

**MEMORANDUM**

February 3, 2020

TO: Wenden Sanders  
Director, Fine Arts

FROM: Allison E. Matney, Ed.D.  
Officer, Research & Accountability

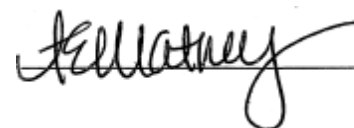
SUBJECT: **THE IMPACT OF A HOUSTON SYMPHONY PARTNERSHIP IN HISD ON ELEMENTARY STUDENTS' READING AND MATHEMATICS ACHIEVEMENT, ATTENDANCE, AND RETENTION IN ORCHESTRA AT MIDDLE SCHOOLS, 2019-2020**

Attached is a copy of the program evaluation conducted for the Fine Arts Department. The study explored the impact of students' participation in a Houston Symphony partnership at a targeted HISD elementary school. Treatment groups received (1) Core Enrichment Violin Only, (2) both Core Enrichment and After-school Violin, or (3) After-school Violin Only from Houston Symphony Community-Embedded Musicians. The control group was all other students at the school.

Key findings include:

- The Houston Symphony (HS) Core Enrichment/After-school Violin group had the highest combined English and Spanish STAAR mean reading and mathematics scale scores among third- and fifth-grade students in 2019, while the HS After-school Violin Only students had the highest mean scale scores among fourth-grade students.
- Paired t-test analyses showed statistically significant improvements in the mean STAAR mathematics scale scores of the HS Core Enrichment and the HS Core Enrichment/After-school treatment groups as well as the Non-HS control group as students progressed from third to fourth and from fourth to fifth grades (2018 to 2019).
- The highest increases in attendance rates over the past two years as students progressed from third to fourth and from fourth to fifth grades were among the HS Core Enrichment/Afterschool Violin group.
- Retention of the fifth-grade student cohort in orchestra at middle schools was eight percent, which is estimated to be below the national average.

Further distribution of this report is at your discretion. Should you have any further questions, please contact me at 713-556-6700.



AEM

Attachment

cc: Grenita Lathan  
Silvia Trinh  
Yolanda Rodriguez  
Margarita Gardea



# RESEARCH

Educational Program Report

**THE IMPACT OF A HOUSTON SYMPHONY  
PARTNERSHIP IN HISD ON ELEMENTARY STUDENTS'  
READING AND MATHEMATICS ACHIEVEMENT,  
ATTENDANCE, AND RETENTION IN ORCHESTRA AT  
MIDDLE SCHOOLS, 2019-2020**



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# EVALUATION REPORT

BUREAU OF PROGRAM EVALUATION

## *The Impact of a Houston Symphony Partnership in HISD on Elementary Students' Reading and Mathematics Achievement, Attendance, and Retention in Orchestra at Middle Schools, 2019–2020*

Prepared by Venita R. Holmes, Dr.P.H.

### Abstract

*This study explored outcomes related to students' participation in a Houston Symphony (HS) partnership at a targeted HISD elementary school. Students received weekly in-school core enrichment instruction and after-school violin instruction by Houston Symphony Community-Embedded Musicians throughout the 2018–2019 academic year. The study found that students in the HS Core Enrichment/After-school Violin group had the highest combined English and Spanish STAAR mean reading scale scores among third- and fifth-grade students in 2019, while the HS After-school Violin Only students had the highest mean scale score among fourth-grade students. In mathematics, the HS Core Enrichment/After-school Violin group achieved the highest mean scale score at the third and fifth-grade levels; whereas, the After-School Violin Only group attained the highest mean scale score at the fourth-grade level on the combined tests in 2019. Paired t-test analyses showed statistically significant improvements in the mean STAAR mathematics scale scores of the HS Core Enrichment and HS Core Enrichment/After-school groups as well as the Non-HS control group as students progressed from third to fourth and from fourth to fifth grades (2018 to 2019). Difference-in-differences (DiD) analyses revealed more consistent benefits in Houston Symphony-group participation over the control group of students who did not participate in the Houston Symphony. The highest increases in attendance rates over the past two years as students progressed from third to fourth and from fourth to fifth grades were among the HS Core Enrichment/After-school Violin group. Retention of the fifth-grade student cohort in orchestra at middle schools was eight percent, which is estimated to be below the national average. Expansion of the Houston Symphony partnership to middle and high schools may help to improve retention outcomes for students in orchestra at these levels.*

### Introduction

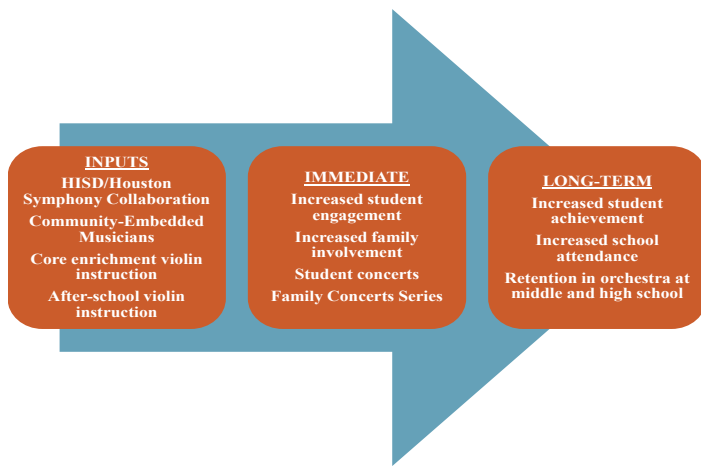
Expanding arts education in schools through community arts partnerships have been found to have lasting social and emotional benefits for students (Arts Education Partnership, 2018). Arts organizations have the capacity to create dynamic and engaging lessons that foster student engagement in schools. Moreover, after-school learning experiences offered through arts organizations have the potential to reinforce in-school learning and enhance academic achievement (Jones, 2018). The benefits of arts partnerships is related to the quality of arts experiences provided to students, which should be suitable and relevant to their individual needs and incorporate best practices in learning, pedagogy, community dynamics, and environment (Bamford, 2010).

To that end, the Houston Independent School District's (HISD) Fine Arts Department provides many opportunities for students to develop as emerging artists through partnerships with local, state, and national organizations (Figure 1). Through a partnership with the Houston Symphony, elementary school teachers and administra-

tors collaborated to develop a quality violin instruction program that will be sustainable beyond the three-year residency, culminating in the spring of 2021 (Figure 2).



**Figure 1:** Lewis Elementary after-school violin class performs in Jones Hall lobby before a Houston Symphony Family Concert with community-embedded musician



**Figure 2:** HISD Fine Arts Department/Houston Symphony partnership logic model

To compliment core enrichment classes, the Houston Symphony provides third through fifth-grade music students weekly in-school and after-school violin classes in a targeted elementary school (Figure 3 and Figure 4). The Houston Symphony offers the broader student community and family members access to the Symphony and its music through its Student Concerts and Family Concerts Series (Figure 5). The Symphony will expand the partnership with HISD to ensure student graduates have access to high-quality string instruction programs in the Chavez High School feeder pattern if they choose to continue musical studies in middle and high schools.

### Background

Fine arts teaching strategies in HISD are designed to provide students with high-quality arts educational experiences through observation and perception, creative expression, historical and cultural relevance, and critical evaluation and response (HISD Fine Arts Department, 2019; Texas Education Agency, 2016). Students are empowered to become self-motivated, adaptable, productive, competent, and lifelong learners who are equipped to meet the demands of the global workforce.

