Title:
Examining the sustainability of an evidence-based summer literacy program: Effects of structured teacher adaptations on sustainability and factors predicting teachers’ sustained use

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Background:
While researchers have successfully identified a number of effective literacy programs, they have been less successful at promoting their sustainability (Coburn, 2003; Elmore, 2004). Thus, a vast amount of researcher-generated knowledge is underutilized.

In an effort to address this challenge, studies have identified factors predicting program sustainability (e.g., Datnow, 2005). Kearns and colleagues (2010) organized these factors into a sustainability-prediction heuristic. With respect to their own intervention, the authors found that teachers’ perceptions of program effectiveness predicted most strongly whether or not they sustained the program the following year. Furthermore, teachers receiving intensive supports were less likely to sustain than teachers receiving fewer supports. The authors speculated that teachers receiving fewer supports had more opportunities to “personalize” the intervention; however, they did not test this hypothesis.

One implication of this evidence is that implementation pathways granting teachers flexibility may increase the extent to which teachers are willing and able to sustain programs. However, while some studies suggest that structured teacher adaptations can increase the effectiveness of evidence-based programs (e.g., Lemons, Fuchs, Gilbert, & Fuchs, 2014), we know of no studies exploring their ability to improve sustainability.

Purpose of Study:
READS is a summer literacy program for elementary students with a demonstrated history of effectiveness (Authors, 2016). The purposes of the present study are: (1) to test the ability of a flexible implementation pathway to support teachers’ sustained use of READS and (2) to expand knowledge about factors that promote program sustainability.

Implementation Pathway 1: Core READS. Teachers in Core READS directly replicated implementation procedures used in previous experiments. Teachers were asked to implement with fidelity.

Implementation Pathway 2: Adaptive READS. Teachers in Adaptive READS were organized into teams and given opportunities to extend or modify program activities to meet students’ needs. See Appendix C for a comparison of these pathways.

Specifically, we ask:
• What is the effect of Adaptive READS on teachers’ perceptions of program effectiveness and feasibility and their sustained use of READS?
• What factors predict the extent to which teachers sustained READS practices in the year following the research study?

Study Design and Participants:
Figure 1 summarizes our design. Twenty-seven schools in 7 North Carolina districts implemented READS. Over the 2013-14 school year/summer, participating schools implemented Core READS (Y1). Over the next school year/summer, all 4th-grade teachers at participating schools implemented either Core or Adaptive READS (Y2). Within districts, pairs (and one triad) of schools were matched based on school poverty and performance on the state standardized test. Within each pair (or triad), one randomly-selected school was assigned to Adaptive READS and the other(s) to Core READS. The research study ended in Fall 2015, but some teachers may have continued to implement READS (Y3). Teachers were balanced on baseline covariates—see Table 1.

Data Collection and Analysis:
Baseline Survey (S1). In Fall 2014, teachers completed a survey asking about demographics and school working conditions.
Exit Survey (S2). In Spring 2015, teachers completed a survey asking about implementation experiences. The response rate was 100% (N=122).

Follow-up Survey (S3). In Spring 2016, teachers completed a survey asking about READS-related beliefs and practices. The response rate was 80% (N=98).

RQ1: Analysis of Adaptive/Core Contrast. Our predictor was whether teachers had been randomly assigned to Core or Adaptive READS. Outcomes were composed of items from S3. Principal components analysis was used to create scales measuring: (1) teachers’ perceptions of the effectiveness of READS, (2) teachers’ beliefs about the feasibility of continuing READS, and (3) teachers’ sustained use of READS. Alphas for all scales were above 0.81.

We created a series of models regressing teachers’ perceived effectiveness, perceived feasibility, and sustained use of READS on condition. To account for the nesting of teachers within schools, we fit linear regressions absorbing the variability due to school-level factors, with cluster robust standard errors. The models took the following form:

\[ Y_{ij} = \alpha + \beta T_j + \gamma R_{ij} + \epsilon_{ij} \]

where:
- \( Y_{ij} \) is the outcome for teacher \( i \) at school \( j \)
- \( T_j \) is condition, treatment vs. control
- \( R_{ij} \) is vector of indicators for each randomization block
- \( \epsilon_{ij} \) is a random error term

RQ2: Analysis Testing Sustainability Model. Using data from S1 and S2, we employed Kearns et al.’s (2010) heuristic as a basis for predicting teachers’ sustained use of READS. See Appendix D for detail on predictors. Alphas for all scales were above 0.83.

