**PreK-4 SA Program Assessment**

# Proposal Considerations for Longitudinal Evaluation of Literacy Outcomes

**Proposal prepared July 27, 2017 for**

**San Antonio Early Childhood Education Municipal Development Corporation**

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# PROPOSAL CONSIDERATION FOR LONGITUDINAL EVALUATION OF LITERACY OUTCOMES

## Summary

The purpose of this document is to present proposal considerations for direct assessment and evaluation of literacy outcomes for former Pre-K 4 SA children during the first grade year. The following proposal includes a brief explanation of the proposed work, timeline of expected activities, assumptions, and a budget.

*Purpose*– to conduct a direct assessment measure of children's literacy skills for both former Pre-K 4 SA children and children who were not selected to attend Pre-K 4 SA.

*Benefit*– inclusion of a direct assessment rather than relying on state and district collected data on child outcomes, which are often not conducted using the same assessment.

*Budget*–

| | | |
|---|---|---|
| Year 1 (2017-18) | $156,358 |
| Year 2 (2018-19) | $128,391 |
| Year 3 (2019-20) | $136,832 |
| Total | $421,581 |

*Period of Performance*– October 1, 2017 to September 2020

## Longitudinal Evaluation Details

Proposed evaluation details include assumptions about the study sample, the proposed design and estimated sample size proposed.

### Sample

**Study eligibility:** The first four cohorts of children who attended Pre-K 4 SA did so by being selected through a lottery. The proposed study will focus on children who applied to attend Pre-K 4 SA during its third year of operation (2015-16) as this was the first full operational year in which every Pre-K 4 SA center was past a startup year. Children who were selected to participate in Pre-K 4 SA during the 2015-16 school year will be eligible to participate in the study as the Pre-K 4 SA treatment group. Children who were not selected to participate in Pre-K 4 SA during the same year will be eligible to participate in the random assignment evaluation as the control group.

**Consent and Study Sample Sizes:** Pre-K 4 SA staff will compile the list from the 2015-16 lottery, identified by center (either attended for former Pre-K 4 SA children or requested for children who were not offered admission to Pre-K 4 SA). Pre-K 4 SA staff will contact eligible treatment and control group families to obtain participants for the proposed study. Westat will draft a parental consent form and submit to Westat's IRB for approval. Pre-K 4 SA staff will obtain signed parental consent from parents or guardians for eligible treatment and control group participants. The target sample size for the study is 280 children; 140 treatment and 140 control. We arrived at the sample size of 280 children for each cohort based on our goal of having approximately 35 children representing each of the four Pre-K 4 SA

centers and approximately 35 children in each center's corresponding control group. Further, we assumed there will be 10% student attrition between stated interest of participation and each data collection time point proposed.

## Research Design, Research Questions, Measures and Statistical Power

*Research design:* The empirical goal of the proposed evaluation is to estimate the magnitude of the causal effect of Pre-K 4 SA on former student literacy outcomes, and study this effect overtime. The effect of Pre-K 4 SA on former student literacy outcomes will be estimated by the taking difference between the treatment and control group on the average student outcome of interest. This difference, when standardized, is the effect size. Because the treatment and control groups will have been formed by lottery-based random assignment, the effect size has the potential to be unbiased unless the statistical equating properties of the lottery are disrupted during study implementation by phenomenon such as high student attrition. The effect sizes, and corresponding p-values and confidence intervals will be used to answer the confirmatory research questions posed for this study, and the research team will make every effort to maintain the integrity of the lottery assignments (including minimizing differential and overall attrition) so the evidence used to calculate these inferential statistics will Meet WWC Group Design Standards.

*Research questions:* The effect sizes used to answer confirmatory questions will be the basis for determining whether the Pre-K 4 SA program has a causal effect on former student's literacy outcomes. We expect the estimated minimum detectable effect (MDE) for which we have planned will lead to: 1) the sample being large enough to produce a reasonably precise effect size (according to literature) of the Pre-K 4 SA effect, and 2) the effect size being able to be replicated if study implementation procedures are duplicated in similar settings with similar target populations. In sum, confirmatory research questions will be answered using effect sizes that are statistically powered with the appropriate degree of precision to have confidence in the answer (and its possible replication). The confirmatory research question is: What is the effect of Pre-K 4 SA on student's literacy skills in first, second and third grade?

Three exploratory questions will also be addressed in the proposed evaluation. In contrast to the confirmatory question, effect sizes used to answer exploratory questions are not used as the basis for determining whether Pre-K 4 SA works; rather, to understand mechanisms by which confirmatory effects may have been found. We propose three, exploratory questions if positive effects are found (Table 1).