A community arts partnership with the Houston Symphony may play a pivotal role toward enhancing students' arts experiences. However, to ensure that the partnership is successful, classroom teachers and Community-Embedded Musicians must work jointly to develop curriculum and have ongoing, relevant professional development. Collaborative work should support the State of Texas curriculum and fine arts teaching strategies to build on student learning and improve student outcomes. This evaluation was designed to explore the impact of the Houston Symphony partnership toward meeting student outcomes in a targeted HISD elementary school. The research questions addressed in the evaluation are as follows.

### Research Questions:

1. What were the demographic characteristics of students who participated in the Houston Symphony partnership at the targeted HISD elementary school?
2. How did students who received direct instruction from Houston Symphony Community-Embedded musicians perform on the STAAR reading and mathematics assessments relative to control-group students in 2018–2019?



**Figure 3:** Houston Symphony Community-Embedded Musician demonstrates to students how to bring the violin to playing position

3. To what extent did the reading and mathematics performance of Houston Symphony partnership students and control-group students improve over the past two years?
4. How did school attendance of Houston Symphony partnership students compare to the attendance of students who did not participate in the partnership?
5. What proportion of the fifth-grade Houston Symphony student cohort were retained in orchestra at HISD middle schools during the 2019–2020 academic year?

### Review of the Literature

The National Endowment for the Arts (2012) maintains that “At-risk students who have access to the arts tend to have better academic results, better workforce opportunities, and more civic engagement” (p. 1). Students not offered education in the arts lose an opportunity to experience a wider array of cognitive, social, and emotional dispositions that the arts may promote (Gadsden, 2008).

There have been numerous research studies that examined the relationship between arts participation and academic achievement among youth. Gillespie, Russell, and Hamann (2014) found that new string programs had several benefits, including increased student participation in all music programs, more student collabora-



**Figure 4:** Third-grade students learn the five steps of getting into playing position



**Figure 5:** After-school violin class HISD students with Houston Symphony community-embedded musicians following lobby concert at Jones Hall

tive opportunities, increased community support by music businesses, and more comprehensive music curriculum.

Hetland (2000) reports positive effects of music listening and spatial reasoning as well as music instruction and spatial reasoning among children from economically-disadvantaged backgrounds. Academic benefits for students have been observed in content-area courses (Deasy, 2002; Hattie, 2009), with improvements in concentration, intrinsic motivation (Shernoff & Vandell, 2007), problem solving skills (Catterall, 2007), and educational aspirations (Marsh & Kleitman, 2002). Non-academic benefits of arts participation were found to be associated with enhanced self-worth (Blomfield & Barber, 2011), empathy (Hunter, 2005), well-being, healthy social relationships (Rose-Krasnor, Busseri, Willoughby, & Chalmers, 2006), leadership skills (Hancock, Dyk, & Jones, 2012), and reduced risky behavior (Miller et al., 1998).

Forgeard, Winner, Norton, and Schlaug (2008) noted that instrumental music training may enhance auditory discrimination, vocabulary, and non-verbal reasoning skills among youth. The study included 59 public school children, 8 to 12-years old, who received at least three years of musical training and a control group that received no musical training. Children who received musical training outperformed control-group children in language development. Moreover, the longer children spent in musical training, the more likely they were to outperform children who did not receive training. Southgate and Roscigno (2009) investigated the association between music training and academic achievement among 13–17 years old children who attended in- and out-of-school activities. Involvement in music had a positive association on students' mathematics and reading scores as well as course grades.

Community arts partnership have the capacity to bring a wealth of skills and resources to schools and bridge the gap in student learning and outcomes (National Guild for Community Arts Education, 2015). Arts partnerships have been found to support student engagement, student voice, social learning, creative skills, and arts-related knowledge and skills (Imms, Jeanneret, & Stevens-Ballenger, 2011). Scripp, Burnaford, Vazquez, Paradis, and Sienkiewicz (2013) found that teachers who participated in a partnership “excelled at arts integration curriculum design, the ability to articulate arts integration program goals and outcomes, effective collaboration with teaching artists, and the documentation and organization of student work portfolios” (p. 1). However, retention of elementary school students in instrumental music programs is of concern to music educators (Cook, 2013). Persistent attrition of students could lead to fewer artistically-oriented citi-

zens to appreciate, understand, teach, and play good music (Kruth, 1964). Strengthening community arts partnerships at all levels of school may have long-term benefits for students and the community at large.

### Methods

This quasi-experimental study explored whether instruction provided by Houston Symphony Community-Embedded Musicians influenced the reading and mathematics performance, school attendance, and retention of students in orchestra at middle school. The methodology used to identify the study population, control group, and data sources are described below.

### Study Population

To reduce the threats to validity, treatment and control student-groups were established. Treatment groups received (1) Core Enrichment Violin Only, (2) both Core Enrichment and After-school Violin, or (3) After-school Violin Only from Houston Symphony Community-Embedded Musicians. The control group was all other students at the targeted elementary school who did not receive instruction through the musicians (Non-Houston Symphony Students). To determine the treatment groups, teacher-student linkages were made using class rosters extracted from the IBM Cognos data system on November 10, 2019.

### Data Collection and Analyses

The HISD Chancery database was used to gather demographic characteristics of the study population and the control group. Academic achievement data were obtained from (STAAR) data files (June 27, 2019). Reading and mathematics performance was assessed, considering the preponderance of research that links performance in these areas to student success (Espin & Deno, 1993; Duncan et al., 2007; Balfanz, Herzog, & Mac Iver, 2007; Kena et al., 2016).

Descriptive statistics were calculated to determine the percentage of students at or above the Approaches Grade Level passing standard on the first administration of the combined English and Spanish STAAR Grades 3–8 examinations. According to the Texas Education Agency (2017), a student achieving the Approaches Grade Level standard is likely to succeed in the next grade or course with targeted academic intervention. Students in this category typically demonstrate the ability to apply the assessed knowledge and skills in familiar contexts (Texas Education Agency, 2017).

Paired samples t-tests were conducted using scale scores from the first administration of the combined reading and mathematics STAAR 3–8 for students with test data in 2017–2018 and 2018–2019. The level of statistical significance was  $p < .05$ , two-tailed test. The one-tailed t-test was also considered in the analyses to detect statistical significance. The Difference-in-Differences (DiD) technique was used to obtain an appropriate counterfactual to estimate a causal effect of the program on the paired reading and mathematics scores between treatment groups and the control group (Bertrand, Duflo, & Mullainathan, 2004; Zhou, Taber, Arcona, & Li, 2016). Zhou et al. (2016) demonstrated that DiD can be applied to estimate treatment effects in a heterogeneous population, where the treatment and control groups varied greatly. “DiD offers a robust method for comparing diverse cohorts when other risk-adjustment methods may not be adequate” (Zhou et al., 2016, p. 414).

Attendance data for the 2017–2018 (pretest) and the 2018–2019 (posttest) academic years were extracted from the Cognos data system on November 10, 2019 to measure change in students’ attendance over time. These data included the number of days present and the total number of days in attendance. Only students with data in both years were included in the analyses.

Fifth-grade Houston Symphony treatment group students were tracked to determine whether they enrolled in orchestra classes in middle school. The retention rate was calculated based on the total number of fifth grade students in the cohort enrolled in an HISD school during the 2019–2020 school year and the number of students enrolled in orchestra at sixth grade.

