (94% vs. 92%), "My science teacher at my school makes science fun" (95% vs. 92%).

Similar to mathematics, a higher percentage of students in their post-program survey agreed with the statement "I would like to have a career in science" (54% vs. 51%). Moreover, less than a third of survey respondents in both pre (28%) and post-program (29%) surveys strongly agreed or agreed with statement "I participate in after school science programs at my school." On the other hand, a large majority of students in both pre (85%) and post-program (87%) surveys strongly agreed or agreed with the statement, 'I like science a lot". Moreover, about three fourths of the students strongly agreed or agreed, "I like conducting science experiments" and "I like conducting science investigations" in both pre and post surveys. Finally, at least 70% of students strongly

agreed or agreed, "I think I could do more difficult science work" in both pre (72%) and post (70%) surveys. (See Table 1c)

Table 1c. Students' Post- and Pre-ELO STEP Attitude towards Science (Positive)

| | *Science items reflecting positive attitude* | Strongly Agree + Agree | Strongly Agree + Agree | Strongly Agree + Agree | Strongly Agree + Agree | Post-Pre Diff of % points |
|---|---|---|---|---|---|---|
| | | Post n | Post % | Pre n | Pre % | % |
| 1 | I am good at science. | 188 | 89.9 | 194 | 86.1 | 3.8 |
| 2 | I would like to have a career in science. | 171 | 54.4 | 183 | 51.4 | 3.0 |
| 3 | My science teacher at my school makes science fun. | 190 | 94.7 | 191 | 92.1 | 2.6 |
| 4 | I think science is interesting. | 196 | 93.9 | 197 | 91.4 | 2.5 |
| 5 | I like science a lot. | 188 | 87.2 | 188 | 85.1 | 2.1 |
| 6 | I participate in after school science programs at my school. | 171 | 29.2 | 155 | 27.7 | 1.5 |
| 7 | I like conducting science experiments. | 185 | 85.9 | 186 | 85.5 | 0.5 |
| 8 | I like conducting science investigations. | 187 | 84.0 | 179 | 84.9 | -1.0 |
| 9 | Science is easy for me. | 180 | 70.6 | 184 | 72.8 | -2.3 |
| 10 | I think I could do more difficult science work. | 179 | 69.8 | 184 | 72.3 | -2.5 |

As shown in Table 1d, 18% of the pre-program survey respondents did "not have much interest in science," compared to 8% of post-program respondents, a decrease of 10 percentage points of the negative attitude. Moreover, the respondents who thought they had little use for science when they got out of school decreased from 53% to 47% (6 percentage points). About a quarter of students strongly agreed or agreed with the statement "Science is hard for me, even when I study" in both pre- (23%) and post-program (21%) surveys. Similar to mathematics, only 13% of students strongly agreed or agreed with the statements "I would rather someone give me the answer to a hard science problem than work it out for myself" and "I don't do very well in science" in both pre- and post- surveys. Overall, students showed an increase of positive attitude and a decrease of negative perspective toward science after exposure to ELO-STEP.

Table 1d. Students' Post- and Pre-ELO STEP Attitude towards Science (Negative)

| | *Science Items reflecting negative attitude* | Strongly Agree + Agree Post n | Strongly Agree + Agree Post % | Strongly Agree + Agree Pre n | Strongly Agree + Agree Pre % | Post-Pre Diff of % points % |
|---|---|---|---|---|---|---|
| 1 | I do not have much interest in science. | 187 | 8.0 | 192 | 17.7 | -9.7 |
| 2 | I expect to have little use for science when I get out of school. | 177 | 46.9 | 174 | 52.9 | -6.0 |
| 3 | Science is hard for me, even when I study. | 178 | 20.8 | 185 | 23.2 | -2.5 |
| 4 | I often think "I can't do it" when a science problem seems hard. | 190 | 30.0 | 187 | 31.0 | -1.0 |
| 5 | I would rather someone give me the answer to a hard science problem than work it out for myself. | 188 | 12.8 | 189 | 12.7 | 0.1 |
| 6 | I don't do very well in science. | 189 | 13.8 | 191 | 13.6 | 0.1 |

## Summary

*Attitudes Towards Mathematics.* Of nine survey items measuring positive perspectives towards mathematics, only one, "My math teacher at my school makes math interesting" showed a positive change from pre (87%) to post ELO-STEP (91%), an increase of 4 percentage points. The highest decrease (-4.6 percentage points) was observed for the statement, "math is easy for me". This decrease was closely followed by the statements, "I like math a lot" and "I think I could do more difficult math work" (90% vs. 86%; 82% vs. 78%, respectively).

Only less than one third of students in the post and pre surveys (25% vs. 29%) agreed, "I participate in after school math program at my school". Moreover, the item "I would like to have a career in math" was only agreed by about half of students in both post and pre surveys (56% and 53%, respectively).

Overall, the percentage of students expressing negative attitudes towards math was low. A decrease of three percentage points (17% vs. 14%) was observed in the statement, "I don't have much interest in math". Further comparisons showed, a higher percentage of students in post compared with their pre survey responses (23% vs.19%) agreed, "Math is hard for me, even when I study" or "I often think I can't do it when a math problem seems hard" (35% vs. 31%). Only about 13% of students in both pre and post survey agreed with the statements, "I don't do very well in math" and "I would rather someone give me the answer to a hard math problem than work it out for myself."

*Attitudes Towards Science.* Analyses showed an increase of students' positive attitude toward science on seven of ten survey items. A comparison of the pre and post responses revealed that a higher percentage of ELO-STEP students in their post-program than pre survey was in agreement with the statements: "I am good at science" (90% vs. 86%), "My science teacher at my school makes science fun" (95% vs. 92%), "I think science is interesting" (94% vs. 92%), and "My science teacher at my school makes science fun" (95% vs. 92%).

Similar to mathematics, about half of students in their post- and pre- program surveys agreed with the statement "I would like to have a career in science" (54% vs. 51%). Alike, only less than a third of survey respondents in both post- (29%) and pre- (28%) surveys agreed, "I participate in after school science programs at my school." A large majority of students expressed relatively similar level of agreement in both post- and pre- surveys with the statements, 'I like science a lot" (87% vs. 85%), "I like conducting science experiments" (86% vs. 86%), and "I like conducting science investigations" (84% vs. 85%), and "I think I could do more difficult science work" (70% vs. 72%).

The survey item, "I do not have much interest in science," showed a decrease of 10 percentage points in the negative attitude. Moreover, the percent of respondents who thought they had little use for science when they got out of school decreased from pre- (53%) to the post-surveys (47%). Only less than a quarter of students agreed, "Science is hard for me, even when I study" in both pre- (23%) and post- (21%) surveys. About 13% of students had the same level of agreement with the statements, "I would rather someone give me the answer to a hard science problem than work it out for myself" and "I don't do very well in science" in both pre- and post-surveys.

***Evaluation Question 2. What was teachers' feedback on ELO-STEP in its first year?***

A series of statements were provided in a survey to address the teachers' experiences pertaining to various components of ELO-STEP. As shown in Table 2a, 12 of 13 teachers agreed or strongly agreed that ELO-STEP lesson content supported the learning needs of students in mathematics (*n*=12, 92%) and science/information literacy (*n*=12, 92%). Moreover, twelve of 13 teachers strongly agreed or agreed with the statement, "Overall I felt the ELO-STEP model was successful in helping students engage in enriched & accelerated academic work in science/information literacy." The remaining teacher (one of the 13 teachers) responded, "It is fine" to the above stated statements. These findings suggest that all teachers were in agreement that the instructional components of ELO-STEP supported students' learning need and engagement.

