



# Literacy First K–1 Report

## The 2017-18 Impact Evaluation

JULY 2019

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APRIL 2019

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## Introduction

Literacy First is an AmeriCorps program that provides trained tutors for students in kindergarten through Grade 2 in the Austin, Texas area. Literacy First’s early literacy program is designed to strengthen students’ early reading and comprehension skills (e.g., phonemic awareness, letter sound identification) through daily, 30-minute tutoring sessions. The program tracks student data, including benchmark assessments, weekly progress monitoring, attendance, and demographics, as well as program fidelity of implementation data from tutors. Literacy First is currently implemented in more than 30 elementary schools in three districts in the Austin area, serving more than 1,600 K-2 students annually. Fifty percent of Literacy First’s tutors are bilingual, allowing the program to provide support to both Spanish and English speakers. The program identifies struggling readers each fall and provides tutoring across the school year. Literacy First has established itself as a program that supports highly trained volunteers to implement an intensive tutoring intervention that relies upon data to guide instruction.

During the 2018–19 school year, American Institutes for Research (AIR) partnered with Literacy First to conduct an independent evaluation of the impact of the Literacy First program on student outcomes. The evaluation used a multi-site randomized controlled trial design across 22 schools in the Austin Independent School District (AISD). This report presents findings from analyses designed to estimate the impact of participation in Literacy First on the early reading skills of struggling readers in kindergarten and Grade 1.

## Background

Over the past two decades, national attention has emphasized the critical role of early literacy and language instruction in preventing reading difficulties and improved our understanding of how young children learn to read (Connor, Alberto, Compton, & O’Connor, 2014; National Reading Panel, 2000; Raynor, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001). The research has established that students who are not strong readers by Grade 3 are less likely to build vocabulary and interact with a wide variety of texts (Good, Simmons, & Kame’enui, 2001). In addition, recent national data indicate that 64% of fourth graders fail to reach proficient-level reading scores as measured by the National Assessment of Educational Progress, which is designed to measure students’ reading comprehension (National Center for Education Statistics, 2015). A recent study by Jacob, Armstrong, Bowden, and Pan (2016) demonstrated the

impact of a volunteer tutoring program on Grade 2 students' reading comprehension skills. Despite these findings, few supplemental early literacy tutoring programs have conducted efficacy trials to demonstrate their potential impact on early literacy, comprehension, and language skills.

Literacy First has established itself as a unique tutoring program in three key areas. First, Literacy First tutors are highly trained volunteers who receive more than 70 hours of training in best practices, as well as weekly follow-up visits from Literacy First experts and coaches. Second, Literacy First is intensive; each child is seen daily for approximately 30 minutes and receives tailored tutoring to address literacy/language needs. Third, Literacy First uses data to drive instruction. Tutors use a response-to-intervention model, with benchmark assessments (which take place three times per year) and weekly progress monitoring.

Literacy First has invested in rigorous research to evaluate program impacts by implementing regression discontinuity design (RDD) studies over the past 3 years, using students' beginning-of-the-year (BOY) reading ability to determine program eligibility. Findings from the evaluations provide strong evidence that Literacy First significantly accelerated students' reading skills across Grades K–2 in two Austin-area school districts and charter schools (Tackett, Leroux, & McFarland, 2013; Tidd, 2014, 2015). Effect sizes found across the annual evaluations range from .20 to .40 (Tidd, 2014, 2015). Additionally, a quasi-experimental study investigating the impact of Literacy First on students' reading skills found that first- and second-grade students who graduated from Literacy First scored statistically significantly higher than matched comparison students on the Development Reading Assessment (Agile Analytics, 2018). However, there are limitations to this research base: None of the studies used an experimental design, and the RDD and propensity score matching studies have the potential for sampling and selection bias. The current study addresses this issue by employing a well-designed and RCT that will meet the WWC standards (version 4.0) in 22 schools with approximately 439 kindergarten and 433 first grade students.

## Research Questions

The study was designed to answer the following research questions:

1. Does participation in Literacy First one-on-one tutoring have significant impacts on kindergarten students' early reading skills, as measured by the Letter Sound Fluency (LSF) and Kindergarten Decoding Fluency (KDF) assessments?



2. Does participation in Literacy First one-on-one tutoring have significant impacts on Grade 1 students' early reading skills, as measured by the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) Nonsense Word Fluency (NWF), DIBELS Oral Reading Fluency (ORF), and Whole Words Read (WWR) assessments?

## Research Design

The evaluation employed a multi-site randomized controlled trial to estimate the impact of Literacy First on kindergarten and Grade 1 students' reading outcomes. The study was conducted within 22 elementary schools in AISD. Each of the participating schools was oversubscribed by a minimum of six students and would not have been able to provide services to all eligible students. As such, the evaluation study design did not cause a reduction in services provided to students. Each of the schools continued to serve the same number of students as it would have in the absence of the evaluation.