### Study Limitations

There were several limitations of the study. Specifically, the study population only included students at one HISD elementary school where students were provided direct instruction by Houston Symphony Community-Embedded Musicians during the 2018–2019 year. The study assumed that rosters with student group assignments were accurate and that students in the control group did not receive instruction by the musicians. While the demographic characteristics of students in each group may have varied, the groups shared a similar educational environment at the same school. Using a control group who attended the same school as the treatment group helped to mitigate some limitations to generate more valid treatment and comparison group analyses. In addition, statistical methods were used to establish equivalence between the groups by controlling for previous years’ performance. The study did not control for whether or not students had multiple years of music instruction through the Houston Symphony partnership. Student outcome measures were limited to the availability of the data in HISD data systems; therefore, students who lacked data on variables of interest were excluded from the study. Other factors may have greatly influenced students’ educational outcomes, including the quality of instruction provided by the musicians (Camilli et al., 2010), student engagement in music classes, and whether students were, purposefully, selected to participate in classes with Houston Symphony instructors.

## Results

### What were the demographic characteristics of students who participated in the Houston Symphony partnership at the targeted HISD elementary school?

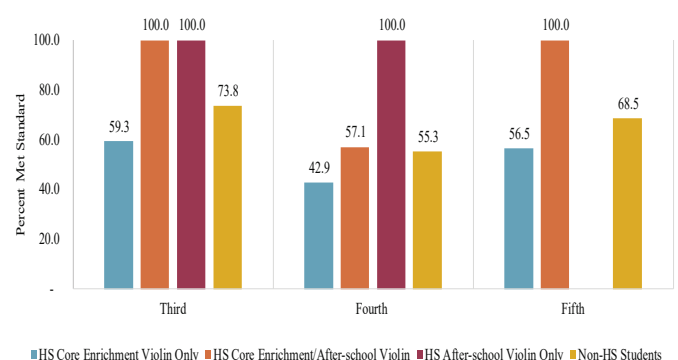
The study population consisted of third through fifth-grade music students who participated in both in-school core enrichment and after-school violin classes weekly at an HISD elementary school during the 2018–2019 academic year. The name of the HISD teacher whose students received instruction from Houston Symphony Community-Embedded Musicians was provided by HISD Fine Arts Department staff. A control group was established consisting of all students in grades three through five who did not participate in the partnership at the same school. Profiles of treatment groups and control-group students are presented in **Table 1 (Appendix A, p. 10)**.

In summary, there were 292 students in the Non-Houston Symphony (HS) control-group and 209 students in the Houston Symphony (HS) treatment group. The HS treatment groups were comprised of Core Enrichment Violin Only ( $n=175$ ), Core Enrichment/After-school Violin ( $n=29$ ), and After-school Violin Only ( $n=5$ ) students.

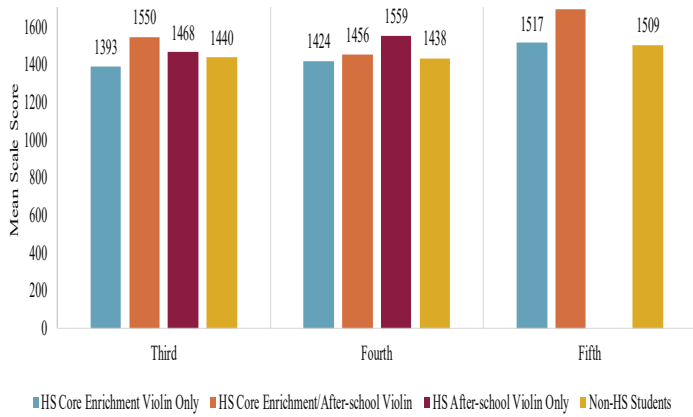
Students in all groups, except the HS After-school Violin Only group, were mostly Hispanic. This group was predominately African American. The HS Core Enrichment/After-school Violin and the Non-HS Student group were more likely to be female than male. The majority of students in all groups were economically disadvantaged and none of the students in the groups were categorized as at risk of dropping out of school. HS Core Enrichment/After-school Violin and HS After-school Violin Only groups had much higher percentages of gifted/talented (G/T) students than the Non-HS student group. While the HS After-school Violin Only group had a much lower percentage of limited English proficient (LEP) students than all other groups, the Non-HS group had lower percentages of LEP students than the HS Core Enrichment Violin Only and the HS Core Enrichment/After-school Violin groups.

### How did students who received instruction from Houston Symphony Community-Embedded Musicians perform on the STAAR reading and mathematics assessments relative to control-group students in 2018–2019?

The percent of students who scored At or Above Approaches Grade Level standard (met standard) on the combined English and Spanish STAAR 3–8 reading assessment for the 2018–2019 academic year can be found in **Figure 6** and in **Table 2a (Appendix B, p. 11)**. Findings related to the HS After-school Violin Only group should be viewed with caution considering the small sample size. The findings revealed that all third-grade students in the



**Figure 6:** Combined English and Spanish reading STAAR by grade level, percent met Approaches Grade Level standard, 2018–2019



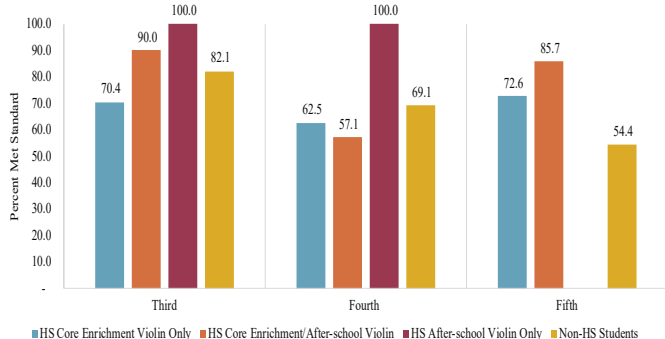
**Figure 7:** Combined English and Spanish reading STAAR by grade level, mean scale scores, 2018–2019

HS Core Enrichment/After-school Violin group as well as the HS After-school Violin Only group met the passing standard on the reading assessment. Among fourth-graders, the HS After-school Violin Only student group had the highest passing rate; while the HS Core Enrichment/After-school Violin students had the highest passing rate among fifth-graders. It should be noted that findings related to the HS After-school Violin Only students were not represented in the fifth-grade group.

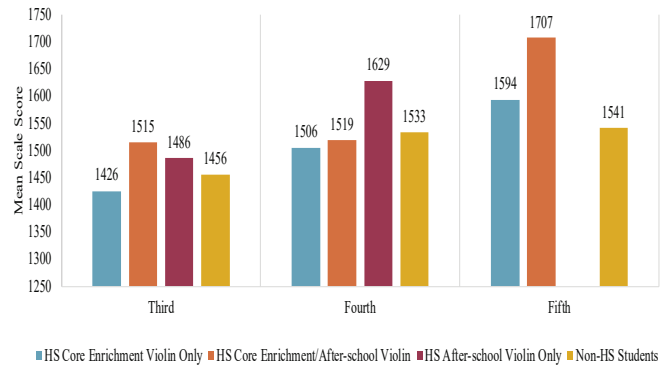
**Figure 7** and **Table 2b** (Appendix B, p. 12) depicts the mean reading scale scores for the student groups. The HS Core Enrichment/After-school Violin group had the highest mean scale score among third-grade and fifth-grade students, while the HS After-school Violin Only students had the highest mean scale score among fourth-grade students.