Eleven of 13 respondents felt the ELO-STEP was successful in helping students engage in enriched and accelerated academic work in mathematics (*n*=11, 85%). One teacher responded "It is fine" to the above stated statement. A majority of responding teachers strongly agreed or agreed that they were provided sufficient time to set up their classes (*n*=9 of 13) for lesson planning (*n*=10 of 13), and that adequate supplies were available (n=9; 69%). All of the 13 teachers strongly agreed (*n*=11) or were fine (*n*=1) with the statement, "Overall I felt the ELO-STEP model was successful in helping students engage in enriched & accelerated academic work in science/information literacy".

Table 2a. ELO-STEP Teacher Survey Responses

| Item (*N*=13) | Strongly Disagree | | Disagree | | It is fine | | Agree | | Strongly Agree | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| 1. I was provided a sufficient amount of time to set up my classroom. | 1 | 7.7 | 1 | 7.7 | 2 | 15.4 | 5 | 38.5 | 4 | 30.8 |
| 2. I was provided a sufficient amount of time for lesson planning. | 1 | 7.7 | 0 | 0.0 | 2 | 15.4 | 6 | 46.2 | 4 | 30.8 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 3. I found the content in the ELO-STEP lessons supported the learning needs of my students in mathematics. | 0 | 0.0 | 0 | 0.0 | 1 | 7.7 | 6 | 46.2 | 6 | 46.2 |
| 4. I found the content in the ELO-STEP lessons supported the learning needs of my students in science/information literacy. | 0 | 0.0 | 0 | 0 .0 | 1 | 7.7 | 4 | 30.8 | 8 | 61.5 |
| 5. An adequate amount of supplies (paper, markers, pens, erasers, etc.) were available. | 0 | 0.0 | 0 | 0.0 | 4 | 30.8 | 6 | 46.2 | 3 | 23.1 |
| 6. Overall I felt the ELO-STEP model was successful in helping students engage in enriched & accelerated academic work in mathematics. | 0 | 0.0 | 1 | 7.7 | 1 | 7.7 | 2 | 15.4 | 9 | 69.2 |
| 7. Overall I felt the ELO-STEP model was successful in helping students engage in enriched & accelerated academic work in science/information literacy. | 0 | 0.0 | 0 | 0.0 | 1 | 7.7 | 1 | 7.7 | 11 | 84.6 |

Teachers also responded to open-ended questions about the strengths of ELO-STEP in their schools and areas for program improvement. Responses were coded into different categories by the evaluators. A teacher could make more than one comment. Teachers' comments are categorized into program strengths and areas for improvement.

*Program Strengths*

1. Well-designed and hands-on curriculum (*n*=11)
2. Motivated and engaged students (*n*=7)
3. Support from parents (*n*=6) and administrator (*n*=2)
4. Supplies provided, science kits and binders helpful (*n*=5)
5. Use of technology in instruction (*n*=5)
6. Collaboration among colleagues (*n*=2)

*Areas for Improvement*

1. Lack of sufficient time (*n*=10)
2. Curriculum difficult to implement in summer schedule (*n*=6)
3. Collaboration with other teachers (*n*=4)
4. Need adequate supplies (n=4)
5. More support for students (*n*=3) and more support from administrators (*n*=2)
6. Technical support (*n*=2)
7. Inconsistent volunteers at the beginning (*n*=2)
8. Program should be offered to other grades (*n*=2)

**Summary**

The ELO-STEP teachers had positive experience regarding different aspects of the ELO-STEP program. All of 13 teachers were in agreement (n=12) or were fine (n=1) that ELO-STEP lesson content supported the learning needs of students in mathematics and science/information literacy. Likewise, All of 13 teachers agreed (n==12) or were fine (n=1) with the statement "Overall I felt the ELO-STEP model was successful in helping students engage in enriched & accelerated

academic work in science/information literacy." These findings suggest that all of the teachers were in agreement with the following aspects of ELO-STEP: a) the lesson content supported the learning needs of students, b) the model was successful in helping students engage in enriched & accelerated academic work, c) the curriculum was well-designed, and d) the students were motivated and engaged. In addition, about two thirds of the survey respondents agreed or strongly agreed that they were provided with sufficient time to set up their classes (9) and also had enough time for lesson planning (10).

Teacher's comments pertaining the program strengths were, "well-designed ELO-STEP curriculum", "motivated and engaged students", "supportive parents", and "the use of technology for instruction". The top three areas identified by teachers for ELO-STEP improvement included, "Lack of sufficient time", "The curriculum was difficult to implement in summer schedule" and "The need more collaboration with colleagues".

***Evaluation Question 3: What was parents' feedback on ELO-STEP in its first year?***

As shown in Table 3a, almost all respondents strongly agreed or agreed (*n*=123, 97%) with the statements, "My child enjoyed the ELO-STEP program this summer". A similar level of agreements was found with the statement, "My child sees him/herself as a "smart" kid at school" (*n*=118, 95%). Additionally, a high majority of responding parents strongly agreed or agreed that the ELO-STEP information was communicated clearly in a language that they could easily understand (*n*=119, 93%) and in a timely manner (*n*=112, 88%).

Table 3a. ELO-STEP Parent Survey Responses

| | Strongly Disagree | | Disagree | | It is Fine | | Agree | | Strongly Agree | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| Information about ELO-STEP was communicated to me clearly in a language that I could easily understand (*N*=128). | 1 | 0.8 | 0 | 0.0 | 8 | 6.3 | 26 | 20.3 | 93 | 72.7 |
| Information about ELO-STEP was communicated in a timely fashion (*N*=127). | 2 | 1.6 | 4 | 3.1 | 9 | 7.1 | 26 | 20.5 | 86 | 67.7 |
| My child enjoyed the ELO-STEP program this summer (*N*=127). | 0 | 0.0 | 0 | 0.0 | 4 | 3.1 | 23 | 18.1 | 100 | 78.7 |
| My child sees him/herself as a "smart" kid at school *(N*=124). | 0 | 0.0 | 0 | 0.0 | 6 | 4.8 | 38 | 30.6 | 80 | 64.5 |

The parents' responses for open-ended questions were summarized by the evaluators according to four themes: ELO-STEP impact on their children, future program participation of their children, ELO-STEP program strengths, and its areas for improvement. A parent could make more than one comment for each open-ended question.

*Program Impact on Students*. As shown in Table 3b, there were 87 comments for the question, "Did you notice any changes in your child's thinking?" from parents who provided comments. A quarter or fewer of the respondents indicated that they notice changes in their children's interest (25%), confidence (24%), motivation (21%), and awareness of environment (15%) after the ELO-STEP participation. There were 74 comments for another open-ended survey question, "How do

you think this program will impact your child in 3rd grade? (Table 3b). The respondents thought ELO-STEP would help their children become more prepared (41%), motivated (15%), and confident (12%) in Grade 3.

Table 3b. ELO-STEP Impact on Students as Reported by Parents

| Did you notice any changes in your child's thinking? If yes, explain. | | |
|---|---|---|
| | n | % |
| Total comments | 87 | 100.0 |
| Interest | 22 | 25.3 |
| Confidence | 21 | 24.1 |
| Motivation | 18 | 20.7 |
| Awareness of environment | 13 | 14.9 |

| How do you think this program will impact your child in 3rd grade? | | |
|---|---|---|
| | n | % |
| Total Comments | 74 | 100.0 |
| More prepared | 30 | 40.5 |
| Motivation to learn | 11 | 14.9 |
| Confidence | 9 | 12.2 |
| Chrome book skills | 6 | 8.1 |
| Thinking skills | 5 | 6.8 |
| Appreciate science | 4 | 5.4 |
| Research skills | 4 | 5.4 |
| Better performance | 3 | 4.1 |
| Science skills | 2 | 2.7 |

*Future Participation.* Table 3c shows that of 121 parents who provided comments, all respondents (100%) indicated that they would consider accelerated or enrichment opportunities for their children in the future. About 74% of 107 commenting parents said "Yes" when asked, "If invited again what is the likelihood of your child participating in the program if it expands to 4th grade next summer"? The remaining 26% replied that it was either "Highly likely" or "Possible" to have their children participate in ELO-STEP in the future.