Following established procedure, all students in kindergarten and Grade 1 from participating schools were screened for Literacy First eligibility by the Literacy First tutors during the first week of September 2017. Eligibility for participation in Literacy First tutoring was determined by students' scores on the BOY assessments. Assessments were administered in Spanish or English, depending on students' current language abilities as determined by the elementary school. Following the assessments, parental consent<sup>1</sup> was obtained for students identified as eligible to receive the program.

Kindergarten students completed the KDF and LSF assessments, which were created by the program administrators. The KDF was created to measure decoding skills aligned with program content, while the LSF is a modified version of the AIMSweb LSF assessment. Grade 1 students completed the DIBELS NWF, DIBELS ORF, and WWR assessments.<sup>2</sup> The WWR is a component of the DIBELS NWF.

All students whose parents did not opt them out of the study and who scored at the Tier 2 level on the assessment were eligible to receive Literacy First services. Students in both the treatment and control group completed the same assessments at the end of the school year in

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<sup>1</sup> Parental consent was passive, as approved by our Institutional Review Board (IRB) for this study. Parent opt-out letters were sent home to all families approximately 3 weeks before Literacy First's administration of the BOY assessments.

<sup>2</sup> Students completing the assessments in Spanish completed the Indicadores Dinámicos del Éxito en la Lectura (IDEL) Fluidez en las Palabras sin Sentido and IDEL Fluidez en el Relato Oral.

May 2018. Students completed the assessments in the language in which they were currently being tutored.

Students' assessment scores were converted to standardized z-scores using sample-based means and standard deviations on each of the assessments. Z-scores were created separately for Spanish and English versions of the assessments. This was necessary in order to place students' scores on the DIBELS and Literacy First assessments on the same scales. While the Spanish and English versions of these assessments are substantively similar, they are not considered equivalent.

## Sample

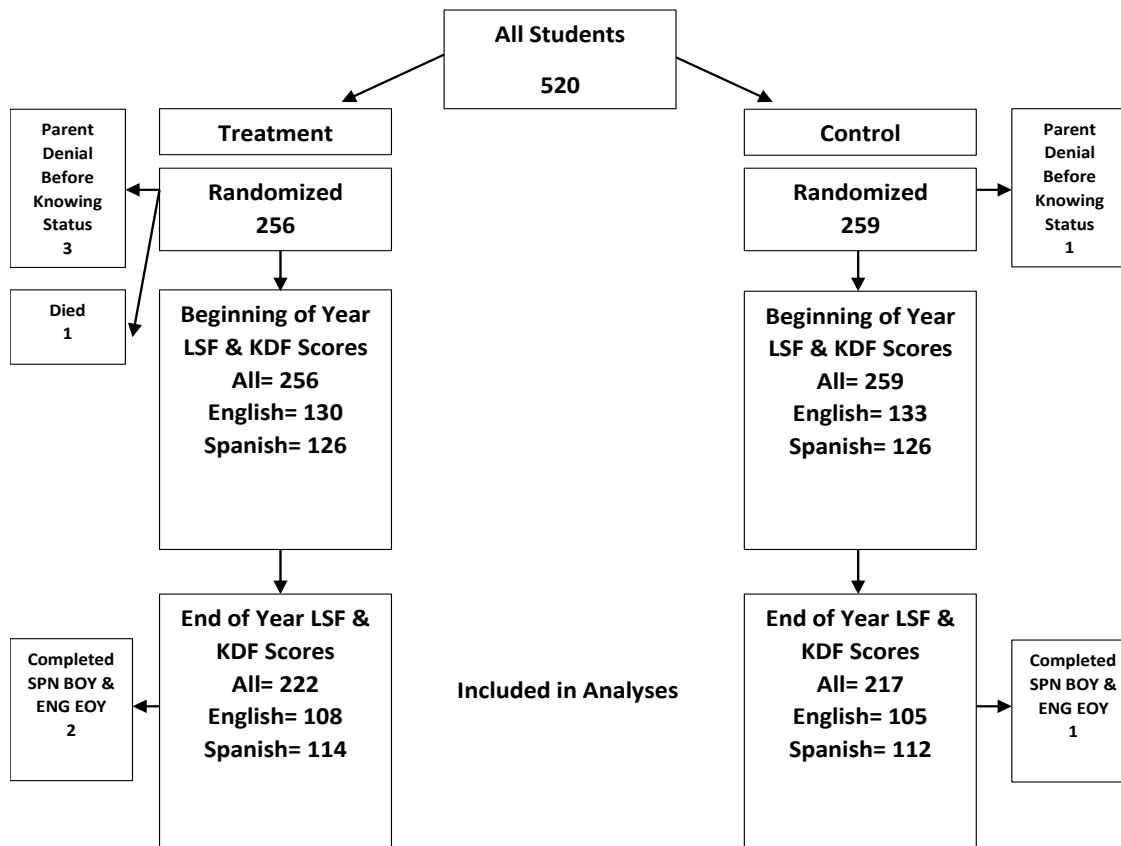
Figures 1 and 2 provide consort diagrams for the study summarizing student progression through the study for kindergarten and Grade 1 students, respectively. Across all 22 AISD schools, 520 kindergarten students were determined to be eligible based on their BOY assessment scores and were randomly assigned to either the treatment group or the control group (Figure 1). Using simple random assignment, 260 students were assigned to each group.<sup>3</sup> Following random assignment, four parents (three in the treatment group and one in the control group) opted out of the study prior to knowing their student's group assignment. Additionally, one student died. These students were excluded from any data analysis. Pretest data were therefore available for 256 treatment group and 259 control group kindergarten students. At the end of the year, 224 treatment group and 218 control group students completed the end-of-year (EOY) assessments. Three of these students (two in the treatment group and one in the control group) completed the BOY assessments in Spanish and the EOY assessments in English. These students were not included in the outcomes analyses due to issues related to the use of standardized scores at BOY and EOY.<sup>4</sup> The final sample of kindergarten students consisted of 222 treatment group students and 217 control group students. The overall attrition rate for kindergarten students was 14.8%, while the differential attrition rate between treatment and control groups was 2.9%. This is indicative of low attrition (What Works Clearinghouse, 2017).