**Figure 8** and **Table 3a** (Appendix C, p. 13) shows mathematics STAAR results by student group and grade level. The HS After-school Violin Only group had the highest passing rate among the third and fourth-grade students; whereas, the HS Core Enrichment/After-school Violin group had the highest passing rate among fifth-grade students. After-school Violin Only students were not represented among fifth graders. In addition, group data with After-school Violin Only students should be viewed with caution, considering the small number of students in the group.

**Figure 9** and **Table 3b** (Appendix C, p. 14) depicts the mean scale scores of the student groups on the STAAR mathematics assessment. The HS Core Enrichment/After-school Violin group achieved the highest mean scale score at the third and fifth-grade levels and the After-School Violin Only group attained the highest



**Figure 8:** Combined English and Spanish mathematics STAAR by grade level, percent met standard, 2018–2019



**Figure 9:** Combined English and Spanish mathematics STAAR by grade level, mean scale score, 2018–2019

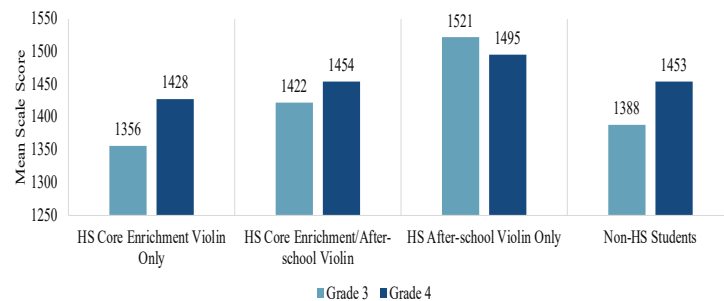
mean scale score at the fourth-grade level. There were no fifth-grade After-school Only students in the data.

### To what extent did the reading and mathematics performance of Houston Symphony partnership students and control-group students improve over the past two years?

A paired t-test was conducted to determine the extent that students who received instruction from Houston Symphony Community-Embedded Musicians improved their reading and mathematics performance from the 2017–2018 academic year to the 2018–2019 academic year. The results of students with two years of STAAR 3–8 reading and mathematics data (2018 and 2019) in English or Spanish over the two-year period were used in the analyses. Scale score comparisons reflected successive progression in grade level testing from year-to-year.

**Figure 10** and **Appendix 4a** (p. 15) reveals statistically significant increases in the mean reading scale scores of the HS Core Enrichment Violin Only group and the Non-HS Students as they progressed from third to fourth grades ( $p < .001$ ). The largest increase was among the HS Core Enrichment Violin Only treatment group (72 points), followed by the Non-HS control student group (65 points).

**Figure 11** (Appendix 4a, p. 15) shows statistically significant

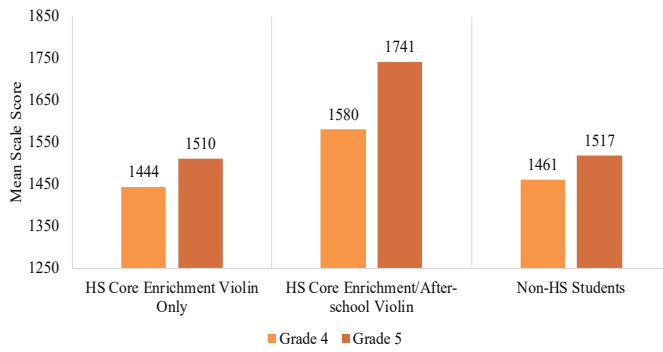


**Figure 10:** Paired T-test analyses, students with two years of combined English and Spanish reading STAAR, successive progression from third (2018) to fourth (2019) grades

increases in the mean reading scale scores of the HS Core Enrichment Violin Only, the HS Core Enrichment/After-school, and the Non-HS student groups as they progressed from fourth to fifth grades ( $p < .001$ ). The largest increase was among the HS Core Enrichment/After-school Violin group (161 points).

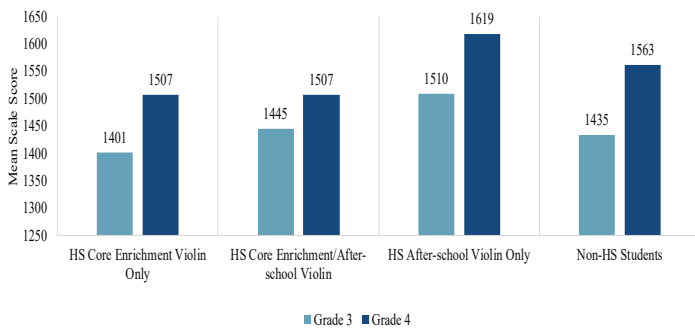
Paired mathematics results of the third to fourth-grade student





**Figure 11:** Paired T-test analyses, students with two years of combined English and Spanish reading STAAR, successive progression from fourth (2018) to fifth (2019) grades

groups are shown in **Figure 12** and **Table 4b** (p. 15). Statistically significant increases were found among the HS Core Enrichment Violin Only, the HS Core Enrichment/After-school and the Non-HS student groups. However, the Non-HS control group showed the most gain over the two-year period (128 points). Among the treatment groups, HS After-school Violin Only students experienced the most gain of 109 points, closely followed by HS Core Enrichment Violin Only students (106 points).

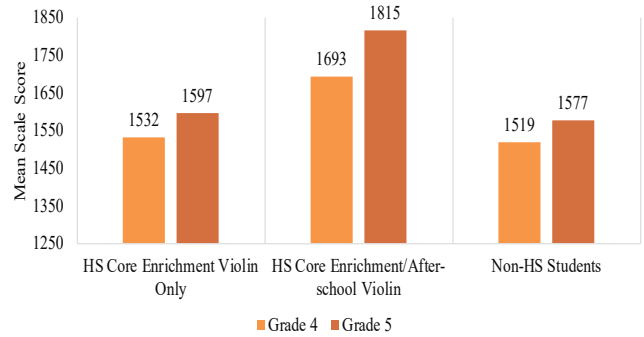


**Figure 12:** Paired T-test analyses, students with two years of combined English and Spanish mathematics STAAR, successive progression from third (2018) to fourth (2019) grades

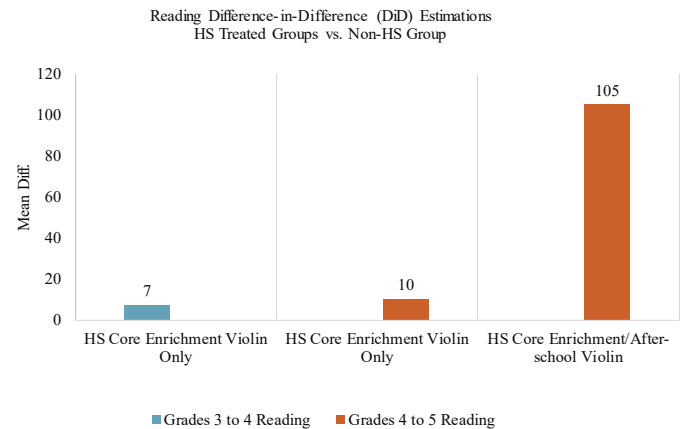
Paired mathematics results of fourth to fifth-grade student groups are shown in **Figure 13**. Statistically significant increases were found among the HS Core Enrichment Violin Only, the HS Core Enrichment/After-school (one-tailed test), and the Non-HS Student groups. However, HS Core Enrichment/After-school Violin students made the largest gain of 122 points. It is also evident that HS Core Enrichment Violin Only students experienced an increase of 65 points; whereas, Non-HS Students had an increase of 58 points from 2018 to 2019.