Table 3c. Future Plans for Children's Participation in Enrichment Opportunities Parents

| In the future, I would consider accelerated or enrichment opportunities for my child | | |
|---|---|---|
| | n | % |
| Total comments | 121 | 100.0 |
| Yes | 121 | 100.0 |
| If invited again what is the likelihood of your child participating in the program if it expands to 4th grade next summer? | | |
| | n | % |
| Total comments | 107 | 100.0 |
| Yes | 79 | 73.8 |
| Highly Likely | 22 | 20.6 |
| Possible | 6 | 5.6 |

*Program Strengths.* In another open-ended question, parents were asked about what they liked about ELO-STEP; 68% of 117 respondents liked the "learning experience of the program and the teachers", 25% liked everything, 4% liked the cost, and 3% liked the activities (Table 3d).

Table 3d. Program Strengths for ELO-STEP as Reported by Parents

| What do you like about ELO-STEP? (Learning, teacher, food, transportation, information, activities, cost, etc.) | | |
|---|---|---|
| | n | % |
| Total comments | 117 | 100.0 |
| Learning experience and teachers | 79 | 67.5 |
| Everything | 29 | 24.8 |
| Cost | 5 | 4.3 |
| Activities | 4 | 3.4 |

*Suggestions for Program Improvement.* When parents were asked about their suggestion for program improvement, 68 commented. Of those commented, 37% (*n*=25, 37%) thought everything was good. The other frequently cited areas for program improvement, as shown in Table 3e, included extended time (24%, *n*=16), more information (*n*=8, 12%), and more activities (*n*=7, 10%).

Table 3e. Areas of Improvement for ELO-STEP as Reported by Parents

| What are some suggestions for improvement? (learning, teachers, food, transportation, activities, cost, etc.) | | |
|---|---|---|
| | n | % |
| Total comments | 68 | 100.0 |
| Everything was good. | 25 | 36.8 |
| Extended time | 16 | 23.5 |
| More information | 8 | 11.8 |
| More activities | 7 | 10.3 |
| Food (provide menu and healthier food) | 6 | 8.8 |
| More hands-on experience | 3 | 4.4 |
| More programs | 3 | 4.4 |

Overall, parents had positive feedback toward ELO-STEP. According to parents, the major program strengths were the learning experience and dedicated teachers. The top three areas for program improvement included extended time, more activities for students, and more program information for parents.

**Summary**

At least 95% of respondents was in agreement with the statements, "My child enjoyed the ELO-STEP program this summer" and "My child sees him/herself as a "smart" kid at school" Additionally, a high majority of parents agreed that the ELO-STEP information was communicated clearly in a language that they could easily understand (93%) and in a timely manner (88%).

When asked, "Did you notice any changes in your child's thinking?" a total of 87 comments were provided by parents. A quarter or fewer of the respondents notice changes in their children's

interest (25%), confidence (24%), and motivation (21%). There were 74 comments for another open-ended survey question, "How do you think this program will impact your child in 3rd grade?" The most frequent response was that ELO-STEP would help their children become more prepared (41%), in Grade 3.

Of 121 parents commenting, all indicated that they would consider accelerated or enrichment opportunities for their children in the future. Another open-ended asked "If invited again what is the likelihood of your child participating in the program if it expands to 4th grade next summer"? Of 107 respondents, 74% said, "Yes" and the remaining 26% replied that it was either "Highly likely" or "Possible" to have their children participate in ELO-STEP in the future.

Parents were asked about what they liked about ELO-STEP. The most frequent response (cited by 68% of 117 respondents) concerned the "Learning experience of the program and the dedicated teachers" followed by "Liked everything" (cited by 25% of respondents). The most frequent response for program improvement was also "everything was good" (cited by 25 or 37% of 68 commenting parents).

# SECTION II. Outcome Evaluation

This section include evaluation purposes, questions, design, samples, measures, analytical procedures; and findings.

## Evaluation Purposes and Questions

The outcome evaluation addressed the effectiveness of ELO-STEP in improving reading and mathematics performance of students who participated in the program. The following evaluation questions, developed in collaboration with program staff, guided the outcome evaluation.

*Question 1. What were the demographic characteristics of students who participated in the 2015 ELO-STEP by gender, race/ethnicity, and services received?*

*Question 2. How did the 2015 ELO-STEP participants perform in mathematics and reading in fall of 2015–2016, compared with their peers who were invited but did not participate? Did the academic benefit of ELO-STEP vary by student groups with regard to race/ethnicity and services received?*

## Design, Samples and Measures

*Design*. To address the effectiveness of ELO-STEP, the analyses of student achievement relied on a quasi-experiment design by including a comparison group as described by Shadish, Cook, & Campbell (2002). A quasi-experimental design compares outcomes for group of students who participated in an intervention program with a comparison group of students who did not but were

similar on observable characteristics (Institute of Education Sciences, 2016). Specifically, a nonequivalent control group, pretest-posttest design was used to assess the reading and mathematics outcomes associated with students' participation in ELO-STEP (Figure 1). As documented in the literature, the stated design is the most appropriate one in assessing the effectiveness of any program among the quasi-experimental designs (Bordens & Abbott, 2008; Fraenkel & Wallen, 2009; Shadish, Cook & Campbell, 2002; Isaac & Michael, 1995).

Disentangling program effects from contextual and participant factors in quasi-experimental designs involves strategic consideration for data, design, and analysis. For this quasi-experimental design, two control techniques were simultaneously employed to mitigate limitations such as the possibility of selection bias (Shadish, Cook & Campbell, 2002) and hence, improving the internal validity of evaluation findings: control by study design and control by statistical techniques (a statistical adjustment for the baseline characteristics). To control by study design, the nonparticipant but invited Title I students were included in the comparison group to naturally control for selection bias (since they met the selection criteria to be included in the ELO-STEP treatment). To further mitigate the possibility of selection bias and the threat of plausible rival hypothesis, advanced statistical analyses were conducted (Campbell and Stanley, 1963; Shadish, Cook & Campbell, 2002) to evaluate the effectiveness of the program.

*Figure 1*. The Evaluation Design of the ELO-STEP Program

| | Pre-program | ELO-STEP | | Post-program | |
|---|---|---|---|---|---|
| ELO-STEP Student Group | $O_1$ | => | $X$ | => | $O_2$ |
| Comparison Group (Non-STEP) | $O_1$ | => | $C$ | => | $O_2$ |

$O_1$ – Spring 2015 local assessment results (InView and AP-PR) for Grades 2
$X$ – ELO-STEP summer treatment 19 days, 2015
$C$ – Non-ELO-STEP treatment
$O_2$ – Fall 2015 MAP-R and MAP-M for Grades 3 in Mathematics and Reading

*Study Samples.* Teachers and staff identified and invited 390 incoming Grade 3 students who met selection criteria to participate in ELO-STEP in summer of 2015. Among all the invitees, 234 students participated and 160 did not. Because the invited nonparticipants met the selection criteria, they were included in the comparison group for estimating the effects of ELO-STEP program. Not all students had data on all measures in two points in time (spring 2015 and fall 2015), so the number of students in the samples were slightly different across measures and content areas.

*Student Characteristics.* The measures, addressing the first evaluation question included gender, race/ethnicity, and services that students received in 2015–2016 school year. The services received referred to the English for Speakers of Other Languages (ESOL), Free and Reduced-priced Meal Systems (FARMS), and special education services. These measures were extracted from MCPS official enrollment data.

