

Title: Final Outcomes of a Multisite Randomized Controlled Trial of Descubriendo la Lectura (DLL)

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Background

Recent syntheses of research on bilingual education programs have concluded that, compared to immersing students in English, teaching them in their native language as well as in English produces superior results in English reading achievement (Francis, Lesaux, & August, 2006; McField & McField, 2014; Rolstad, Mahoney, & Glass, 2005; Slavin & Cheung, 2004). With 80 percent of ELs claiming Spanish as their home language (Calderon, Slavin, & Sanchez, 2011) and with the continued growth of bilingual programs across the United States, the number of students receiving initial literacy instruction in Spanish will increase, as will the need for a Spanish-language program for students who continue to struggle to acquire essential early literacy skills—even in their native or first language. One such program is the Spanish-language reconstruction of Reading Recovery known as Descubriendo la Lectura (DLL) (Reading Recovery Council of North America, 2014).

Purpose

Despite the growing representation of Latino students in U.S. schools, the education system continues to fail to identify reliable and replicable programs to serve Spanish-speaking English learners (ELs). This national, multisite trial investigates how supplemental Spanish-language literacy instruction, provided by DLL, can impact literacy achievement for first-grade ELs who are struggling readers. With both Spanish- and English-language assessments, this study is the first to investigate the impact of the widely replicated DLL program on both Spanish and English literacy outcomes.

Intervention

DLL offers one-on-one lessons in Spanish for a period of 12–20 weeks to first-grade Spanish-speaking students struggling with reading and writing. The program extends the successful Reading Recovery approach to ELs by first addressing literacy in their native Spanish language. Lesson activities include rereading familiar books, reading a recently assigned book while teachers take a running record, working with letters or words using magnetic letters, writing a story, assembling the child's cut-up story, and reading a new, strategically selected book (Reading Recovery Council of North America, 2014).

Research Design

This study is a multisite student-level RCT involving three cohorts of students (2016-17, 2017-18, and 2018-19). Students were randomly assigned to an *immediate* treatment group or a *delayed* treatment group, with the latter serving as a control group for the former.

Setting/Sample

The final combined Cohort 1, 2, and 3 sample includes 32 DLL teachers within 32 schools and 401 first grade students assigned to either treatment or control conditions across three states: Texas, Illinois, and Arizona. Demographically, approximately 39% of the students are female, 97% are Hispanic, and 81% are economically disadvantaged.

Data Collection

Our test data include pretests (prior to randomization) and posttests (upon exiting DLL services) for first grade students. The tests include:

- 1) *Instrumento de Observación (IdO)*, a Spanish literacy assessment administered to all at-risk Spanish-speaking students who perform below grade level in DLL schools, measuring: Letter Identification, Ohio Word Test, Concepts About Print, Writing Vocabulary, Hearing and Recording Sounds in Words, and Text Reading,
- 2) *Iowa Test of Basic Skills (ITBS)* literacy assessment measuring: Vocabulary, Word Analysis, and Reading, and,
- 3) *Logramos* literacy assessment, the Spanish-language version of the *ITBS*.

We also collected demographic data (e.g., gender, socioeconomic status) and additional data that show whether students successfully completed the DLL program or were recommended for additional intervention services.

Implementation data include interviews with DLL teachers, DLL teacher leaders and principals, lesson observations, and teacher-completed activity logs.

Analysis

Student-level randomization, blocked within schools, produced statistically equivalent treatment and control samples across pretest and demographic measures. Overall and differential student attrition rates across the three assessments were low, ranging from 0.1% to 4% differential and 5% to 19% overall.

For each outcome, we fit the following model to assess the intention-to-treat (ITT) impact of DLL on literacy achievement:

$$Y_{ij} = \alpha + \beta(DLL_{ij}) + \gamma(PRETEST_{ij}) + u_j + \varepsilon_{ij}$$

In this model, Y_{ij} represents the test score of students within schools, α represents the model intercept (the grand mean for the reference group), β is the coefficient representing the impact of DLL for student i in school j , γ is the coefficient representing the association between the pretest measure and the outcome, u_j is the school-specific error, and ε_{ij} is the student-specific error term.