Difference-in-differences (DiD) analyses (**Figure 14**) revealed a benefit in treatment-group participation over the control group as evidenced by a higher mean reading score of 7 points as students progressed from third to fourth grade. Moreover, as students progressed from fourth to fifth grades, there were benefits observed in HS Core Enrichment Violin Only participation by 10 points and in HS Core Enrichment/After-school Violin participation by 105 points over Non-HS participation.

Difference-in-Differences (DiD) analyses revealed a benefit

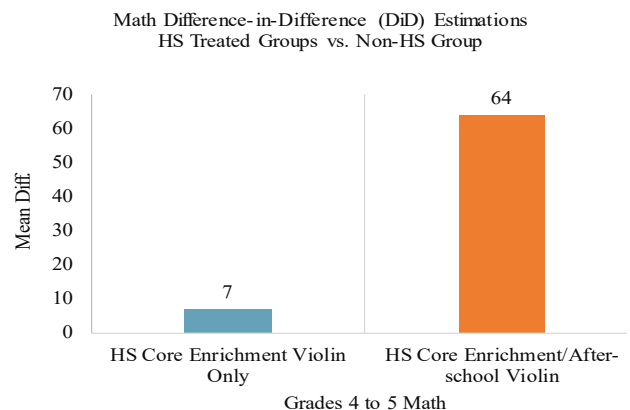


**Figure 13:** Paired T-test analyses, students with two years of combined English and Spanish mathematics STAAR, successive progression from fourth (2018) to fifth (2019) grades

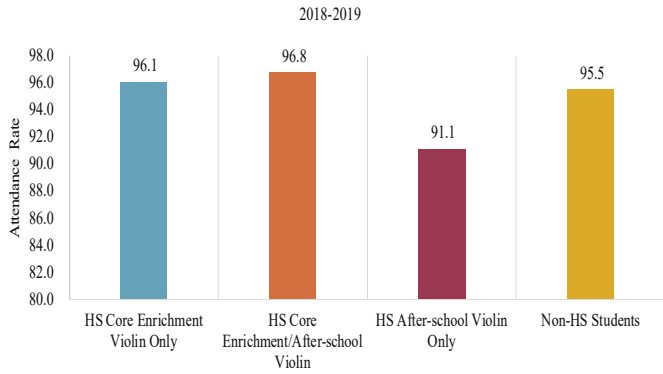


**Figure 14:** Difference-in-Difference estimations, HS treated groups vs. Non-HS group using 2018 and 2019 paired STAAR reading data

in HS Core Enrichment Violin Only participation over the control group as evidenced by a higher mean mathematics score of 7 points as students progressed from fourth to fifth grade (**Figure 15**). A benefit was also observed in HS Core Enrichment/After-school Violin participation by 64 points over Non-HS participation as students progressed from fourth to fifth grade.



**Figure 15:** Difference-in-Differences estimations, HS treated groups vs. Non-HS group using 2018 and 2019 paired STAAR mathematics data



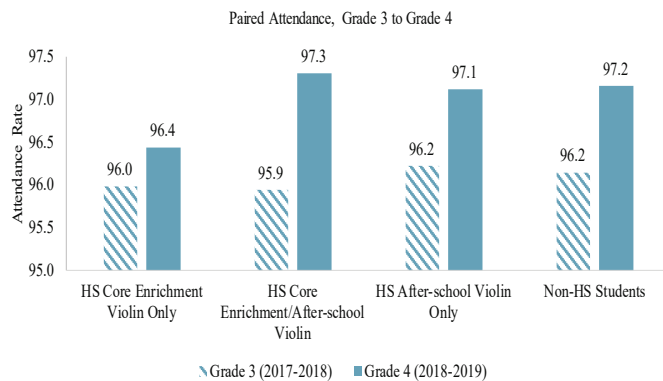
**Figure 16:** Attendance rates by Houston Symphony and Non-Houston Symphony student groups, 2018–2019

### How did school attendance of Houston Symphony partnership students compare to the attendance of students who did not participate in the partnership?

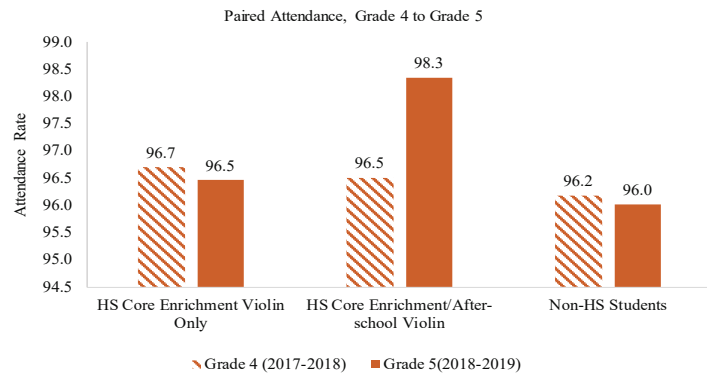
The mean attendance rates for the Houston Symphony partnership student groups and the control group for the 2018–2019 academic year are displayed in **Figure 16** and in **Appendix E**, p. 16. It is apparent that the highest attendance rate was among HS Core Enrichment/After-school Violin students (96.8 percent). The Non-HS Students had an attendance rate of 95.5 percent. HS After-school Violin only students had the lowest attendance rate. This finding should be viewed with caution considering the small sample size.

The 2018–2019 attendance data were used as a posttest, and the 2017–2018 attendance data were used as a pretest to estimate change in attendance over time. Only students with two years of data were included in the analyses. **Figure 17** shows increases in the mean attendance rates of all student groups as they progressed from third grade to fourth grade. The highest increase was among the HS Core Enrichment/Afterschool Violin group (95.9 percent vs. 97.3 percent or 1.4 percentage points). The attendance rate of the Non-HS Students increased by one percentage point over the two-year period.

**Figure 18** shows the mean attendance rates of HS treatment groups and Non-HS Students as they progressed from fourth to fifth grades. Insufficient data were available to detect changes in attendance rates for the After-school Violin Only group. It is evi-



**Figure 17:** Paired attendance rates by Houston Symphony and Non-Houston Symphony student groups, grade 3 (2017–2018) to grade 4 (2018–2019)



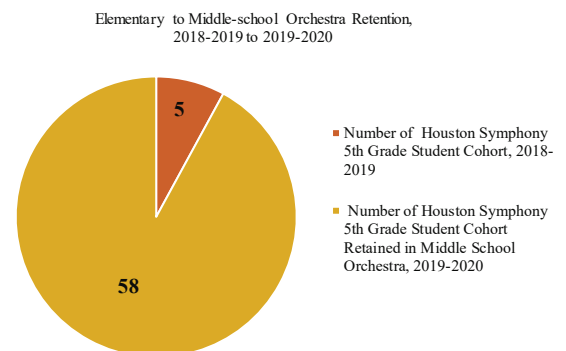
**Figure 18:** Paired attendance rates by Houston Symphony and Non-Houston Symphony student groups, grade 4 (2017–2018) to grade 5 (2018–2019)

dent that only students in the HS Core Enrichment/After-school Violin group showed an increase in the mean attendance rate from 2017–2018 (96.5 percent) to 2018–2019 (98.3 percent). The difference was by 1.8 percentage points.