*Pre-program Measures*. Pre-program measures for addressing the second evaluation question included InView and AP-PR. InView has been administered to Grade 2 students in MCPS since the 2011–2012 school year and was used in this study as one of the criteria to identify students for accelerated instruction. InView is a norm-referenced test focusing on quantitative skills predictive of student academic success (CTB/McGraw-Hill, 2004). The test assesses nonverbal and verbal abilities with five subtests. Nonverbal ability measures include three subtests: sequences, analogies, and quantitative reasoning. In the sequences subtest, students are presented with symbols and required to complete a given sequence. The analogy subtest assesses a student's ability to identify relationships among pictures. The quantitative reasoning subtest examines the ability to think about numbers and solve a problem through reasoning process. The verbal ability measure includes verbal reasoning-words and verbal reasoning-context. In the verbal reasoning-words subtest, students are presented verbal items that "require deductive and analytical reasoning." In the verbal reasoning–context subtest, students read short passages and draw their conclusions (CTB/McGraw-Hill, 2004). The test reliability coefficients range from .80 to .95 (CTB/McGraw-Hill, 2004). The InView total score is the composite score of the five subtests, which was used as a covariate to control for any achievement differences between the treatment and comparison groups at the end of Grade 2 before ELO-STEP.

*Post-program or Outcome Measures.* The post-program measures (dependent variables) in analytical models included MAP in Reading (MAP-R) and MAP in Mathematics (MAP-M). Please note that in the evaluation plan, data of Monitoring Instructional Reading Levels (MIRL) in fall 2015 was cited as one of the outcome measures. However, only 69 out of 394 (17.5%) students in the ELO-STEP group and comparison group had MIRL data in October 2015. As a result, MIRL data were not included in the analyses.

MAP-R and MAP-M are computer adaptive achievement tests developed by NWEA. MCPS has been administering the MAP-R in Grades 3–8 since 2004 and MAP-M after a pilot study in 2011. MAP-R measures five reading areas: Word recognition and vocabulary, Reading Comprehension–Literal, Reading Comprehension–Inferential/Interpretive, Reading Comprehension-Evaluation, and Literary Response and Analysis. MAP-M measures algebraic concepts, computation, geometry, measurement, number sense and numeration, statistics, probability and graphing (NWEA, 2011). Scores on MAP-R and MAP-M are reported in RIT (Rasch unIT) scale. The RIT scores report student performance on an equal-interval scale (NWEA, 2008). MAP-R and MAP-M scores in fall 2015 were used as outcome measures to examine the ELO-STEP program impact on student academic performance.

## Analytical Procedures

*Descriptive statistics.* The ELO-STEP student characteristics were analyzed using descriptive analyses.

*Bivariate statistics. T*-test and chi-square statistics were used to identify significant academic difference between the ELO-STEP participants and their peers in the comparison group before exposure to ELO-STEP. T-tests were used when pre-program measures were scale scores such as

(InView), and chi-square was used when outcomes were categorical, such as the proportions of students meeting Grade 2 reading benchmark (AP-PR).

*Advanced statistical models.* Analyses for each of the outcome measures were conducted separately. Subgroup analyses were conducted only if a group had 30 or more students, to make sure that the sample size was sufficient enough to yield stable statistics. The Analysis of Covariance (ANCOVA) was used to test for significant differences between the two groups of students' mean RIT scores on MAP-R (Campbell & Stanley, 1963; Kirk, 1995). ANCOVA is commonly used as an analytical procedure on the data collected from quasi-experimental designs. It assesses the effects of an intervention program while controlling for covariates, particularly a pretest, that might confound the effects of the program (Campbell & Stanley, 1963; Judd, Smith, & Kidder, 1991; Institute of Education Sciences, 2016). In examining the group means differences pertaining to MAP-M, InView total scale scores in spring of the previous school year was used as a covariate. To test for significant difference between two group of students (ELO-STEP vs. non-ELO-STEP) pertaining to their MAP-R test scores, advanced statistical models were constructed which controlled for students' prior abilities as measured by the Grade 2 reading benchmark (AP-PR). Only students who had complete data for both of these outcome measures and also had prior performance measures were included in the analyses.

*Effect size.* The statistical analyses were supplemented with the computation of effect size statistics. A small mean difference between the treatment and comparison group may-be judged to be statistically significant when a sampling error is small due to a large sample size. Conversely, a relatively large mean difference may be judged to be not statistically significant when a sampling error is large due to a small sample size. Therefore, several researchers (e.g., Carver, 1993; Levin, 1993; Thompson, 1995; American Psychological Association, 2001) suggest that it would be prudent to report the results of statistical significance tests as well as estimates of the practical significance (e.g., the effect size). One of the most common effect size measures is the standardized mean difference, Cohen's *d* by which an ES of 0.2 is considered small, an ES of at least 0.5 is considered medium, and an ES of 0.8 or greater is considered large (Cohen, 1988). The effect size index is scale invariant or metric-free and can be used to interpret the patterns of outcome measures' differences between groups of students and across different measures (Bloom et al., 2008; Lipsey et al, 2012). The Cohen's *d* index has been shown to be upwardly biased when the sample size is small. (Institute of Education Sciences, 2016). So caution should be exercised in interpretation of the effect sizes when the study samples are small.

## Outcome Evaluation Findings

Results are shown in the order of the evaluation questions.

### *Evaluation Question 1. What were the demographic characteristics of students who participated in the 2015 ELO-STEP by gender, race/ethnicity, and services received?*

Table 4 displays characteristics of ELO-STEP participants and their peers who were invited but did not participate in the program. In summer of 2015, 394 students were selected and invited to participate in ELO-STEP but 234 students actually attended the program (59%). The ELO-STEP

participants, had a higher percentage of Black or African American (30% vs. 24%), Hispanic/Latino (43% vs. 39%) and Asian (15% vs. 13%) compared to non-participants. On the other hand, the percentage of White students in the ELO-STEP program was lower than their peers in the comparison group (8% vs. 17%). Likewise, a lower proportion of ELO-STEP participants received ESOL (8% vs. 13%) or FARMS (59% vs. 51%) services than their counterparts in the comparison group. The ELO-STEP group had a slightly higher percentage of male (56% vs. 55%) and a lower percentage of female (44% vs. 45%) students than the group of students in the comparison group. About 1% of the program participants and 3% of nonparticipants received special education services in 2015–2016.

Table 4. Characteristics of ELO-STEP and Comparison Groups

| | ELO-STEP Participants | | Invitees Who Did Not Participate | |
|---|---|---|---|---|
| | *N* | *%* | *N* | *%* |
| Total | 234 | | 160 | |
| Female | 103 | 44.0 | 72 | 45.0 |
| Male | 131 | 56.0 | 88 | 55.0 |
| American Indian/Alaskan | -- | -- | -- | -- |
| Asian | 34 | 14.5 | 21 | 13.1 |
| Black or African American | 70 | 29.9 | 39 | 24.4 |
| Hispanic/Latino | 101 | 43.2 | 63 | 39.4 |
| Pacific Islanders/Hawaii | 1 | 0.4 | 0 | 0.0 |
| White | 19 | 8.1 | 27 | 16.9 |
| Two or More Races | 9 | 3.8 | 10 | 6.3 |
| ESOL* | 18 | 7.7 | 20 | 12.5 |
| FARMS* | 137 | 58.5 | 81 | 50.6 |
| Special Education* | 3 | 1.3 | 5 | 3.1 |

*Note.* *Refers to services received in 2015–2016 school year. There were no American Indian students.

