Evaluation of the Sioux City Community School District's Implementation of Small-Group, Skills-Based Literacy Instruction

Iowa Reading Research Center
University of Iowa College of Education

IOWA READING RESEARCH CENTER

Student Reading Success Through Research and Collaboration

Acknowledgements

The Iowa Reading Research Center would like to acknowledge the Sioux City Community School District's administrators, consulting teachers, and teachers for their dedicated effort toward improving literacy instruction for all students. Their work has become a model for the state, with many districts attempting to replicate what the Sioux City educators have put in place. Through the Iowa Reading Research Center's experience with the district, important contributions were made to the Early Literacy Blueprint Initiative, including the creation of the small-group, skills-based instruction module now being delivered at professional development sessions across Iowa.

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Background

Under the direction of Associate Superintendent Dr. Kim Buryanek, seven elementary schools (Cohort 1) in the Sioux City Community School District began implementing small-group, skills-based instruction (SGSB) within the daily literacy block during the 2016-2017 school year at. In the subsequent year, 2017-2018, the remainder of the district elementary schools implemented the instructional approach during the kindergarten through Grade 5 literacy block (Cohort 2). This phased implementation allowed for a comparison of students' literacy performance in Cohort 1 with that of students in Cohort 2. The Iowa Reading Research Center (IRRC) was asked to perform this analysis and report on the effectiveness of SGSB. The following sections outline the preparation of the data, the analytic procedures employed, and the results.

Measures

Students took the usual literacy assessments required by the state. The first measures were part of the Formative Assessment System for Teachers (FAST) universal screener and included the Curriculum-Based Measurement for Reading (CBMreading) and the computer-adaptive test of reading (aReading). These were administered three times per year in kindergarten through Grade 5. In addition, students took the Iowa Assessments administered each spring in Grades 3-5. All test data were gathered for the year prior to implementing SGSB instruction (the 2015-2016 school year) as well as the first 2 years of implementing the approach. Thus, 3 years of data were used in the different analyses.

Data Cleaning

Students' data were removed from the analysis for the following reasons:

- Students changed grade levels within a given school year
- Students was listed with a grade level other than kindergarten through Grade 5
- Students was not assigned a teacher (i.e., homeschooled, nonpublic shared time, etc.)
- Students' school was listed as "Boys & Girls Home"

Additionally, all student characteristics were kept constant across the 3 years for analysis. In other words, if a student's free or reduced-price lunch (FRL), English learner (EL), individualized education program (IEP), or gifted and talented status changed from "Yes" to "No" or vice versa during the 3 years, we assigned that student a value of "Yes" for the entire 3-year period.

One additional consideration related to the data is that analyses needed to account for students being nested within classrooms across the 3 years of the study. However, several students changed teachers, even within a school year (4.6% in 2015-2016; 5.4% in 2016-2017; 6.2% in 2017-2018). Consequently, we had to identify the teacher who delivered most of the instruction within each measurement period (i.e., prior to fall FAST administration, between fall and winter FAST administrations, and between winter and spring FAST administrations) in a given year. A similar determination was made for each of the Iowa Assessments measurement periods. If a student was assigned to the primary teacher for 5 days or less during an academic year, that student-to-teacher link was removed for the particular measurement period in the analysis.

Effect of Small-Group, Skills-Based Instruction on FAST and Iowa Assessments Scores

This set of analyses considered the effects over time of SGSB on student scores on FAST (aReading and CBMreading) and the Iowa Assessments. Consequently, we grouped students into grade cohorts for which we could track measured growth across the 3 academic years.

Because the implementation of SGSB was staggered by year across schools, we considered the effect of implementing SGSB both during the entire duration of the change (i.e., the 2016-2017 and 2017-2018 school years) and during just the final year of the study when the change had been fully implemented in all schools (i.e., the 2017-2018 school year). By focusing on just the 2017-2018 school year, we could effectively investigate a possible "second-year effect" of SGSB by comparing to schools that were implementing the change for the first time.