We created a series of models regressing each predictor onto teachers’ scores on the sustained use scale. The models took the following form, with our standard errors clustered at the school-level to account for similarities of teacher responses within schools:

\[ Y_{ij} = \alpha + \beta X_{(i)j} + \gamma R_{ij} + \epsilon_{ij} \]

where:
- \( Y_{ij} \) is the outcome for teacher \( i \) at school \( j \)
- \( X_{(i)j} \) is a teacher- or school-level predictor
- \( R_{ij} \) is vector of indicators for each randomization block
- \( \epsilon_{ij} \) is a random error term

Results:

RQ1: Results of Adaptive/Core Contrast. In Table 2, we present estimated Adaptive-Core contrasts on outcomes related to sustainability. Adaptive teachers perceived READS to be more effective than Core teachers (ES=.43), and there was a non-significant trend in favor of Adaptive READS with respect to perceptions of program feasibility (ES=.18). However, Adaptive teachers did not report sustaining READS practices more than Core teachers.

RQ2: Results of Testing Sustainability Model. In Table 3, we present results from the sustainability analysis. The following factors significantly predicted sustainability of READS practices: feasibility (ES=.54), training quality (ES=.41), perceived effectiveness (ES=.33), and principal support (ES=.32).

Conclusions:

As in Kearns et al. (2010), perceived effectiveness at the end of the research study predicted program sustainability the following year. However, our findings further suggest that
perceptions of program feasibility and training quality—factors not measured in the earlier study—may also be relevant. Participation in a flexible implementation pathway, while it seemed to increase teachers’ perceptions of program effectiveness the following year, was not enough to promote sustainability. Thus, adaptive efforts, in addition to focusing on questions of how to improve programs to meet students’ needs, might also focus on questions of sustainability. Future research should explore the efficacy of adaptive implementation efforts to address relevant sustainability factors, as well as student outcomes.
Appendices

Appendix A. References

Authors. (2016).

Appendix B. Tables and Figures

Figure 1. Study Design

27 study schools implement Core READS as part of a larger replication study. Students within schools are randomly assigned to READS or control.

Year 1

2013-2014 Summer 2014

Year 2

2014-2015 Summer 2015

Fall 2014: Teachers complete baseline survey (S1).

Spring 2015: Teachers complete post-implementation survey; response rate is 100% (S2).

Year 3

2015-2016 Summer 2016

i3 funding ends

Spring 2016: Teachers complete a follow-up survey; response rate is 80% (S3).
Table 1. Teacher-level demographic variables by condition

<table>
<thead>
<tr>
<th>Variable</th>
<th>Respondents Mean</th>
<th>Respondents SD</th>
<th>Respondents N</th>
<th>Non-respondents Mean</th>
<th>Non-respondents SD</th>
<th>Non-respondents N</th>
<th>t</th>
<th>p-value</th>
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<tr>
<td>Number years working in field of education</td>
<td>11.04</td>
<td>6.95</td>
<td>98</td>
<td>13.04</td>
<td>8.62</td>
<td>24</td>
<td>1.06</td>
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<td>Working at the same school as last year</td>
<td>.76</td>
<td>.43</td>
<td>98</td>
<td>.52</td>
<td>.51</td>
<td>21</td>
<td>-1.93</td>
<td>0.06</td>
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<td>Teacher at Adaptive READS school (1=Y, 0=N)</td>
<td>.55</td>
<td>.50</td>
<td>98</td>
<td>.33</td>
<td>.48</td>
<td>24</td>
<td>-1.97</td>
<td>0.06</td>
</tr>
<tr>
<td>Have/working toward master's? (1=Y, 0=N)</td>
<td>.56</td>
<td>.50</td>
<td>84</td>
<td>.50</td>
<td>.51</td>
<td>24</td>
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<td>Female (1=Y, 0=N)</td>
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<td>.96</td>
<td>.20</td>
<td>24</td>
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<td>0.19</td>
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<tr>
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<td>.45</td>
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<td>White (1=Y, 0=N)</td>
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<td>.50</td>
<td>98</td>
<td>.67</td>
<td>.48</td>
<td>24</td>
<td>0.86</td>
<td>0.39</td>
</tr>
</tbody>
</table>

| Core                                              | Adaptive         |
| Number years working in field of education         | 10.56            | 7.29           | 52             | 11.59                | 6.94               | 56               | -0.75| 0.45    |
| Working at the same school as last year            | 0.81             | 0.40           | 52             | 0.77                 | 0.43               | 56               | 0.50 | 0.62    |
| Number years working at current school             | 5.67             | 5.65           | 46             | 5.59                 | 5.92               | 51               | 0.07 | 0.94    |
| Current grade 4 teacher                            | 0.37             | 0.49           | 52             | 0.54                 | 0.50               | 56               | -1.79| 0.08    |
| Have/working toward master's? (1=Y, 0=N)           | 0.52             | 0.51           | 46             | 0.59                 | 0.50               | 49               | -0.68| 0.50    |
| Female (1=Y, 0=N)                                  | 0.83             | 0.38           | 52             | 0.96                 | 0.19               | 56               | -2.35| 0.02    |
| Black (1=Y, 0=N)                                   | 0.29             | 0.46           | 52             | 0.29                 | 0.46               | 56               | 0.03 | 0.98    |
| White (1=Y, 0=N)                                   | 0.60             | 0.50           | 52             | 0.57                 | 0.50               | 56               | 0.26 | 0.80    |
Table 2. Effects of Condition (Adaptive vs. Core) on Sustainability Outcomes