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<sup>3</sup> Due to small sample sizes within each school, as well as data availability, it was not possible to use a stratified random assignment procedure.

<sup>4</sup> Z-scores based on the study sample were constructed separately for the students completing the English and Spanish versions of each of the assessments. For students who completed the BOY assessments in Spanish and EOY assessments in English, the z-scores for the BOY and EOY assessments were not calculated relative to the same groups of students or based on the same scales.

**Figure 1. Consort Diagram Displaying Participation Status of Kindergarten Students**

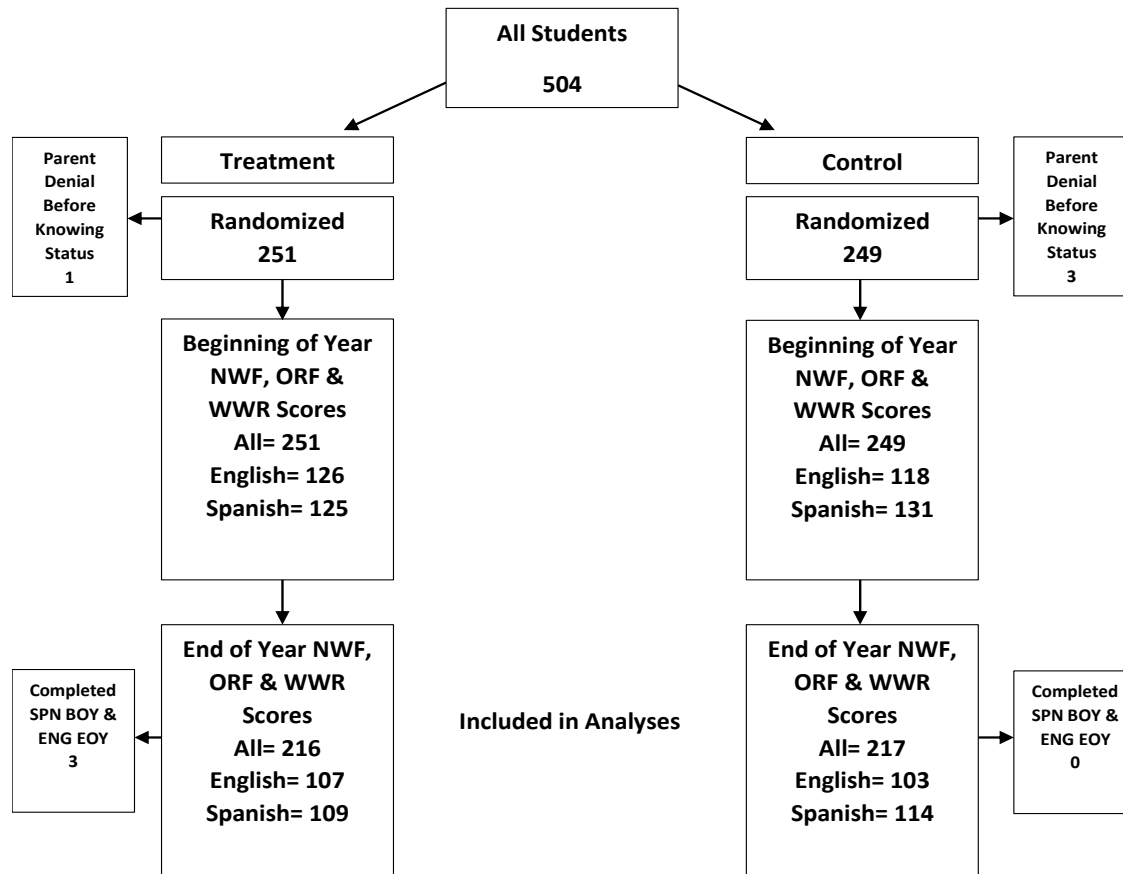


For Grade 1, 504 students were determined to be eligible based on their BOY assessment scores (Figure 2). Using the same procedure, 252 students were assigned to the treatment group and 252 were assigned to the control group. Following random assignment, four parents (one in the treatment group and three in the control group) opted their students out of the evaluation prior to knowing their student’s group assignment. These students were excluded from any data analysis. Pretest data were therefore available for 251 treatment group and 249 control group Grade 1 students. At the end of the year, 219 treatment group and 217 control group students completed the EOY assessments. Three of the treatment group students completed the BOY assessments in Spanish and the EOY assessments in English. These students were not included in the outcomes analyses due to issues related to the use of standardized scores at the beginning and end of the year.<sup>5</sup> The final sample of Grade 1 students consisted of

<sup>5</sup> Z-scores based on the study sample were constructed separately for the students completing the English and Spanish versions of each of the assessments. For students who completed the BOY assessments in Spanish and EOY assessments in English, the z-scores for the BOY and EOY assessments were not calculated relative to the same groups of students or based on the same scales.

216 treatment group students and 217 control group students. The overall attrition rate for grade 1 students was 13.4%, while the differential attrition rate between treatment and control groups was 1.1%. These estimates are indicative of low attrition (What Works Clearinghouse 2017).

**Figure 2. Consort Diagram Displaying Participation Status of Grade 1 Students**



## Sample Characteristics

The analytic samples used to examine the impact of Literacy First on the outcome assessments consisted of: (1) 222 treatment group and 217 control group kindergarten students, and (2) 216 treatment group and 217 control group Grade 1 students. Baseline equivalence on key demographic and achievement variables was assessed using Hedge’s *g* for continuous variables (i.e., ORF scores) and Cox’s index for dichotomous variables (i.e., gender and previous Literacy