Results

DLL impacts for the final pooled sample were positive and were similar in magnitude across each of the three yearly cohorts. Impacts on the Spanish-language assessments were consistently large and statistically significant, ranging from $d=.34$ to $d=.95$ for the *IdO*, and from $d=.29$ to $d=.39$ for the *Logramos*. For the English-language *ITBS* assessment, the impacts ranged from $d=.07$ to $d=.20$, with only the treatment effect for the Vocabulary subtest achieving statistical significance at the conventional $p < .05$ criterion (see Tables 1-4).

Implementation fidelity was measured via interviews, lesson observations, and teacher-completed activity logs. In general, the DLL lessons were implemented daily, as prescribed, lessons were deliberate, and the instructional activities followed the intervention's established standards and guidelines. Though implementation data suggest no clear differences in fidelity across cohorts, we are currently analyzing routinely collected program data, which indicate

whether students successfully completed DLL or were referred for additional services. Using this information, we plan to estimate treatment-on-the-treated (TOT) impact estimates to augment the ITT results reported here.

Conclusion

We found that DLL produces a clear benefit to students across many dimensions of literacy, and those impacts are consistent across schools and years. Comparing the mean effect size of $d=.58$ found across the 11 Spanish literacy measures to benchmarks provided by Hill, Bloom, Black, and Lipsey (2008), the average DLL impact is equal to approximately 60% of the overall literacy growth that occurs during the first-grade year. Indeed, as a supplemental intervention spanning only 12-20 weeks, DLL produces impressive impacts of a magnitude rarely seen for educational programs of any type. Though the average impact of $d=.15$ for the 4 English literacy measures was relatively modest, it will be important to continue investigating longitudinal English-language outcomes in second and third grade and the extent to which these strong initial treatment effects in Spanish transfer to later English-language outcomes.

Appendix A. References

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Appendix B. Results Tables

Table 1. Multilevel Estimates for *Instrumento de Observación (IdO)* Outcomes.

	Letter Identification	Sound in Words	Writing Vocabulary	Concepts about Print	Ohio Word Test	Text Reading Level	Total Score
(Intercept)	-0.37 *** (0.07)	-0.19 ** (0.07)	-0.49 *** (0.09)	-0.48 *** (0.08)	-0.27 *** (0.07)	-0.50 *** (0.06)	-0.49 *** (0.07)
DLL Impact	0.67 *** (0.08)	0.34 *** (0.08)	0.88 *** (0.07)	0.88 *** (0.07)	0.49 *** (0.08)	0.95 *** (0.08)	0.90 *** (0.07)
Pretest	0.54 *** (0.04)	0.51 *** (0.05)	0.41 *** (0.04)	0.38 *** (0.04)	0.46 *** (0.05)	0.38 *** (0.04)	0.54 *** (0.04)

Note: *** $p < 0.001$, ** $p < 0.01$.

Table 2. Multilevel Estimates for *Logramos* Outcomes.

	Reading	Language	Vocabulary	Total
(Intercept)	-0.24 ** (0.09)	-0.23 (0.14)	-0.19 (0.10)	-0.22 ** (0.08)
Treatment	0.40 *** (0.09)	0.29 *** (0.08)	0.29 ** (0.09)	0.33 *** (0.08)
Pretest	0.37 *** (0.05)	0.14 ** (0.04)	0.08 (0.05)	0.52 *** (0.05)

Note: *** $p < 0.001$, ** $p < 0.01$.

Table 3. Multilevel Estimates for *Iowa Test of Basic Skills (ITBS)* Outcomes.

	Reading	Language	Vocabulary	Total
(Intercept)	-0.14 (0.11)	-0.08 (0.13)	-0.08 (0.11)	-0.11 (0.11)
Treatment	0.16 (0.10)	0.07 (0.09)	0.20 * (0.09)	0.15 (0.10)
Pretest	0.19 *** (0.06)	0.07 (0.05)	0.05 (0.05)	0.27 *** (0.06)

Note: *** $p < 0.001$, * $p < 0.05$.