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Note. Standard errors clustered at the school level in parentheses. Models control for fixed effects of randomization blocs.
Table 3. Predictors of Sustainability

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*Note. Standard errors clustered at the school level in parentheses. Models control for fixed effects of randomization blocks.*
### Appendix C: Comparison of Implementation Activities for Core READS and Adaptive READS

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Adaptive READS Activity</th>
<th>Description of Adaptive READS Activity</th>
<th>Core READS Activity</th>
<th>Description of Core READS Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 2014</td>
<td>Initial working group meeting (2 hours)</td>
<td>School teacher teams meet to (1) learn about the research-based principles underlying READS; (2) discuss their school-specific READS data; (3) identify problems of practice related to READS. Research team member and implementation partner are present.</td>
<td>Nothing</td>
<td></td>
</tr>
<tr>
<td>Dec. 2014</td>
<td>Online discussion forums</td>
<td>Working at their own pace, teachers learn more about the core components of READS through a series of online modules. Teachers participate in discussion forums with their teammates. Teachers brainstorm adaptations to READS.</td>
<td>Nothing</td>
<td></td>
</tr>
<tr>
<td>Jan.-Mar. 2015</td>
<td>Working group meetings (60-90 minutes per meeting)</td>
<td>School teacher teams meet to (1) discuss possible adaptations and why they want to make them; (2) finalize a set of adaptations that they will commit to. Research team member and/or implementation partner are present.</td>
<td>Core READS lesson training (2 hours)</td>
<td>In March, each school team participates in a training to learn how to implement the scripted READS lessons.</td>
</tr>
<tr>
<td>Mar.-June 2015</td>
<td>READS implementation</td>
<td>Teachers implement their adaptation plan with support from their CIS Lead. Teachers meet monthly to discuss implementation and prepare for upcoming READS activities.</td>
<td>Core READS implementation</td>
<td>Teachers teach the 6 scripted READS lessons and attend READS Family Night.</td>
</tr>
<tr>
<td>June-July 2015</td>
<td>Conference in Boston</td>
<td>Adaptive READS school teams gather in Boston to share their implementation experiences and what they learned.</td>
<td>Conference in North Carolina</td>
<td>Core READS teachers gather in North Carolina to share their implementation experiences and what they learned.</td>
</tr>
</tbody>
</table>
Appendix D: Operationalization of Predictive Factors

• **External technical support:** Following Kearns et al. (2010), we operationalized *level of support* using condition (C-READS vs. A-READS), as A-READS teachers received more support. We measured *length of support* as whether teachers had experience with READS prior to the 2014-15 school year. We operationalized *training quality* using a scale from the spring 2015 survey measuring how much teachers felt they had learned about the core components of READS. To measure *flexibility*, we used a scale from the spring 2015 survey measuring how much teachers reported adapting the READS program. Thus, while condition measured teachers’ potential for adaptation, the flexibility scale measured how much teachers actually adapted.

• **Implementation experiences:** We measured *perceived effectiveness* using the perceived effectiveness scale from the spring 2015 survey. We operationalized *feasibility* using a scale from the spring 2015 survey measuring teachers’ beliefs about whether it would be feasible to sustain particular aspects of READS without the supports provided during the 14-15 school year. We measured *alignment with existing programs* using an alignment scale from the spring 2015 survey. We operationalized *ability to implement* using a single item from the spring 2015 survey.

• **Teacher characteristics:** We operationalized *ideology* using a single item from the spring 2015 survey querying teachers about how well READS was aligned with their personal beliefs about teaching. We operationalized *experience* as the number of years participating teachers had been working in education. Kearns et al (2010) operationalized classroom characteristics using the percentage of English language learners (ELLs) in the class, since KPALS had previously demonstrated particular success with ELLs. Since READS has been shown to be more effective in high-poverty schools, we operationalized *classroom characteristics* using school poverty rates.

• **School/district support:** We operationalized *principal support* using a single item from the spring 2015 survey. We did not collect data on teachers’ *access to professional development*, so we were unable to include this predictor in our models. Finally, we operationalized the degree of *collaboration* teachers experienced using a scale from the fall 2014 survey.