Analyses were performed in the R environment using the twang, survey, and lme4 packages. The first analysis involved multiple steps for each student cohort:

1. Treatment (Cohort 1) and control (Cohort 2) groups were balanced using propensity scores by students' characteristics (i.e., gender, race, FRL, EL, IEP, gifted and talented) and spring 2016 baseline test score (either FAST aReading, CBMreading, or Iowa Assessments, depending on the model).
2. Propensity scores were then entered in the models as weights.
3. The statistical analyses were performed for each outcome and student cohort. The treatment variable in the model was a dichotomous variable representing whether that student was in a Cohort 1 or Cohort 2 school.
4. All the main effects analyses took into account the nested structure of the data via cluster standard errors.

The second analysis, which considered the effects specifically in the 2017-2018 school year, involved the same steps above except that treatment and control groups were balanced on

spring 2017 test scores instead of spring 2016 test scores. This created a different set of propensity scores to be entered as weights in the models.

Main Effects on FAST and Iowa Assessments Scores by Grade Level

While causal inferences could best be established by tracking score changes for a group of students longitudinally over time, we also investigated main effects across the 3 years at a particular grade level (i.e., where the students change each year, but the grade level is kept constant). For this analysis, we considered three conditions: student scores in classes not implementing SGSB (Group 0 of Cohort 2), student scores under the first year of SGSB (Group 1 of Cohort 1), and student scores under the second year of the new instructional approach (Group 2 of Cohort 1). Effect sizes are displayed in the last column of Table 1, with statistical significance noted by the asterisk in the *p*-value column.

For most grade levels we found a statistically significant positive difference in FAST scores between Group 2 and Group 0 (i.e., student scores under the second year of SGSB were significantly higher than student scores in classes not implementing the approach). We only found a statistically significant difference between Group 1 and Group 0 FAST aReading scores for Grade 1. This suggests that significant score improvements on aReading within most grade levels may not manifest themselves until the second year of the change to the instructional approach. On the other hand, we found statistically significant differences between Group 1 and Group 0 on CBMreading scores for most grade levels, which suggests score improvements on CBMreading may manifest themselves sooner (within the first year of implementing SGSB) than on aReading. Additionally, statistically significant positive differences in Iowa Assessments scores between Group 2 and Group 0 were found for Grades 2 and 5, as well as significant positive differences in scores between Group 1 and Group 0 for Grades 2 and 3. We recommend interpreting the results in this section cautiously, though, as the students being compared change year-to-year for this analysis.

Table 1. Grade Level Model Results for FAST and Iowa Assessments Across Multiple Years

Grade	Outcome	Groups Compared	Mean Difference	Standard Error	*t* statistic	*p*-value	Effect Size
K	aReading	1 vs. 0 years	-0.229	1.629	-0.140	0.888	-0.008
		2 vs. 0 years	-2.215	1.639	-1.352	0.177	-0.082
1	aReading	1 vs. 0 years	2.341	1.145	2.044	0.042 *	0.080
		2 vs. 0 years	2.695	1.298	2.076	0.038 *	0.092
2	aReading	1 vs. 0 years	0.527	0.993	0.531	0.596	0.019
		2 vs. 0 years	3.978	1.112	3.578	<0.001 *	0.144
3	aReading	1 vs. 0 years	0.957	0.809	1.183	0.238	0.040
		2 vs. 0 years	2.075	0.914	2.270	0.024 *	0.086
4	aReading	1 vs. 0 years	1.060	0.742	1.429	0.154	0.048
		2 vs. 0 years	4.086	0.848	4.815	<0.001 *	0.185
5	aReading	1 vs. 0 years	0.936	0.775	1.208	0.228	0.042
		2 vs. 0 years	3.942	0.863	4.568	<0.001 *	0.176
2	CBMreading	1 vs. 0 years	6.421	1.523	4.217	<0.001 *	0.167
		2 vs. 0 years	10.911	1.936	5.637	<0.001 *	0.284
3	CBMreading	1 vs. 0 years	4.638	1.552	2.988	0.003 *	0.113
		2 vs. 0 years	2.947	1.672	1.763	0.079	0.072
4	CBMreading	1 vs. 0 years	3.755	1.472	2.551	0.011 *	0.094
		2 vs. 0 years	4.630	1.692	2.736	0.007 *	0.116
5	CBMreading	1 vs. 0 years	2.331	1.451	1.606	0.109	0.058
		2 vs. 0 years	7.614	1.590	4.789	<0.001 *	0.190
2	IA	1 vs. 0 years	2.503	1.230	2.035	0.042 *	0.088
		2 vs. 0 years	5.906	1.474	4.008	<0.001 *	0.207
3	IA	1 vs. 0 years	3.828	1.056	3.626	<0.001 *	0.134
		2 vs. 0 years	0.232	1.218	0.191	0.849	0.008
4	IA	1 vs. 0 years	0.651	1.076	0.605	0.546	0.021
		2 vs. 0 years	1.493	1.206	1.238	0.217	0.049
5	IA	1 vs. 0 years	1.785	1.095	1.631	0.104	0.059
		2 vs. 0 years	3.087	1.224	2.521	0.012 *	0.101