### What proportion of the fifth-grade Houston Symphony student cohort were retained in orchestra at HISD middle schools during the 2019–2020 academic year?

Several studies have examined factors that may contribute to students’ retention and attrition in instrumental music education at postsecondary levels (Hamann & Gillespie, 1998; Kuhlman, 2005; Witt & Goodrich, 2003). Factors identified in the research include “(1) a new teacher when changing schools, (2) socioeconomic status, (3) motivational reasons (including family, peer, and self), (4) scholastic achievement, (5) the grade level in which instruction begins, and (6) scheduling conflicts” (Cook, 2013, p. 3). Hamann and Gillespie (2002) estimated that the average national orchestra student attrition rate is 27% between elementary and middle school.

To determine the influence of the Houston Symphony partnership on retention in orchestra among the study population, the 2018–2019 fifth-grade student cohort was tracked to sixth grade. The results are depicted in **Figure 19**. It was evident that 63 fifth-grade students from the cohort continued enrollment in HISD middle schools during the 2019–2020 academic year. Five of the students were enrolled in an orchestra course in sixth grade, yielding an 8 percent retention rate. These students attended three middle schools in the east area of HISD.



**Figure 19:** Retention of 5th-grade student cohort in HISD middle schools, 2019–2020

## Discussion

The HISD Fine Arts Department emphasizes the importance of community partnerships to support a quality fine arts education and the development of the whole child. Consistent exposure to fine arts has been found to enhance student engagement, which enhances academic achievement. Students have expanded opportunities to develop their abilities and habits of mind that empower them to learn across multiple content areas.

This evaluation explored the impact of the Houston Symphony partnership at a targeted HISD elementary school on student achievement, attendance, and retention in orchestra. The study used a retrospective design, and students were not randomized to treatment or control groups. An underlying assumption of the study was that the partnership provided quality arts instruction to students that was aligned to state standards. Treatment groups were established based on Houston Symphony involvement and a control-group consisting of students with similar background characteristics at the same school strengthened the validity of the study.

Paired t-test analyses showed statistically significant improvements in the mean STAAR reading and mathematics scale scores of HS Core Enrichment Violin Only, HS Core Enrichment/After-school Violin, After-school Only and Non-HS Student groups as they progressed from third to fourth and from fourth to fifth grades. The analyses was conducted using 2018 and 2019 test data. Difference-in-differences (DiD) analyses revealed more consistent benefits in Houston Symphony-group participation over the control group that did not participate in the Houston Symphony for HS Core Enrichment Violin Only students and HS Core Enrichment/After-school Violin students as evidenced by higher mean reading and mathematics scores as students progressed from third to fourth and from fourth to fifth grade. Based on the research, retention of fifth-grade cohort students in orchestra at middle school was eight percent, which is estimated to be below the national average (Hamann & Gillespie, 2002).

In consideration of study findings, there was evidence of benefits of the Houston Symphony partnership toward improving students' academic performance and school attendance. Evidence of the partnerships' ability to retain students in orchestra at middle school was not substantiated. To ensure that the partnership remains successful and has lasting effects, classroom teachers and teaching artists must work jointly to develop curriculum that is aligned to state standards. Expanding the partnership beyond the elementary level to middle and high school students may help to promote retention of students in orchestra.

## References

Arts Education Partnership. (2018). What School Leaders Can Do to Increase Arts Education. Retrieved from <https://www.ecs.org/what-school-leaders-can-do-to-increase-arts-education/>

Balfanz, R., Herzog, L., & Mac Iver, D. J. (2007). Preventing student disengagement and keeping students on the graduation path in urban middle-grades schools: Early identification and effective interventions. *Educational Psychologist*, 42(4), 223-235.

Bamford, A. (2010). Issues of global and local quality in arts education. *Encounters on education*, 11, 47-66.

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How Much Should We Trust Differences-in-Differences Estimates? *Quarterly Journal of Economics*. Retrieved from <http://www.nber.org/papers/w8841.pdf>

Blomfield, C. J., & Barber, B. L. (2011). Developmental experiences during extracurricular activities and Australian adolescents' self-concept: Particularly important for youth from disadvantaged schools. *Journal of Youth and Adolescence: A Multidisciplinary Research Publication*, 40, 582-594. doi:10.1007/s10964-010-9563-0.

Camilli, G., Vargas, S., Ryan, S., & Barnett, W. S. (2010). Meta-analysis of the effects of early education interventions on cognitive and social development. *Teachers College Record*, 112(3), 579-620.

Catterall, J. S. (2007). Enhancing peer conflict resolution skills through drama: An experimental study. *Research in Drama Education*, 12, 163-178. doi:10.1080/13569780701321013.

Cook, B. (2013). An Examination of Factors Contributing to Orchestra Students' Attrition in Transition From Elementary to Middle School. Retrieved from [https://deepblue.lib.umich.edu/bitstream/handle/2027.42/97769/Cook-Thesis\\_final.pdf?sequence=1](https://deepblue.lib.umich.edu/bitstream/handle/2027.42/97769/Cook-Thesis_final.pdf?sequence=1)

Deasy, R. (2002). *Critical links: Learning in the arts and student academic and social development*. Washington, DC: The Arts Education Partnership.

Duncan, G., Dowsett, C., Classens, A., Magnuson, K., Huston, A., Klebanov, P., Pagani, L., Feinstein, L., Engel, Brooks-Gunn, J., Sexton, H., Duckworth, K., & Japel, C. (2007). School Readiness and Later Achievement. *Developmental Psychology*, 43, 1428-1446.

Espin, C., & Deno, S. (1993). Performance in reading from content area text as an indicator of achievement. *Remedial & Special Education*, 14(6), 47.

Forgeard, M., Winner, E., Norton, A., & Schlaug, G. (2008). Practicing a Musical Instrument in Childhood is Associated with Enhanced Verbal Ability and Nonverbal Reasoning. doi.org/10.1371/journal.pone.0003566

Gadsden, V. L. (2008). The arts and education: knowledge generation, pedagogy, and the discourse of learning, *Review of Research in Education*, 2, 29-61. doi: 10.3102/0091732X07309

Gillespie, R., Russell, J. A., & Hamann, D. L. (2014). String Music Educators' Perceptions of the Impact of New String Programs on Student Outcomes, School Music Programs, and Communities. *Journal of Research in Music Education*, 62(2), 175-187. doi.org/10.1177/0022429414531987

Gullatt, D. E. (2007). Research links the arts with student achievement gains. *The Educational Forum*, 71(3), 211-220.

Hamann, D. L., & Gillespie, R. (1998). The status of the orchestra programs in the public schools. *Journal of Research in Music Education*, 46(1), 75-86.

Hamann, D. L., & Gillespie, R. (2002). Status of orchestra programs in public schools. *Journal of String Research*, 2, 9-35. Retrieved from <http://web.cfa.arizona.edu/sites/jsr/index.php/requirements/>

Hancock, D., Dyk, D., & Jones, K. (2012). Adolescent Involvement in Extracurricular Activities: Influences on Leadership Skills. *Journal of Leadership Education*, 11(1), 84-101.