*Table 1. Exploratory research questions*

| | |
|---|---|
| ERQ1 | If there is an effect of Pre-K 4 SA on children's end-of year literacy skills, does the effect differ as children progress from one grade to the next? |
| ERQ2 | If there is an effect of Pre-K 4 SA on children's end-of-year literacy skills, does this effect differ by child subgroup? |
| ERQ3 | If there is an effect of Pre-K 4 SA on children's end-of-year literacy skills, does this effect differ by experienced Pre-K 4 SA quality (as measured by the CLASS)? |

*Note.* For questions concerning subgroups of children, we will consider ELL, ethnicity, gender, etc., for potential subgroup analyses and will confer with Pre-K 4 SA on the most important subgroups of interest.

## Measures

To measure literacy across all time points, we proposed used the Letter-Word Identification and Passage Comprehension tests from the Woodcock-Johnson IV Tests of Achievement (Schrank, Mather, & McGrew, 2014) and similar subtests from the Bateria III (Muñoz-Sandoval, Woodcock, McGrew, & Mather, 2005). Both subtests together are estimated to take approximately 10-15 minutes to administer on average. These measures are proposed for the following reasons: 1) short assessment time (less than 20 minutes), 2) availability of a validated Spanish version of the assessment, 3) a norm-referenced assessment, 4) the same assessment can be used and compared over time with all age ranges of interest (6 to 9 years of age), and 5) wide acceptance and use as an evaluation measure. Several other measures were considered but did not include at least one of these criteria. Table 3 includes all finalist measures considered.

Table 3. Final list of assessments considered for recommendation.

| Assessment Name | Subtest(s) Considered for Proposal | What would be measured | Criteria | | | | |
|---|---|---|---|---|---|---|---|
| | | | Assessment Time | Spanish Language | Norm Referenced | Evaluation Age Span | Evaluation Use |
| Clinical Evaluation of Language Fundamentals-5th Ed. | Word structure | Grammar (children's knowledge of grammatical rules) | √ | X[1] | √ | √ | X |
| Comprehensive Test of Phonological Processing (CTOPP)/Test of Phonological Processing in Spanish (TOPPS) | Rapid Letter Naming Blending words Segmenting words | Assessment of reading-related phonological processing skills | √ | √ | X[2] | √ | √ |
| Diagnostic Assessment of Reading Comprehension (DARC) | Text memory Text inferencing Knowledge access Knowledge integration | Ability to access prior knowledge from long-term memory, make inferences based on information provided in the text, recall new text information from memory, and integrate accessed prior knowledge with new text information | X | √ | X | X | √ |
| Gates-MacGinitie Reading Comprehension test | Reading Comprehension | How well a child can read and understand entire passages | X | X | √ | √ | √ |
| Test of Early Reading Ability 3 (TERA-3) | Alphabet Conventions Meaning | Assess reading ability with overall reading quotient | X | X | √ | X[3] | √ |
| Test of Word Reading Efficiency (TOWRE) | Sight Word Efficiency Phonemic Decoding Efficiency | Children's ability to read printed words and decode pseudo words accurately and fluently | √ | X | √ | √ | √ |
| Woodcock Johnson Tests of Achievement (WJ-IV) | Letter Word Passage Comprehension | Decoding skills Reading comprehension and lexical knowledge | √ | √ | √ | √ | √ |
| Woodcock Reading Mastery Tests, Third Edition (WRMT™-III) | Word Identification Passage Comprehension | Decoding skills Assess children's ability to identify missing word(s) in a short passage | √ | X | √ | √ | √ |

[1] In progress but not yet available.

[2] Norms available for the English version but no norms identified for the Spanish version.

[3] During the last year, some students may be at the upper end or slightly past the upper end of the age range.

### Statistical power (and estimated MDEs)

Longitudinal cohort design: As Table  shows, the proposed sample of Pre-K 4 SA children attended during the 2015-16 school year and are expected to be in 1st grade during the 2017-18 school year. We define attrition as a Pre-K 4 SA cohort member being excluded from the analysis sample because of missing a value on an outcome. Based on our previous experience, we assume student attrition of 10% between consent and end-of-year post-testing for the first year and subsequent years of post-test follow up. At this rate, attrition will reduce the target consent sample size of 280 to an end-of-year post-test follow up sample size of approximately 252 children. We proposed to continue annual post-test follow ups with students in through the end of the 2019-20 school year. The assessment will occur at the end of grade 1, grade 2, and grade 3.

The estimated MDEs can be defined as the smallest effect size that has an 80% chance of being declared statistically significant under certain assumptions invoked during the design phase. For a fixed-effects regression model, we assume a two-tailed test with alpha = .05, beta = .80, proportion of children randomly assigned to each group of .50, *r*-squared between tests = .70, and up to four covariate Pre-K 4 SA site indicator variables. The MDEs reported in Table  were estimated with these assumptions using Dong & Maynard (2013) Power Up software.