First tutoring). Tests of statistical significance between the treatment and control groups on baseline characteristics were also conducted.

Tables 1 and 2 present descriptive data, mean, percentage, and effect size differences between the treatment and comparison groups for kindergarten and Grade 1 students, respectively. As shown, most of the effect size differences are in the acceptable range but are large enough to warrant inclusion in the final analytic impact models to control for baseline differences, based on What Works Clearinghouse (WWC) threshold standards (What Works Clearinghouse, 2017).<sup>6</sup> The only variable exceeding WWC thresholds was race/ethnicity. Additionally, Tables 1 and 2 present p values from analyses comparing the percentages of students in each category for the treatment and control groups, as well as differences in students' BOY assessment scores. There were no statistically significant differences between students in the treatment or control groups on any of the student characteristics or outcomes.

Table 1 presents the descriptive statistics for kindergarten students in the treatment and control groups. Overall, the kindergarten students were primarily Hispanic (85%) and economically disadvantaged (94.5%), had limited English proficiency (57.5%), and did not participate in special education (89.5%).

**Table 1. Kindergarten Sample Descriptive Statistics, Statistical Significance, and Effect Size Differences**

|                                    | Treatment |      | Control |      | P Value | Effect Size |
|------------------------------------|-----------|------|---------|------|---------|-------------|
|                                    | N         | %    | N       | %    |         |             |
| <b>Race/Ethnicity</b>              |           |      |         |      |         |             |
| Black                              | 19        | 8.6  | 18      | 8.3  | 0.71    | 0.08+       |
| Hispanic                           | 182       | 82.0 | 190     | 88.0 | 0.08    | -0.29++     |
| White                              | 14        | 6.3  | 7       | 3.2  | 0.13    | 0.44++      |
| Other race/ethnicity               | 7         | 3.2  | 2       | 0.9  | 0.14    | 0.74++      |
| <b>Limited English Proficiency</b> |           |      |         |      |         |             |
| Yes                                | 134       | 60.4 | 119     | 54.8 | 0.29    | 0.12+       |