***Evaluation Question 2: How did the 2015 ELO-STEP participants perform in mathematics and reading in fall of 2015–2016, compared with their peers who were invited but did not participate? Did the benefit of ELO-STEP vary by student groups with regard to race/ethnicity and services received?***

To ensure that the ELO-STEP and comparison groups were similar in academic performance prior to the program, baseline equivalency of student achievement was examined with scores from Grade 2 InView and AP-PR reading benchmark. The goal was to examine academic differences between the two groups of students before the exposure to ELO-STEP. The analyses revealed that the ELO-STEP group of participants and the nonparticipants group performed at a similar level on InView total scores (pre-program measures). The disaggregation of results indicated that ELO-STEP participants receiving FARMS service had significantly higher InView scores than their nonparticipating peers. Similar analyses revealed a significantly higher percentage of all ELO-STEP participants met the Grade 2 reading benchmark than their counterparts. Subgroup analyses revealed a significantly higher percentage of the ELO-STEP participants receiving FARMS services met the reading benchmark in Grade 2 than nonparticipating FARMS recipients. As a results, Grade 2 Inview total scale scores and Grade 2 reading benchmark on AP-PR were included

in statistical models to control for the students' prior academic achievement. The detailed analyses are included in Appendix C. The significant differences, based on bivariate analyses, justified the use of pre-program performance as covariates or control variables when the program impact was estimated.

The program impact was examined by comparing MAP-R and MAP-M scores between ELO-STEP group and the comparison group. Analyses were conducted separately for all students, Black or African American, Hispanic/Latino students, and FARMS recipients. Note that comparisons between groups were made when a subgroup had 30 or more students. In this study, only three subgroups in the data set had 30 or more students (Black or African American, Hispanic/Latino students, and FARMS recipients). The effect sizes were calculated to show if the program impact was practically significant.

***Mathematics***. Table 5a presents adjusted means on fall MAP-M for the ELO-STEP and comparison groups after controlling for initial differences on InView. The calculated adjusted mean difference (1.56) for all students between the two groups (attendees and non-attendees) was statistically significant ($p < .05$) in favor of ELO-STEP group. The magnitude of the difference was close to be practically significant (effect size =.19).

Disaggregation of the data by race showed that differences between attendees and non-attendees were statistically significant for two of three subgroups. However, the magnitude of the differences were practically significant for all three subgroups examined in favor of ELO-STEP attendees. The analyses did not show a statistically significant difference between participants and nonparticipants of Black or African American students (Table 5a). However, the adjusted mean difference (2.17) was practically significant (effect size=.27), suggesting that the magnitude of difference was meaningful in educational settings. The same analyses revealed that Hispanic/Latino ELO-STEP participants performed significantly higher than their nonparticipant peers on fall MAP-M ($p < .05$). The adjusted mean difference (3.22) was also practically significant (effect size=.40). Likewise, the ELO-STEP FARMS recipients outperformed ($p < .05$) their nonparticipating peers on fall MAP-M. The adjusted mean difference (2.18) was practically significant as well (effect size=.27).

Table 5a. Adjusted Means of MAP-M RIT Scores for ELO-STEP Participants and their Peers

| | Means of MAP-M RIT Scores in Fall 2015 | | | | | | ELO-STEP Program Effect | | |
|---|---|---|---|---|---|---|---|---|---|
| | ELO-STEP Participants | | | Nonparticipants | | | ELO-STEP vs. Non-ELO-STEP | | |
| | *N* | Original Mean (SD) | Adjusted Mean | *N* | Original Mean (SD) | Adjusted Mean | Adjusted Mean Difference | St. Error | Effect Size |
| All | 230 | 201.89 (8.43) | 201.73 | 148 | 199.94 (7.95) | 200.18 | 1.56* | 0.73 | 0.19 |
| Black or African American | 69 | 202.10 (8.34) | 201.92 | 33 | 199.36 (6.68) | 199.75 | 2.17 | 1.51 | 0.27 |
| Hispanic/Latino | 99 | 201.01 (7.59) | 200.68 | 61 | 196.93 (8.11) | 197.46 | 3.22* | 1.11 | 0.40 |
| FARMS | 135 | 201.23 (8.08) | 200.65 | 75 | 197.43 (7.79) | 198.47 | 2.18* | 1.01 | 0.27 |

*Note*. SD = Standard Deviation. *$p < .05$.

***Reading***. As shown in Table 5b, the comparison of the two groups of students on their MAP-R produced mixed results. For all students, the adjusted mean difference (1.52) was neither statistically ($p > .05$) nor practically (effect size=.14) significant, suggesting that ELO-STEP students as a group performed as well as their peers in the comparison group as measured by the fall 2015 MAP-R. The analyses by race did not find a statistically significant ($p > .05$) difference between the two groups of Black or African American (ELO-STEP participants vs. non-ELO-STEP participants) as measured by fall 2015 MAP-R. Moreover, the adjusted mean differences (.5) in reading between the groups of students (attendees and non-attendees) was not practically significant (ES = .05). On the other hand, the adjusted mean difference (3.37) was statistically significant ($p < .05$) for Hispanic/Latino students (Table 5b). The magnitude of the mean difference was also practically significant (effect size =.32), indicating that the reading difference between ELO-STEP attendees and non-attendees was meaningful in educational settings. This suggested that Hispanic/Latino ELO-STEP participants performed significantly higher (both statistically and practically) than their nonparticipating peers after ELO-STEP, when their prior reading abilities were controlled for.

Parallel analyses did not find a statistically significant difference between ELO-STEP participants who received FARMS services and their counterparts in the comparison group. (Table 5b). The adjusted mean difference between the two groups of students (2.75) was not statistically significant ($p > .05$), but the difference was meaningful in an educational setting (effect size=.27).

Table 5b. Adjusted Means of MAP-R RIT Scores for ELO-STEP Participants and their Peers

| | Means of MAP-R RIT Scores in Fall 2015 | | | | | | ELO-STEP Program Effect | | |
|---|---|---|---|---|---|---|---|---|---|
| | ELO-STEP Participants | | | Nonparticipants | | | ELO-STEP vs. Non-STEP | | |
| | *N* | Original Mean (SD) | Adjusted mean | *N* | Original Mean (SD) | Adjusted Mean | Adjusted Mean Difference | St. Error | Effect Size |
| All | 231 | 202.77 (9.97) | 202.49 | 148 | 200.54 (11.71) | 200.97 | 1.52 | 1.11 | 0.14 |
| Black or African American | 69 | 203.26 (9.63) | 203.16 | 33 | 202.45 (8.30) | 202.66 | 0.50 | 1.93 | 0.05 |
| Hispanic/Latino | 100 | 200.44 (10.03) | 200.10 | 61 | 196.18 (11.13) | 196.74 | 3.37* | 1.68 | 0.32 |
| FARMS | 136 | 201.07 (10.17) | 200.85 | 76 | 197.70 (9.56) | 198.09 | 2.75 | 1.42 | 0.27 |

*Note*. SD = Standard Deviation. * $p < .05$.

***Comparison of Program Impact in Reading and Mathematics***. The impact of ELO-STEP on student reading and mathematics performance as measured by effect sizes are shown in Figure 1. The effect sizes in mathematics ranged from 0.19 for all students to 0.40 for Hispanic/Latino students, while the effect sizes in reading ranged from 0.05 for Black or African American students to 0.32 for Hispanic/Latino students. The outcome analyses suggested that ELO-STEP intervention reinforced academic achievement of students impacted by poverty. In mathematics, the benefits of the program were evident for all of the four comparisons made, suggesting its effectiveness in improving performance of all students, Black or African American, Hispanic/Latino, and students receiving FARMS beyond that observed in similar peers. In reading, parallel analyses found a

benefit for two of four comparisons made, indicating that ELO-STEP positively impacted the reading performance of Hispanic/Latino and those students receiving FARMS.