As Table 4 shows, the multi-year, longitudinal design with treatment (Pre-K 4 SA) and control ("business as usual") produces a MDEs of .20 standard deviations at the end of grade 1, .21 at the end of grade 2, and the end of grade 3 MDEs is .22. The main point of Table 4 is that longitudinal design can be used to examine the potential of Pre-K 4 SA to have potential effects that are sustained in Grade 1, Grade 2, and Grade 3.

*Table 4. Pre-K 4 SA Cohort Cross-Sectional Sample Sizes and Estimated MDEs by School Year*

| Grade Level Prior to Proposed Study | | Yearly Sample Sizes and Estimated Yearly MDEs for Pre-K 4 SA and Control Groups | | |
|---|---|---|---|---|
| SY 2015/16 | SY2016/17 | SY 2017/18 | SY 2018/19 | SY 2019/20 |
| Pre-kindergarten | Kindergarten | Grade 1 (n=252) [.20] | Grade 2 (n=227) [.21] | Grade 3 (n=204) [.22] |

*Note.* MDEs in brackets ([ ]) are for one school year are in standard deviation units.

### Student Assessment and Minimizing Attrition

***Student assessment:*** Post testing of students for end-of-grade outcomes will occur every spring. Westat's research team will conduct post-testing of children and parents at designated locations arranged by Pre-K 4 SA. It is suggested that Pre-K 4 SA provide incentives to both children and adults for participating at each post testing time point. Westat's budget estimates do not include cost and expenses for testing locations, participant recruitment or incentives for participants.

***Minimizing student attrition:*** While Pre-K 4 SA is obtaining initial consent from a parent/guardian (adult), it is recommended that parents/guardians be asked for contact information for a friend or relative that is not living with the parent/guardian and child to allow for a backup follow-up plan if the original contact information becomes outdated. In addition, Pre-K 4 SA may want to send occasional postcards (mail and email) to participating families to alert us if they move or as reminders of upcoming participation. In addition, it is recommended that parent incentives increase each year (for example,

starting at $25 at baseline and progressively increasing to $75) to cover time, travel and encourage continued participation in data collection, and offer children a book to take home each time. In addition to individual incentives, Pre-K 4 SA may also consider several drawings be held each year for additional incentive opportunities for participants.

**Documenting the counterfactual condition:** Understanding the counterfactual or "business as usual" control condition is critical in an RCT. In this case, children who were not selected to participate in Pre-K 4 SA may have experienced any number of varied opportunities during the pre-K year. Potential experiences include attending district pre-K classrooms within elementary schools, Head Start attendance, attendance in parochial or private school pre-K programs, attendance in private pre-K or day care centers, or home care which could include relatives or other individuals providing private care.

As so many possible options may be included in the counterfactual condition, we proposed that parents/guardians complete a brief survey about their children's educational experiences during the first data collection time point. This brief questionnaire will ask families about this child's pre-K year (what type of program or experience the child participated in and whether it was a full or half day program; the frequency of participation; how many children are in their class; etc.).

## Proposed Timeline and Budget

| Proposed Timeline | Date (Annual) |
|---|---|
| **Year 1 (2017-18)** | |
| Westat develops parental consent forms in English and Spanish | October |
| Westat submits to Westat's IRB for study approval | November |
| Westat purchases testing materials | December |
| Pre-K 4 SA staff acquire consent to participate | January – April |
| Westat recruits and trains assessors (data collectors) | March – April |
| Pre-K 4 SA holds event and assessments are delivered (4 events) | May |
| Westat cleans and prepares data for analyses | June |
| Westat analyzes data | July – August |
| Draft and Finalize report | August – September |
| **Year 2 (2018-19)** | |
| Pre-K 4 SA contacts participants (reminder) | January – March |
| Westat trains/refresh assessors | March – April |
| Westat purchases testing materials | April |
| Pre-K 4 SA holds event and assessments are delivered (4 events) | May |
| Westat cleans and prepares data for analyses | June |
| Westat analyzes data | July – August |
| Draft and Finalize report | August – September |
| **Year 3 (2019-20)** | |
| Pre-K 4 SA contacts participants (reminder) | January – March |
| Westat trains/refresh assessors | March – April |
| Westat purchases testing materials | April |
| Pre-K 4 SA holds event and assessments are delivered (4 events) | May |
| Westat cleans and prepares data for analyses | June |
| Westat analyzes data | July – August |
| Draft and Finalize report | August – September |

**Total budget for the longitudinal evaluation is $421,581 over 3 years.**

*Budget–*        Year 1 (2017-18)        $156,358
                 Year 2 (2018-19)        $128,391
                 Year 3 (2019-20)        $136,832
                 Total                   $421,581

Budget estimate includes ~2000 hours of staff labor for parental consent form development, IRB approval, recruitment and training of data collectors, data collection, data cleaning/analysis, and report writing. The budget also includes the following other direct expenses: consultant labor for training and to individually administer a direct assessment with up to 280 students each year; testing materials and record forms in English and Spanish; travel, copying, computing and supply expenses for data collection.