<sup>6</sup> The WWC does not require variables with effect size differences less than 0.05 to be included in analytic models. The WWC requires variables with values between 0.05 and 0.25 to be included in analytic models. The WWC considers variables with effect size differences larger than 0.25 to not be equivalent. Absolute values are used for effect size differences.

|  |             |                |             |                |                |                    |
|--|-------------|----------------|-------------|----------------|----------------|--------------------|
| No   | 88          | 39.6           | 98          | 45.2           | 0.29           | -0.12+             |
| <b>Special Education</b>                   |             |                |             |                |                |                    |
| Yes  | 22          | 9.9            | 25          | 11.5           | 0.50           | -0.12+             |
| No   | 200         | 90.1           | 192         | 88.5           | 0.50           | 0.12+              |
| <b>Gender</b>                              |             |                |             |                |                |                    |
| Male                                       | 114         | 51.4           | 107         | 49.3           | 0.68           | 0.05+              |
| Female                                     | 108         | 48.6           | 110         | 50.7           | 0.68           | -0.05+             |
| <b>Economic Disadvantage</b>               |             |                |             |                |                |                    |
| Yes  | 206         | 93.6           | 204         | 94.9           | .065           | -0.12+             |
| No   | 16          | 6.4            | 13          | 5.1            | 0.65           | 0.12+              |
| <b>Beginning-of-Year Assessment Scores</b> |             |                |             |                |                |                    |
|  | <b>Mean</b> | <b>Std Dev</b> | <b>Mean</b> | <b>Std Dev</b> | <b>P Value</b> | <b>Effect Size</b> |
| LSF score (standardized)                   | 0.01        | 0.99           | -0.02       | 1.01           | 0.75           | 0.03               |
| KDF score (standardized)                   | 0.02        | 1.12           | -0.01       | 0.86           | 0.76           | 0.03               |

\*p<.05, \*\*p<.01

+0.05< absolute value of effect size ≤0.25, ++Absolute value of effect size >0.25

Table 2 presents the descriptive statistics for Grade 1 students in the treatment and control groups. Similar to the kindergarten students, Grade 1 students were primarily Hispanic (84%) and economically disadvantaged (92%), had limited English proficiency (52%), and did not participate in special education (88.5%). The majority of students had not previously received Literacy First tutoring in kindergarten (58.8%).

**Table 2. Grade 1 Sample Descriptive Statistics, Statistical Significance, and Effect Size Differences**

|                                    | Treatment |      | Control |      | P Value | Effect Size |
|------------------------------------|-----------|------|---------|------|---------|-------------|
|                                    | N         | %    | N       | %    |         |             |
| <b>Race/Ethnicity</b>              |           |      |         |      |         |             |
| Black                              | 21        | 9.7  | 20      | 9.2  | 0.72    | 0.07+       |
| Hispanic                           | 178       | 82.4 | 186     | 85.7 | 0.26    | -0.18+      |
| White                              | 12        | 5.6  | 5       | 2.3  | 0.03*   | 0.69++      |
| Other race/ethnicity               | 4         | 1.9  | 5       | 2.3  | 1.00    | 0.00        |
| <b>Limited English Proficiency</b> |           |      |         |      |         |             |
| Yes                                | 113       | 52.3 | 113     | 52.1 | 1.00    | 0.00        |
| No                                 | 103       | 47.7 | 104     | 47.9 | 1.00    | 0.00        |
| <b>Special Education</b>           |           |      |         |      |         |             |

|  |             |                |             |                |                |                    |
|--|-------------|----------------|-------------|----------------|----------------|--------------------|
| Yes  | 28          | 13.0           | 21          | 9.7            | 0.33           | 0.18+              |
| No   | 188         | 87.0           | 196         | 90.3           | 0.33           | -0.18+             |
| <b>Gender</b>                              |             |                |             |                |                |                    |
| Male                                       | 111         | 51.4           | 114         | 52.5           | 0.68           | -0.05+             |
| Female                                     | 105         | 48.6           | 103         | 47.5           | 0.68           | 0.05+              |
| <b>Economic Disadvantage</b>               |             |                |             |                |                |                    |
| Yes  | 198         | 92.1           | 199         | 91.7           | 1.00           | 0.00               |
| No   | 18          | 7.9            | 18          | 8.3            | 1.00           | 0.00               |
| <b>Prior Literacy First Tutoring</b>       |             |                |             |                |                |                    |
| Yes  | 93          | 43.0           | 86          | 39.6           | 0.53           | 0.07+              |
| No   | 123         | 57.0           | 131         | 60.4           | 0.53           | -0.07+             |
| <b>Beginning-of-Year Assessment Scores</b> |             |                |             |                |                |                    |
|  | <b>Mean</b> | <b>Std Dev</b> | <b>Mean</b> | <b>Std Dev</b> | <b>P Value</b> | <b>Effect Size</b> |
| ORF score (standardized)                   | -0.02       | 0.92           | 0.02        | 1.07           | 0.64           | -0.04              |
| NWF score (standardized)                   | -0.03       | 1.03           | 0.03        | 0.97           | 0.55           | -0.06+             |
| WWR score (standardized)                   | 0.03        | 0.93           | -0.03       | 1.06           | 0.58           | 0.06+              |