Note. * = Statistically significant results at $\alpha < .05$. K = kindergarten; aReading = Formative Assessment System for Teachers computer-adaptive test of reading; CBMreading = Formative Assessment System for Teachers Curriculum-Based Measurement for Reading; IA = Iowa Assessments.

iReady: Correlations with FAST Measures

Most of our focus in these analyses was on the FAST and Iowa Assessments outcomes, as these measures were administered at consistent time periods across schools and across all 3 years of the study. However, we also looked at the scores on the iReady measure, administered to students in four of the schools during the 2017-2018 school year. Due to the computer-based, individually administered nature of the measure, there was much inconsistency in both the time

periods of administration and number of administrations per student. Therefore, we only took iReady scores with administration dates close to the FAST administration dates and correlated these scores with FAST scores at each grade level and testing period (see Table 2). This consisted of scores for 1,298 students (though only 312 students had iReady scores that coincided with all three FAST administration periods).

Table 2. Correlations Between iReady and FAST Scores

Grade	Period	N	Correlation With:	
			aReading	CBMreading
K	Winter	97	0.546	--
K	Spring	149	0.685	--
1	Fall	85	0.799	--
1	Winter	67	0.909	0.819
1	Spring	155	0.865	0.711
2	Fall	116	0.865	0.789
2	Winter	57	0.918	0.856
2	Spring	177	0.884	0.694
3	Fall	170	0.912	0.797
3	Winter	134	0.880	0.782
3	Spring	200	0.875	0.772
4	Fall	60	0.885	0.786
4	Winter	96	0.797	0.735
4	Spring	162	0.855	0.709
5	Fall	60	0.835	0.583
5	Winter	101	0.820	0.612
5	Spring	182	0.823	0.597

Note. aReading = Formative Assessment System for Teachers computer-adaptive test of reading; CBMreading = Formative Assessment System for Teachers Curriculum-Based Measurement for Reading; K = kindergarten.

With the exception of kindergarten, all grade levels exhibited high correlations between iReady and aReading scores. Correlations for kindergarten scores were moderate. Similarly, iReady and CBMreading scores showed high correlations at all grade levels with the exception of Grade 5, where the correlations were moderate. Like previous model results, all of these correlations took into account the nesting of students in classrooms. These high correlations suggest that we would expect SGSB to produce similar effects on iReady scores as they did on FAST scores.

Conclusion

SGSB involves a substantive shift in the instructional approach that requires time for teachers to learn and put into practice. In five of the seven schools in Cohort 1, this change in instructional approach also was accompanied by the adoption of new literacy curriculum. Thus, teachers were grappling simultaneously with orienting themselves to the new materials, how those materials were organized, and the intended ways to use them. This may have contributed to the delayed significance observed in the effects at some of the grades. It is not uncommon for substantive changes to require multiple years for full implementation. Gradual refinement of teachers' fidelity of implementation likely will continue, and subsequent analyses may explore the association of student outcomes with teachers' level of fidelity. This could further inform the kinds of supports needed to facilitate instructional change.