A comparative analyses of effect sizes revealed that the largest ELO-STEP impact was found for Hispanic/Latino students in both reading (effect size=.32) and mathematics (effect size=.40). The second largest impact was found for Black or African American students in mathematics (effect size=.27). By contrast, the lowest program impact was observed for Black or African American students in reading (effect size=.05). For FARMS recipients, the program impact was the same (effect size=.27) for both reading and mathematics.

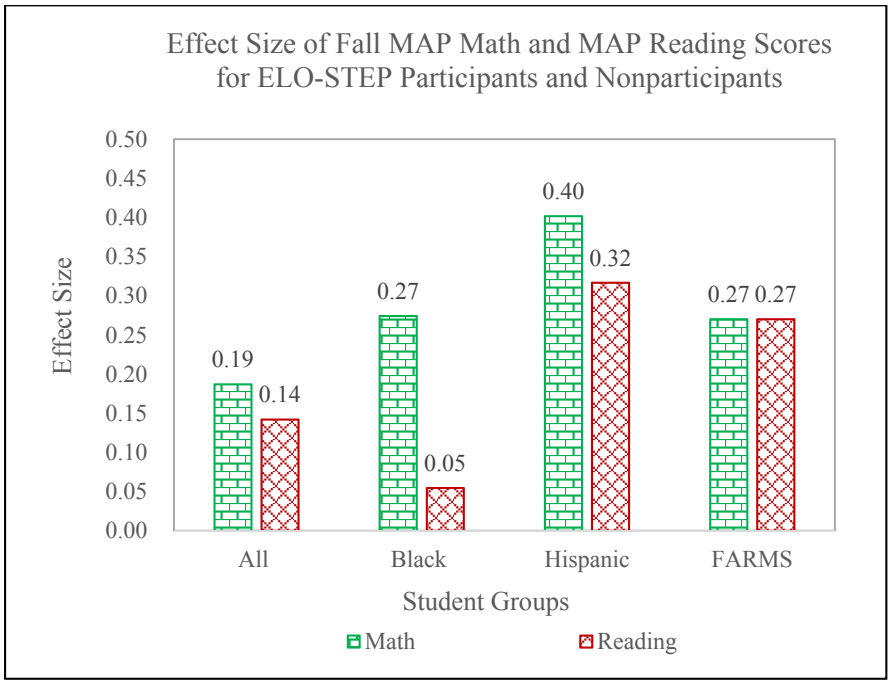


*Figure 2.* A Comparison of Effect sizes for Impact of ELO-STEP

## Summary

The benefits of the ELO-STEP varied by content area, with more positive findings in mathematics than in reading. In mathematics, the benefits of ELO-STEP were evident for all of four comparisons made. In reading, a benefit for an entire participants was evident for two of four comparisons made. The analyses revealed that the largest ELO-STEP impact was found for Hispanic/Latino students in both reading (ES=.32) and mathematics (ES=.40). The second largest impact was found for Black or African American students in mathematics (.27). By contrast, the lowest program impact was observed for Black or African American students in reading (ES=.05) followed by all ELO-STEP students in reading (ES=.14).

# SECTION III: Discussion and Conclusion

In the last decade, the number of intervention programs has grown, but more needs to be learned about the benefits associated with these programs and their effects on students' educational experiences. In school districts, scarce resources are usually spent to implement rather than evaluate programs. As a result, too few resources are committed in evaluating the efficacy of educational initiatives (Bonner-Tompkins, Richards, & Scruggs, 2013). This evaluation examined the implementation and outcomes of ELO-STEP that was first offered in summer of 2015 as an equity strategy to narrow the achievement and opportunity gaps among high achievers in Title I schools.

Augustine, et al. (2013) argued that effective summer programs providing high-quality and enriched academic opportunities to students share a number of features. Some of those included: a) Structured instruction (in reading, writing, or mathematics) that are consistent with state and local content standards and are matched with students' academic needs; b) Adequate intensity and duration of instruction (three hours a day, five days per week, for five to six weeks); c) Lower student-to-adult ratios than those in the regular school year; and d) Supplement academic content with enrichment activities. The authors also commented that enrichment activities attract students to attend summer programs regularly and help bridge the "opportunity gap" that exists between low-income and higher-income students during the summer. The findings of this evaluation indicated that ELO-STEP features were similar to those identified by Augustine, et al. (2013). Specifically, the current study showed that ELO-STEP benefitted 234 above average students by providing free breakfast, lunch, transportation, and rigorous learning opportunities for 4 hours per day for 19 days with a class size of about 20 students.

The formative evaluation found that the ELO-STEP students had mostly positive educational experiences with a vast majority of them reporting that their math and science teachers made those subjects interesting. The ELO-STEP teachers conveyed: a) the lesson content supported the learning needs of students, b) the model was successful in helping students engage in enriched & accelerated academic work, c) the curriculum was well-designed, and d) the students were motivated and engaged. Likewise, parents were very positive in their feedback reporting that their child enjoyed the learning experience associated with the program, liked the teachers, and will participate in enrichment opportunities in the future.

Findings from outcome evaluation indicated that the ELO-STEP programing might be used as a potential mechanism to improve outcomes for low income, above average students. It was found that the benefits of ELO-STEP varied by content area, with more positive findings in mathematics than in reading. That is, there were significant differences between the two groups of students (participants vs. non-participants) in favor of ELO-STEP for of all students, Black or African American, Hispanic/Latino, and FARMS recipients. Parallel analyses found an academic benefit of the summer program in reading for Hispanic/Latino and FARMS recipients.

A comparative analyses of effect sizes revealed that the largest ELO-STEP impact was found for Hispanic/Latino students in both reading (effect size=32) and mathematics (effect size=.40). The second largest impact was found for Black or African American students in mathematics (effect size=.27). By contrast, the lowest program impact was observed for Black or African American

students in reading (effect size=.05). For FARMS recipients, the program impact was the same (effect size=.27) for both reading and mathematics.

In conclusion, this evaluation found that ELO-STEP consisted of a combination of several best practices similar to those identified in the literature (Olszewski-Kubilius and Clarenbach, 2012) for supporting highly able students in schools impacted by poverty including: 1) the use of multiple measures in selecting the students; 2) the presence of enriched curriculum for nurturing critical and creative thinking skills through engaging, hands-on, and rigorous instruction; 3) the presence of teachers' professional development; 4) the presence expanded learning time outside of the normal school day; and 5) the equalized opportunities between more affluent and less affluent families by providing summer learning to students impacted by poverty. The use of the above stated practices most likely contributed in the positive educational experience of ELO-STEP students.

## Recommendations

- Explore reasons why many students are not considering a career in mathematics and science. The survey item, "I would like to have a career in math" was agreed to by slightly over a half in the post and the pre surveys. Parallel to mathematics, less than a half of students agreed, "I would like to have a career in science".

- Explore avenues to encourage Title I students to participate in after school mathematics and science programs. Analyses revealed that only less than a third of students in the post and pre surveys agreed, "I participate in after school programs in my school" for both mathematics and science.

- Continue with the use of the instructional mathematics practices for ELO-STEP. The benefits of the ELO-STEP varied by content area, with more positive findings in mathematics than in reading. In mathematics, the benefits of ELO-STEP were evident for all of four comparisons made. That is, there were significant differences between the two groups of students (participants vs. non-participants) in favor of ELO-STEP for of all students, Black or African American, Hispanic/Latino, and FARMS recipients.

- Examine and revise the reading instructional lessons to ensure adequacy in scope and rigor. This study showed a more pronounced positive impact of the ELO-STEP on students' mathematics than on reading performance. In reading, the program benefits were evident for participants in only two of the four comparisons made. Differences between participants and non-participant were significant in reading, in favor of ELO-STEP, for two subgroups, Hispanic/Latino and FARMS recipients.