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. London: Routledge.

Hetland, L. (2000). Learning to make music enhances spatial reasoning. *Journal of Aesthetic Education*, 34(3/4), 179-238.

Houston Independent School District. (2019). Fine Arts Department. Retrieved from <https://www.houstonisd.org/Page/169237>

Hunter, M. (2005). *Education and the arts: Research overview. A summary report prepared for the Australia Council for the Arts.*

Canberraarts/.: Australian Government and Australia Council for the Arts.

Imms, W., Jeanneret, N., & Stevens-Ballenger, J. (2011). *Partnerships between schools and the professional arts sector: Evaluation of impact on student outcomes*. Southbank, Victoria: Arts Victoria.

Jones, S. D. (2017). *ESSA: Mapping opportunities for the arts*. Denver, CO: Education Commission of the States. Retrieved from <http://www.aep-arts.org/essa/>.

Kena, G., Hussar, W., McFarland, J., de Brey, C., Musu-Gillette, L., Wang, X., Zhang, J., Rathbun, A., Wilkinson-Flicker, S., Diliberti, M., Barmer, A., Bullock-Mann, F., & Dunlop-Velez, E. (2016). *The Condition of Education 2016 (NCES 2016-144)*. U.S. Department of Education, National Center for Education Statistics. Retrieved from <http://nces.ed.gov/pubsearch>.

Kruth, E. (1964). *Student drop-out in instrumental music in the secondary schools of Oakland, California*. (Doctoral dissertation, Stanford University, 1964). *Dissertation Abstracts*, 25, 5633-4.

Kuhlman, K. (2005). *Musical aptitude versus academic ability as a predictor of beginning instrumental music achievement and retention: Research and implications*. *Update: Applications of Research in Music Education*, 24(1), 34-43.

Marsh, H. W., & Kleitman, S. (2002). *Extracurricular School Activities: The Good, the Bad, and the Nonlinear*. *Harvard Educational Review*, 72, 464-515. doi.org/10.17763/haer.72.4.051388703v7v7736

Miller, B. L., Cummings, J., Mishkin, F., Boone, K., Prince, F., Ponton, M., & Cotman, C. (1998). *Emergence of artistic talent in frontotemporal dementia*. *Neurology*, 51(4), 978-982.

National Endowment for the Arts. (2012). *The arts and achievement in at-risk youth: Findings in four longitudinal studies*. Retrieved from <http://www.nea.gov/research/arts-at-risk-youth.pdf>

National Guild for Community Arts Education. (2015). *The Practice of Partnerships: High – Impact Education Partnerships with K-12 Schools*. Metlife Foundation Partners in Arts Education

Program 2005-2014. Retrieved from <https://static1.squarespace.com/static/570e58a5f85082287b0f4b1b/t/57a62ffa20099e8b-fa2b78b9/1470509078251/Practice-of-Partnership.pdf>

Rose-Krasnor, L., Busseri, M. A., Willoughby, T., & Chalmers, H. (2006). *Breadth and intensity of youth activity involvement as contexts for positive development*. *Journal of Youth and Adolescence*, 35, 365–379.

Scripp, L., Burnaford, G. Vazquez, O. Paradis, L. & Sienkiewicz, F. (2013). *Partnerships in arts Integration Research final reports*.

Shernoff, D. J., & Vandell, D. L. (2007). *Engagement in after-school program activities: Quality of experience from the perspective of participants*. *Journal of Youth and Adolescence*, 36, 891–903. doi:10.1007/s10964-007-9183-5.

Southgate, D. E., & Roscigno, V. J. (2009). *The Impact of Music on Childhood and Adolescent Achievement*. *Social Science Quarterly*, 90, 4-21. Retrieved from <http://dx.doi.org/10.1111/j.1540-6237.2009.00598.x>

Texas Education Agency. (2016). *Fine Arts Frequently Asked Questions*. Retrieved from [https://tea.texas.gov/Academics/Subject\\_Areas/Fine\\_Arts/Fine\\_Arts/](https://tea.texas.gov/Academics/Subject_Areas/Fine_Arts/Fine_Arts/)

Texas Education Agency. (2017). *State of Texas Assessment of Academic Skills (STAAR®) performance labels and policy definitions*. Retrieved from [https://tea.texas.gov/...assessment/STAAR\\_Performance\\_Labels\\_and\\_Policy\\_Definitions.pdf](https://tea.texas.gov/...assessment/STAAR_Performance_Labels_and_Policy_Definitions.pdf)

Witt, A.C., & Goodrich, K. (2003). *Retention and retainment in string classes: Review of the research literature*. In G.V. Barnes (Ed.), *Applying research to teaching and playing stringed instruments* (pp. 85-98). Fairfax, VA: American String Teachers Association with National School Orchestra Association.

Zhou, H., Taber, C., Arcona, S., & Li, Y. (2016). *Difference-in-differences method in comparative effectiveness research: utility with unbalanced groups*. *Applied health economics and health policy*, 14(4), 419-429.

## Appendix A

**Table 1: Demographic Characteristics of Houston Symphony (HS) Violin Treatment Group Students and Non-Houston Symphony Control Group Students (Grades 3 through 5), 2018–2019**

	Treatment Groups (N=209)						Non-Houston Symphony Control Group (N=292)	
	HS Core Enrichment Violin Only (N= 175)		HS Core Enrichment/ After-school Violin (N=29)		HS After-school Violin Only (N=5)			
<b>Race/Ethnicity</b>	N	%	N	%	N	%	N	%
American Indian	0	-	0	-	0	-	-	-
Black	28	16.0	4	13.8	3	60.0	72	24.7
Hispanic	141	80.6	24	82.8	2	40.0	216	74.0
White	3	1.7	0	-	0	-	1	.3
Two or More Races	3	1.7	1	3.4	0	-	2	.7
<b>Gender</b>								
Male	109	62.3	13	44.8	3	60.0	112	38.4
Female	66	37.7	16	55.2	2	40.0	180	61.6
<b>Eco Disadv.</b>	171	97.7	27	93.1	5	100.0	288	98.6
<b>At Risk</b>	0	-	0	-	0	-	0	-
<b>Special Ed</b>	19	10.9	0	-	1	20.0	1	11.3
<b>G/T</b>	17	9.7	6	20.7	1	20.0	21	7.2
<b>LEP</b>	116	66.3	19	65.5	1	0.2	170	58.2
<b>Source:</b> Chancery and PEIMS databases								

## Appendix B

Table 2a: STAAR Combined English and Spanish Reading Percent At or Approaches Grade Level Standard, 2018–2019				
	Grade Level	At or Above Approaches Grade Level Standard	N	%
<b>HS Core Enrichment Violin Only</b>				
	Third	Did Not Meet	22	40.7
		Met	32	59.3
		Total	54	100.0
	Fourth	Did Not Meet	32	57.1
		Met	24	42.9
		Total	56	100.0
	Fifth	Did Not Meet	27	43.5
		Met	35	56.5
		Total	62	100.0
<b>HS Core Enrichment/After-school Violin Only</b>				
	Third	Met	10	100.0
	Fourth	Did Not Meet	6	42.9
		Met	8	57.1
		Total	14	100.0
	Fifth	Met	7	100.0
<b>HS After-school Violin Only</b>				
	Third	Met	1	*
	Fourth	Met	3	*
<b>Non-HS Students</b>				
	Third	Did Not Meet	22	26.2
		Met	62	73.8
		Total	84	100.0
	Fourth	Did Not Meet	42	44.7
		Met	52	55.3
		Total	94	100.0
	Fifth	Did Not Meet	28	31.5
		Met	61	68.5
		Total	89	100.0
*Less than 5 students				