\*p<.05, \*\*p<.01

+0.05< absolute value of effect size ≤0.25, ++Absolute value of effect size >0.25

## Analysis

The study used a multi-site design in which students were randomly assigned within schools to treatment and control groups. Since students were nested within schools, a two-level hierarchical linear model was used to analyze the data, with students at level 1 and schools at level 2. The equation below was used to estimate the impact of Literacy First tutoring on Kindergarten and Grade 1 student outcomes.<sup>7</sup>

### Level-1 Students

$$Y_{ij} = \beta_{0j} + \beta_{1j}*(Treatment_{ij}) + \beta_{2j}*(Tutoring\ 2016-17_{ij}) + \beta_{3j}*(Black_{ij}) + \beta_{4j}*(White_{ij}) + \beta_{5j}*(Other\ Race_{ij}) + \beta_{6j}*(Male_{ij}) + \beta_{7j}*(Special\ Education_{ij}) + \beta_{8j}*(Economic\ disadvantage_{ij}) + \beta_{9j}*(BOY\ Assessment_{ij}) + \beta_{10j}*(Spanish_{ij}) + \beta_{11j}*(LEP_{ij}) + r_{ij}$$

### Level-2 Schools

<sup>7</sup> The Tutoring 2016-17 variable was omitted from impact analyses using data for Kindergarten students.

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + u_{1j}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

$$\beta_{5j} = \gamma_{50}$$

$$\beta_{6j} = \gamma_{60}$$

$$\beta_{7j} = \gamma_{70}$$

$$\beta_{8j} = \gamma_{80}$$

$$\beta_{9j} = \gamma_{90}$$

$$\beta_{10j} = \gamma_{100}$$

$$\beta_{11j} = \gamma_{100}$$

where  $Y_{ij}$  is the student outcome (i.e., LSF, ORF),  $\beta_{0j}$  is the adjusted mean outcome score across school sites, and  $\beta_{1j}$  is the adjusted treatment effect across school sites. A dummy variable indicator, *Spanish*, was included to control for differences on English and Spanish versions of the assessments. All variables, with exception of the treatment indicator, were group-mean centered. As shown, the treatment effect was allowed to vary across sites.

## Results

Results of the analyses showed statistically significant, positive effects of Literacy First participation on kindergarten students' letter sound fluency and decoding fluency relative to students who received supplemental reading supports through their classroom teacher (e.g., tutoring, and small group instruction). Results of the analyses also showed statistically significant, positive effects of Literacy First on participation Grade 1 students' nonsense word fluency, oral reading fluency, and whole word reading relative to students that received supplemental reading supports from their teachers. For all outcomes, additional analyses were conducted to assess whether there was a significant interaction between the treatment effect and taking the Spanish versions of the assessments. These analyses did not reveal any statistically significant differences in treatment effect for students who completed Spanish versions of the assessments.

Table 3 shows the treatment effects for kindergarten students. As shown in Table 3,<sup>8</sup> treatment group students scored 0.83 standard deviations higher than control group students on the EOY LSF assessment on average across sites, controlling for baseline student characteristics. Similarly, treatment group students scored 0.53 standard deviations higher than control group

<sup>8</sup> Detailed data tables are provided in Appendix A.



students on the EOY KDF assessment on average across sites (see Appendix A for data tables). The results were statistically significant.

**Table 3. Treatment effects of Literacy First for Kindergarten Students**

| Kindergarten Assessment             | Treatment Effect<br>(in standard deviation units) |
|-------------------------------------|---|
| Letter Sound Fluency (LSF)          | 0.83**  |
| Kindergarten Decoding Fluency (KDF) | 0.53**  |

\* $p < .05$ , \*\* $p < .01$

Table 4 shows the results of the analyses examining the effect of Literacy First on Grade 1 students' nonsense word fluency, oral reading fluency, and whole word reading. Grade 1 students who received Literacy First tutoring scored 0.33 standard deviations higher on the EOY DIBELS NWF assessment than students who did not receive Literacy First tutoring, on average across sites (see Appendix A). Similarly, Grade 1 students in the treatment group scored 0.38 standard deviations higher on the EOY DIBELS ORF assessment than students in the control group, on average across sites. Grade 1 students in the treatment group also scored 0.24 standard deviations higher on the EOY WWR assessment than students in the control group, on average across sites. The results were statistically significant.