- Revisit the daily schedule for ELO-STEP classes and allocate more time for literacy activities. During the summer, math instructional practices and activities (75 minutes) were longer than reading (30 minutes on information literacy). The shorter instructional time in literacy may have attributed to less pronounced impact of the ELO-STEP on students' reading performance.

- Explore the possibilities of providing information and/or technical assistance to ELO-STEP teachers to enable them conduct Action Research (AR) in their classrooms. AR can provide an opportunity for teachers to: a) systematically collect data on their students via multiple measures, b) identify patterns in the data, c) think about ways to improve their delivery of instructions, student learning, and student engagement and d) collaborate with colleagues by sharing experiences and best practices.

- Increase the number of students accessing ELO-STEP via outreaching, especially to highly able students in Title I schools so that those students would have more opportunity to be selected for the highly gifted centers in succeeding grades.

- Confirm the patterns of the findings in this report with at least one more cohort of students who attended ELO-STEP.

- Conduct future studies to include the examination of students' instructional experiences as they transition to successive grade levels.

# SECTION IV: Strengths and Limitations

## Strengths

The generalization of the survey results depends mostly upon the sampling techniques and the response rates. In this study, the census administration of the surveys guarded against the sampling error by including all the major ELO-STEP stakeholders (teachers, students, parents) in the sampling frame so that everyone had a chance to participate. The response rates in this study was high for teachers and students and teachers and moderate for parents. The generalizability of any research findings, however, is ultimately an empirical question that may be answered by replicating the study with different subjects and settings.

## Limitations

The ultimate goal of any program is to be effective and produce its intended outcomes. The school district accountability efforts have often been challenged to develop procedures that determine the effects of its interventions (or programs) on student achievement within the typical implementation setting (lack of randomization of students to a program). Many researchers assert experimental designs are necessary to make casual conclusion about program effects (Ashenfelter & Card, 1985; Barnow, 1987; Burtless & Orr, 1986; Hedrick, Bickman, & Rog, 1993; Shadish, Cook, & Campbell, 2002; Institute of Education Sciences, 2016). The overwhelming strength of a randomized experiment is its ability to rule out threats to internal validity by controlling all known and "unknown" extraneous variables. (Hedrick et al., 1993, P. 56). Randomization are not often

feasible in educational settings due to ethical, practical, and logistic issues. School administrators commonly believe that it is unethical to deny a potentially beneficial program to students who need the program merely for evaluation purposes. In addition, there are also many practical and logistical issues that may occur during the course of the evaluation. For example, a student assigned to a treatment group may transfer to another school system. Or in some other cases, students randomly assigned to and participated in a program may be excluded from the analyses due to lack of complete data record for some of the students (Modarresi et al., 2007; Li, et al., 2006). Accordingly, a quasi-experimental design without randomized assignment of students either to program or a comparison group (Isaac & Michael, 1995; Shadish, Cook & Campbell, 2002) is one of the alternatives used to determine a program effect in educational settings. This evaluation used a non-equivalent control group design—a frequently used type of quasi-experimental design to examine the effects of ELO-STEP on student academic achievement. Therefore, the effects of the program on students' achievement are confounded by the probability that students in the comparison group may have benefited from similar interventions.

In closing, ELO-STEP effectiveness was assessed mostly by the performance of students entering the third grade in both reading and mathematics. Other program effects (e.g., having better critical skills, etc.) were not addressed by this study.

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# Appendix A

Table A1. FY 2016 Budget for ELO-STEP

| | Number of Teachers | Explanation | Cost |
|---|---|---|---|
| Teachers' salaries, setup and professional meeting | 14 | Setup refers to time for teachers to set up their classrooms prior to the start of the program. Teachers also participate in a one-hour staff meeting to review expectations and procedures. | $59,223.75 |
| Staff benefit | | | $4,819.37 |
| Instruction supplies/materials | | | $6,090.00 |
| Total STEP cost | | | **$70,133.12** |

Source: Received from MCPS Division of Title 1 Programs on Oct. 28, 2015.
*Note.* The ELO-STEP budget excludes transportation and meal cost.

# Appendix B

Table B1. Reponses on Pre-ELO-STEP Student Survey in Summer 2015

| | Pre-program Student Survey | Total | Strongly Agree | Agree | Disagree | Strongly Disagree | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|---|---|---|---|
| | | N | *n* | *n* | *n* | *n* | % | % | % | % |
| Q1 | I like math a lot. | 195 | 98 | 78 | 12 | 7 | 50.3 | 40.0 | 6.2 | 3.6 |
| Q2 | I do not have much interest in science. | 192 | 8 | 26 | 45 | 113 | 4.2 | 13.5 | 23.4 | 58.9 |
| Q3 | Science is easy for me. | 184 | 44 | 90 | 44 | 6 | 23.9 | 48.9 | 23.9 | 3.3 |
| Q4 | I am good at working math problems. | 195 | 105 | 72 | 15 | 3 | 53.8 | 36.9 | 7.7 | 1.5 |
| Q5 | I think science is interesting. | 197 | 125 | 55 | 9 | 8 | 63.5 | 27.9 | 4.6 | 4.1 |
| Q6 | I don't do very well in math. | 190 | 6 | 18 | 61 | 105 | 3.2 | 9.5 | 32.1 | 55.3 |
| Q7 | I would rather someone give me the answer to a hard science problem than work it out for myself. | 189 | 10 | 14 | 36 | 129 | 5.3 | 7.4 | 19.0 | 68.3 |
| Q8 | I am good at science. | 194 | 73 | 94 | 21 | 6 | 37.6 | 48.5 | 10.8 | 3.1 |
| Q9 | I like science a lot. | 188 | 119 | 41 | 23 | 5 | 63.3 | 21.8 | 12.2 | 2.7 |
| Q10 | I would like to have a career in science. | 183 | 47 | 47 | 57 | 32 | 25.7 | 25.7 | 31.1 | 17.5 |
| Q11 | Science is hard for me, even when I study. | 185 | 6 | 37 | 69 | 73 | 3.2 | 20.0 | 37.3 | 39.5 |
| Q12 | I don’t do very well in science. | 191 | 4 | 22 | 77 | 88 | 2.1 | 11.5 | 40.3 | 46.1 |
| Q13 | I like conducting science investigations. | 179 | 97 | 55 | 19 | 8 | 54.2 | 30.7 | 10.6 | 4.5 |
| Q14 | Math is easy for me. | 190 | 92 | 61 | 34 | 3 | 48.4 | 32.1 | 17.9 | 1.6 |
| Q15 | I would rather someone give me the answer to a hard math problem than work it out for myself. | 189 | 10 | 14 | 40 | 125 | 5.3 | 7.4 | 21.2 | 66.1 |
| Q16 | I often think "I can't do it" when a math problem seems hard. | 186 | 23 | 35 | 57 | 71 | 12.4 | 18.8 | 30.6 | 38.2 |
| Q17 | My science teacher at my school makes science fun. | 191 | 117 | 59 | 10 | 5 | 61.3 | 30.9 | 5.2 | 2.6 |
| Q18 | I would like to have a career in math. | 171 | 55 | 41 | 42 | 33 | 32.2 | 24.0 | 24.6 | 19.3 |
| Q19 | I like to play games that use numbers. | 185 | 75 | 82 | 20 | 8 | 40.5 | 44.3 | 10.8 | 4.3 |
| Q20 | I think I could do more difficult science work. | 184 | 63 | 70 | 37 | 14 | 34.2 | 38.0 | 20.1 | 7.6 |
| Q21 | I like conducting science experiments. | 186 | 106 | 53 | 18 | 9 | 57.0 | 28.5 | 9.7 | 4.8 |
| Q22 | I do not have much interest in math. | 191 | 12 | 21 | 51 | 107 | 6.3 | 11.0 | 26.7 | 56.0 |
| Q23 | My math teacher at my school makes math interesting. | 180 | 100 | 56 | 17 | 7 | 55.6 | 31.1 | 9.4 | 3.9 |
| Q24 | I think math is interesting. | 193 | 103 | 69 | 14 | 7 | 53.4 | 35.8 | 7.3 | 3.6 |
| Q25 | I often think "I can't do it" when a science problem seems hard. | 187 | 23 | 35 | 47 | 82 | 12.3 | 18.7 | 25.1 | 43.9 |
| Q26 | Math is hard for me, even when I study. | 182 | 10 | 25 | 52 | 95 | 5.5 | 13.7 | 28.6 | 52.2 |
| Q27 | I think I could do more difficult math work. | 185 | 87 | 65 | 22 | 11 | 47.0 | 35.1 | 11.9 | 5.9 |
| Q28 | I participate in after school math programs at my school. | 160 | 21 | 26 | 48 | 65 | 13.1 | 16.3 | 30.0 | 40.6 |
| Q29 | I participate in after school science programs at my school. | 155 | 26 | 17 | 46 | 66 | 16.8 | 11.0 | 29.7 | 42.6 |
| Q30 | I expect to have little use for science when I get out of school. | 174 | 45 | 47 | 36 | 46 | 25.9 | 27.0 | 20.7 | 26.4 |