**Appendix B (cont'd)**

<b>Table 2b: STAAR Combined English and Spanish Reading Mean Scale Score, 2018-2019</b>						
	<b>Grade Level</b>	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>
<b>HS Core Enrichment Violin Only</b>						
	Third	54	1216	1812	1393.39	144.226
	Fourth	56	1150	1766	1423.59	132.859
	Fifth	62	1233	1870	1516.90	147.519
<b>HS Core Enrichment/After-school Violin</b>						
	Third	10	1356	1812	1549.60	140.957
	Fourth	14	1283	1715	1456.00	111.335
	Fifth	7	1511	1870	1694.14	145.011
<b>HS After-school Violin Only</b>						
	Third	1	*	*	*	*
	Fourth	3	*	*	*	*
<b>Non-HS Students</b>						
	Third	84	993	1812	1439.92	164.126
	Fourth	94	1083	1851	1438.28	137.115
	Fifth	89	1255	1787	1509.10	124.641
*Less than 5 students						

### Appendix C

Table 3a: STAAR Combined English and Spanish Mathematics Percent At or Approaches Grade Level Standard, 2018–2019				
	Grade Level	At or Above Approaches Grade Level Standard	N	%
<b>HS Core Enrichment Violin Only</b>				
	Third	Did Not Meet	16	29.6
		Met	38	70.4
		Total	54	100.0
	Fourth	Did Not Meet	21	37.5
		Met	35	62.5
		Total	56	100.0
	Fifth	Did Not Meet	17	27.4
		Met	45	72.6
		Total	62	100.0
<b>HS Core Enrichment/After-school Violin</b>				
	Third	Did Not Meet	1	*
		Met	9	90.0
		Total	10	100.0
	Fourth	Did Not Meet	6	42.9
		Met	8	57.1
		Total	14	100.0
	Fifth	Did Not Meet	1	*
		Met	6	85.7
		Total	7	100.0
<b>HS After-school Violin Only</b>				
	Third	Met	1	*
	Fourth	Met	3	*
<b>Non-Fine HS Students</b>				
	Third	Did Not Meet	15	17.9
		Met	69	82.1
		Total	84	100.0
	Fourth	Did Not Meet	29	30.9
		Met	65	69.1
		Total	94	100.0
	Fifth	Did Not Meet	41	45.6
		Met	49	54.4
		Total	90	100.0
*Less than 5 students				



**Appendix C (cont'd)**

<b>Table 3b: STAAR Combined English and Spanish Mathematics Mean Scale Score, 2018–2019</b>						
	<b>Grade Level</b>	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>
<b>HS Core Enrichment Violin Only</b>						
	Third	54	1186	1897	1425.65	121.150
	Fourth	56	1274	1770	1505.61	130.597
	Fifth	62	1308	2078	1593.76	170.128
<b>HS Core Enrichment/ After-school Violin</b>						
	Third	10	1333	1762	1515.20	119.395
	Fourth	14	1395	1700	1519.29	99.612
	Fifth	7	1308	2078	1706.71	250.070
<b>HS After-school Violin Only</b>						
	Third	1	*	*	*	*
	Fourth	3	*	*	*	*
<b>Non-HS Students</b>						
	Third	84	1105	1897	1456.26	129.035
	Fourth	94	1214	2040	1532.76	163.337
	Fifth	90	1218	1860	1540.62	157.535
*Less than 5 students						

**Appendix D**

<b>Table 4a: Combined English and Spanish Reading STAAR 3–8 Paired T-test Analyses, Houston Symphony Treatment Student Groups and Control Student Group with 2 Years of Data, Successive Progression from Third to Fourth Grades and Fourth to Fifth Grades, 2018 and 2019 (First Test Administration)</b>								
Student Groups	Reading STAAR							
	2018 Mean Scale Score	2019 Mean Scale Score	Mean Diff.	N	Std. Deviation 2017	Std. Deviation 2018	t	Sig.
	Grade 3	Grade 4						
HS Core Enrichment Violin Only	1356	1428	72	43	130.2817	138.751	4.730	.000**
HS Core Enrichment/ After-school	1422	1454	32	55	139.840	155.921	.907	.384
HS After-school Only	++	++	++	2	++	++	++	++
Non-HS Students	1388	1453	65	65	124.4197	137.994	6.269	.000***
	Grade 4	Grade 5						
HS Core Enrichment Violin Only	1444	1510	66	55	139.8400	155.921	4.827	.000***
HS Core Enrichment/ After-school	1580	1741	161	5	153.7573	140.389	4.501	.000***
HS After-school Only	-	-	-	-	-	-	-	-
Non-HS Students	1461	1517	56	65	127.7081	129.611	3.825	.000***
<b>Source:</b> Cognos database for 2018-2019 clsss rosters to link teachers with students; Combined English and Spanish STAAR 3-8 database, spring 2018 and spring 2019 paired data *p< .05 **p<.01 ***p<.001 ++Less than 5 students								

<b>Table 4b: Combined English and Spanish Mathematics STAAR 3–8 Paired T-test Analyses, Houston Symphony Treatment Student Groups and Control Student Group with 2 Years of Data, Successive Progression from Third to Fourth Grades and Fourth to Fifth Grades, 2018 and 2019 (First Test Administration)</b>								
Student Groups	Mathematics STAAR							
	2018 Mean Scale Score	2019 Mean Scale Score	Mean Diff.	N	Std. Deviation 2017	Std. Deviation 2018	t	Sig.
	Grade 3	Grade 4						
HS Core Enrichment Violin Only	1401	1507	106	43	96.2615	127.790	7.665	.000***
HS Core Enrichment/ After-school	1445	1507	62	12	88.8108	100.019	3.137	.009**
HS After-school Only	++	++	++	2	++	++	++	++
Non-HS Students	1435	1563	128	65	115.2918	158.683	11.026	.000***
	Grade 4	Grade 5						
HS Core Enrichment Violin Only	1532	1597	65	55	145.4412	175.098	4.655	.000***
HS Core Enrichment/ After-school	1693	1815	122	5	153.5757	184.891	2.398	.075+
HS After-school Only	-	-	-	-	-	-	-	-
Non-HS Students	1519	1577	58	65	145.3702	152.205	4.942	.000***
<b>Source:</b> Cognos database for 2018-2019 clsss rosters to link teachers with students; Combined English and Spanish STAAR 3-8 database, spring 2018 and spring 2019 paired data *p< .05 **p<.01 ***p<.001 +statistically significant, one-tailed test at p<.05 ++Less than 5 students								

## Appendix E

**Table 5: Attendance, 2018–2019**

Attendance, 2018–2019					
Student Groups	N	Minimum	Maximum	Mean	Std. Deviation
HS Core Enrichment Violin Only	175	80.4	100.0	96.053	4.1784
HS Core Enrichment/After-school Violin	29	84.7	100.0	96.772	3.7354
HS After-school Violin Only	5	73.8	100.0	91.137	10.4001
Non-HS Comparison	292	.0	100.0	95.511	7.7706