**Table 4. Treatment Effects of Literacy First for Grade 1 Students**

| First Grade Assessment      | Treatment Effect<br>(in standard deviation units) |
|-----------------------------|---|
| Nonsense Word Fluency (NWF) | 0.33**  |
| Oral Reading Fluency (ORF)  | 0.38**  |
| Whole Words Read (WWR)      | 0.24**  |

\* $p < .05$ , \*\* $p < .01$

## Summary

This study employed a multi-site, randomized, experimental design to estimate the impact of Literacy First on kindergarten and Grade 1 student outcomes. Kindergarten and Grade 1 students were screened for eligibility in September 2018, based on student scores on BOY assessments measuring letter sound fluency and decoding fluency for kindergarten students and nonsense word fluency, oral reading fluency, and whole word reading for Grade 1 students. Eligible students were randomly assigned to a treatment condition in which students received Literacy First tutoring or a “business as usual” control condition. Both groups of students continued to receive any additional support normally received. At the end of the year, students completed the same assessments. Multilevel modeling was used to estimate the impact of participation in Literacy First on student outcomes.

Overall, the study shows that students who received Literacy First tutoring outperformed students who did not receive Literacy First tutoring on all five of the outcome measures included in the evaluation. Results of the analyses showed statistically significant, positive effects on kindergarten students’ letter sound fluency and decoding fluency. On average across sites, kindergarten students in the treatment group scored 0.83 standard deviations higher on the EOY LSF and 0.53 standard deviations higher on the EOY KDF than students in the control group, controlling for baseline student characteristics. Similarly, results of the analyses showed statistically significant, positive effects of Literacy First on Grade 1 students’ nonsense word fluency, oral reading fluency, and whole word reading. Grade 1 students in the treatment group scored 0.33 standard deviations higher on the DIBELS NWF, 0.38 standard deviations higher on the DIBELS ORF, and 0.24 standard deviations higher on the WWR than control group students on average across sites, controlling for baseline student characteristics.

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## Appendix A. Data Tables

**Exhibit A-1. Impact Analysis Results for Letter Sound Fluency, Kindergarten Students**

| Fixed Effect                      | Coefficient | Standard Error | t-ratio | Approx. d.f. | P Value |
|-----------------------------------|-------------|----------------|---------|--------------|---------|
| Intercept                         | -0.45       | 0.12           | -3.76   | 21           | 0.00**  |
| Treatment                         | 0.83        | 0.76           | 10.91   | 21           | 0.00**  |
| BOY LSF                           | 0.25        | 0.04           | 6.86    | 386          | 0.00**  |
| Black                             | -0.11       | 0.14           | -0.78   | 386          | 0.44    |
| White                             | -0.08       | 0.19           | -0.41   | 386          | 0.68    |
| Other race                        | -0.27       | 0.27           | -0.99   | 386          | 0.32    |
| Male                              | -0.04       | 0.07           | -0.54   | 386          | 0.59    |
| Limited English Proficiency (LEP) | -0.13       | 0.17           | -0.77   | 386          | 0.44    |
| Special education                 | -0.37       | 0.12           | -3.06   | 386          | 0.00**  |
| Economic disadvantage             | -0.28       | 0.17           | -1.63   | 386          | 0.11    |
| Spanish                           | 0.14        | 0.17           | 0.88    | 386          | 0.38    |

\*p<.05, \*\*p<.01

**Exhibit A-2. Impact Analysis Results for Kindergarten Decoding Fluency, Kindergarten Students**

| Fixed Effect          | Coefficient | Standard Error | t-ratio | Approx. d.f. | P Value |
|-----------------------|-------------|----------------|---------|--------------|---------|
| Intercept             | -0.29       | 0.12           | -2.32   | 21           | 0.03*   |
| Treatment             | 0.53        | 0.08           | 6.39    | 21           | 0.00**  |
| BOY KDF               | 0.18        | 0.04           | 4.38    | 385          | 0.00**  |
| Black                 | -0.00       | 0.16           | -0.03   | 385          | 0.98    |
| White                 | -0.06       | 0.22           | -0.29   | 385          | 0.77    |
| Other race            | 0.18        | 0.30           | 0.61    | 385          | 0.54    |
| Male                  | -0.06       | 0.08           | -0.70   | 385          | 0.49    |
| LEP                   | -0.28       | 0.19           | -1.51   | 385          | 0.13    |
| Special education     | -0.35       | 0.14           | -2.59   | 385          | 0.10    |
| Economic disadvantage | -0.53       | 0.19           | -2.81   | 385          | 0.01**  |
| Spanish               | 0.37        | 0.19           | 1.98    | 385          | 0.05    |