Table B2. Reponses on Post-ELO-STEP Student Survey in Summer 2015

| | Post-program Student Survey | | Strongly Agree | Agree | Disagree | Strongly Disagree | Strongly Agree | Agree | Disagree | Strongly Disagree |
|---|---|---|---|---|---|---|---|---|---|---|
| | | N | *n* | *n* | *n* | *n* | % | % | % | % |
| Q1 | I like math a lot. | 191 | 105 | 59 | 16 | 11 | 55.0 | 30.9 | 8.4 | 5.8 |
| Q2 | I do not have much interest in science. | 187 | 4 | 11 | 56 | 116 | 2.1 | 5.9 | 29.9 | 62.0 |
| Q3 | Science is easy for me. | 180 | 49 | 78 | 45 | 8 | 27.2 | 43.3 | 25.0 | 4.4 |
| Q4 | I am good at working math problems. | 187 | 87 | 77 | 20 | 3 | 46.5 | 41.2 | 10.7 | 1.6 |
| Q5 | I think science is interesting. | 196 | 139 | 45 | 10 | 2 | 70.9 | 23.0 | 5.1 | 1.0 |
| Q6 | I don't do very well in math. | 184 | 6 | 19 | 51 | 108 | 3.3 | 10.3 | 27.7 | 58.7 |
| Q7 | I would rather someone give me the answer to a hard science problem than work it out for myself. | 188 | 9 | 15 | 39 | 125 | 4.8 | 8.0 | 20.7 | 66.5 |
| Q8 | I am good at science. | 188 | 95 | 74 | 15 | 4 | 50.5 | 39.4 | 8.0 | 2.1 |
| Q9 | I like science a lot. | 188 | 126 | 38 | 18 | 6 | 67.0 | 20.2 | 9.6 | 3.2 |
| Q10 | I would like to have a career in science. | 171 | 56 | 37 | 52 | 26 | 32.7 | 21.6 | 30.4 | 15.2 |
| Q11 | Science is hard for me, even when I study. | 178 | 11 | 26 | 52 | 89 | 6.2 | 14.6 | 29.2 | 50.0 |
| Q12 | I don’t do very well in science. | 189 | 7 | 19 | 53 | 110 | 3.7 | 10.1 | 28.0 | 58.2 |
| Q13 | I like conducting science investigations. | 187 | 117 | 40 | 23 | 7 | 62.6 | 21.4 | 12.3 | 3.7 |
| Q14 | Math is easy for me. | 191 | 78 | 67 | 35 | 11 | 40.8 | 35.1 | 18.3 | 5.8 |
| Q15 | I would rather someone give me the answer to a hard math problem than work it out for myself. | 188 | 12 | 11 | 36 | 129 | 6.4 | 5.9 | 19.1 | 68.6 |
| Q16 | I often think "I can't do it" when a math problem seems hard. | 188 | 31 | 34 | 50 | 73 | 16.5 | 18.1 | 26.6 | 38.8 |
| Q17 | My science teacher at my school makes science fun. | 190 | 133 | 47 | 6 | 4 | 70.0 | 24.7 | 3.2 | 2.1 |
| Q18 | I would like to have a career in math. | 164 | 51 | 37 | 39 | 37 | 31.1 | 22.6 | 23.8 | 22.6 |
| Q19 | I like to play games that use numbers. | 181 | 83 | 67 | 16 | 15 | 45.9 | 37.0 | 8.8 | 8.3 |
| Q20 | I think I could do more difficult science work. | 179 | 71 | 54 | 39 | 15 | 39.7 | 30.2 | 21.8 | 8.4 |
| Q21 | I like conducting science experiments. | 185 | 125 | 34 | 21 | 5 | 67.6 | 18.4 | 11.4 | 2.7 |
| Q22 | I do not have much interest in math. | 179 | 12 | 13 | 40 | 114 | 6.7 | 7.3 | 22.3 | 63.7 |
| Q23 | My math teacher at my school makes math interesting. | 183 | 111 | 55 | 9 | 8 | 60.7 | 30.1 | 4.9 | 4.4 |
| Q24 | I think math is interesting. | 182 | 101 | 55 | 20 | 6 | 55.5 | 30.2 | 11.0 | 3.3 |
| Q25 | I often think "I can't do it" when a science problem seems hard. | 190 | 22 | 35 | 44 | 89 | 11.6 | 18.4 | 23.2 | 46.8 |
| Q26 | Math is hard for me, even when I study. | 177 | 19 | 22 | 45 | 91 | 10.7 | 12.4 | 25.4 | 51.4 |
| Q27 | I think I could do more difficult math work. | 176 | 88 | 49 | 25 | 14 | 50.0 | 27.8 | 14.2 | 8.0 |
| Q28 | I participate in after school math programs at my school. | 166 | 27 | 15 | 50 | 74 | 16.3 | 9.0 | 30.1 | 44.6 |
| Q29 | I participate in after school science programs at my school. | 171 | 37 | 13 | 49 | 72 | 21.6 | 7.6 | 28.7 | 42.1 |
| Q30 | I expect to have little use for science when I get out of school | 177 | 50 | 33 | 32 | 62 | 28.2 | 18.6 | 18.1 | 35.0 |

# Appendix C

Table C1. Mean and Standard Deviation of MAP-P Math and InView Scores in Grade 2 for All ELO-STEP Participants and Their Comparison Group

| **Before ELO-STEP in Spring 2015** | ELO-STEP | *n* | Mean | Standard Deviation | Mean Difference | *p-value* |
|---|---|---|---|---|---|---|
| InView in Grade 2 Total Score | | | | | | |
| All Students | Participants | 234 | 416.2 | 26.9 | 2.49 | .38 |
| | Nonparticipants | 160 | 413.7 | 29.0 | | |
| Black or African American Students | Participants | 70 | 414.7 | 25.8 | 4.03 | .45 |
| | Nonparticipants | 39 | 410.7 | 27.9 | | |
| Hispanic/Latino Students | Participants | 101 | 412.3 | 22.5 | 5.38 | .14 |
| | Nonparticipants | 63 | 406.9 | 21.9 | | |
| FARMS Recipients | Participants | 137 | 414.2 | 24.1 | 10.03* | .00 |
| | Nonparticipants | 81 | 404.2 | 23.0 | | |