\*p<.05, \*\*p<.01

**Exhibit A-3. Impact Analysis Results for Nonsense Word Fluency, Grade 1 Students**

| Fixed Effect          | Coefficient | Standard Error | t-ratio | Approx. d.f. | P Value |
|-----------------------|-------------|----------------|---------|--------------|---------|
| Intercept             | -0.14       | 0.07           | -2.05   | 21           | 0.05*   |
| Treatment             | 0.33        | 0.09           | 3.70    | 21           | 0.00**  |
| BOY NWF               | 0.42        | 0.04           | 9.63    | 378          | 0.00**  |
| Tutoring 2016–17      | -0.10       | 0.09           | -1.05   | 378          | 0.30    |
| Black                 | 0.10        | 0.07           | -2.05   | 378          | 0.54    |
| White                 | -0.03       | 0.24           | -0.13   | 378          | 0.90    |
| Other race            | 0.34        | 0.32           | 1.10    | 378          | 0.27    |
| Male                  | 0.20        | 0.09           | 2.34    | 378          | 0.02*   |
| LEP                   | -0.07       | 0.09           | -0.77   | 378          | 0.44    |
| Special education     | 0.01        | 0.14           | 0.05    | 378          | 0.96    |
| Economic disadvantage | -0.05       | 0.17           | -0.30   | 378          | 0.77    |
| Spanish               | -0.01       | 0.11           | -0.10   | 378          | 0.92    |

\*p&lt;.05, \*\*p&lt;.01

**Exhibit A-4. Impact Analysis Results for Oral Reading Fluency, Grade 1 Students**

| Fixed Effect          | Coefficient | Standard Error | t-ratio | Approx. d.f. | P Value |
|-----------------------|-------------|----------------|---------|--------------|---------|
| Intercept             | -0.17       | 0.08           | -2.26   | 21           | 0.04*   |
| Treatment             | 0.38        | 0.08           | 4.75    | 21           | 0.00**  |
| BOY ORF               | 0.51        | 0.04           | 12.39   | 378          | 0.00**  |
| Tutoring 2016–17      | 0.08        | 0.08           | 0.91    | 378          | 0.36    |
| Black                 | 0.01        | 0.15           | 0.09    | 378          | 0.93    |
| White                 | 0.20        | 0.22           | 0.90    | 378          | 0.37    |
| Other race            | 0.28        | 0.29           | 0.96    | 378          | 0.34    |
| Male                  | 0.07        | 0.08           | 0.90    | 378          | 0.37    |
| LEP                   | -0.05       | 0.09           | -0.57   | 378          | 0.57    |
| Special education     | 0.03        | 0.13           | 0.21    | 378          | 0.84    |
| Economic disadvantage | -0.49       | 0.16           | -3.08   | 378          | 0.00**  |
| Spanish               | -0.06       | 0.10           | -0.56   | 378          | 0.57    |

\*p&lt;.05, \*\*p&lt;.01

**Exhibit A-5. Impact Analysis Results for Whole Words Read, Grade 1 Students**

| Fixed Effect          | Coefficient | Standard Error | t-ratio | Approx. d.f. | P Value |
|-----------------------|-------------|----------------|---------|--------------|---------|
| Intercept             | -0.11       | 0.07           | -1.46   | 21           | 0.16    |
| Treatment             | 0.24        | 0.09           | 2.67    | 21           | 0.01**  |
| BOY WWR               | 0.38        | 0.05           | 8.39    | 378          | 0.00**  |
| Tutoring 2016–17      | -0.10       | 0.09           | -0.99   | 378          | 0.33    |
| Black                 | 0.15        | 0.17           | 0.87    | 378          | 0.38    |
| White                 | 0.07        | 0.25           | 0.28    | 378          | 0.78    |
| Other race            | 0.50        | 0.32           | 1.56    | 378          | 0.12    |
| Male                  | 0.22        | 0.09           | 2.53    | 378          | 0.01*   |
| LEP                   | 0.03        | 0.09           | 0.32    | 378          | 0.75    |
| Special education     | -0.04       | 0.14           | 2.67    | 378          | 0.77    |
| Economic disadvantage | 0.05        | 0.17           | 0.28    | 378          | 0.78    |
| Spanish               | -0.00       | 0.11           | -0.04   | 378          | 0.97    |

\*p&lt;.05, \*\*p&lt;.01



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