Poster Abstract (non-blinded)

An Efficacy Study of a First Grade Integrated Science and Literacy Curriculum

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Background

A new generation of science curriculum materials are being developed across all levels of K–12 education in an effort to meet the ambitious vision of the Next Generation Science Standards (NGSS). The NGSS recasts science proficiency as not only what students know, but also how they can use and apply what they know to make sense of the natural world and design solutions to problems.

Currently, the number of curriculum materials that have been designed from the ground up for the NGSS is limited, and thus there is a limited efficacy evidence basis for NGSS designed curricula. As more and more curriculum materials become available for supporting the implementation of NGSS, the science education field is going to need comprehensive research on the efficacy of curricula.

The need for high-quality curriculum materials is especially great in the early elementary grades where there has been a paucity of materials that provide the necessary language and literacy support for all young students, including those with linguistically diverse backgrounds, to engage in rich science learning. Moreover, little research has investigated curriculum-based integration in the primary grades. Accordingly, promising new curriculum materials are needed, along with research-based evidence on the efficacy of literacy-rich NGSS designed curricula.

Purpose

This poster will present on an IES-funded study that aims to advance the discourse around the impact of science curriculum that integrates literacy and science through a large-scale randomized controlled trial of a research-based *Integrated Science and Literacy Curriculum (ISLC) Efficacy Study* (ISLC) designed to support integrated science, language, and literacy learning in first grade. The curriculum has shown promise in prior studies, especially for underrepresented populations and low-performing students and it is ready for experimental trial at scale. The study's goals are to understand classroom implementation, the impact of the first grade curriculum on student achievement in science and literacy learning, and teachers' instructional practice in light of the NGSS.

Setting

The study is taking place in multiple school districts in California. District eligibility for participation is based upon commitment to: (1) offering science instruction in first grade, (2) adopting the NGSS but without immediate plans to purchase new NGSS-designed curricula, and (3) agreeing to school-level randomization. In addition, an eligible districts' first grade student population should be comprised of 25% or more of English Learners (ELs).

Population

The study sample will include approximately 168 first grade classrooms in 56 public elementary schools in California, with approximately 4,000 students across all schools. We will seek to recruit a representative sample of California schools and ensure the sample includes districts serving culturally and linguistically diverse student populations with relatively high English Learner student populations and with students who qualify for the Federal lunch program.

Intervention

The ISLC intervention, developed with prior IES funding, is a content-rich integrated science and literacy curriculum providing an authentic science and language-rich context with features that support first grade students in building science content knowledge as well as oral language, vocabulary, comprehension, and word-reading strategies. It is designed to support teachers in delivering an active, rigorous, and NGSS curriculum that builds students' science proficiency and literacy skills. ISLC consists of three units in life, physical, and Earth science, ordered and distributed evenly over the first grade year to obtain suitable duration, spacing, and intensity of use. The materials provide students with opportunities to strengthen their scientific proficiency by engaging with disciplinary core ideas, science practices, and crosscutting concepts as called for by the NGSS. Moreover, students encounter central concepts through multiple modalities: doing, talking, reading, writing and visualizing.

Research Design

The researchers will randomly assign each of the 56 schools, with an average of 3 teachers at each school and 25 students per classroom, to either the treatment or control condition. The teachers in treatment schools will be trained on the curriculum and asked to implement the three ISLC units in first grade classrooms for two consecutive years. Researchers will examine the efficacy of the intervention in the second implementation year. Teachers in schools assigned to the control condition will use their business-as-usual curriculum and instructional practices and the typical professional development opportunities made available to them by the district.

Measures and Data Collection

The research team will administer standardized assessments in both science and reading in both implementation years, including the Iowa Assessments Science battery and the Gates-MacGinitie Reading Tests (GMRT). They will also administer researcher-developed assessments that measure science proficiency with the performance expectations of the NGSS. For ELs, researchers will also analyze scores on the state-level English language development tests. Researchers will use surveys, implementation logs, classroom observations and interviews to collect data on instructional practices in treatment and control classrooms and fidelity of implementation data within treatment classrooms.

Data Analysis Plan

We will document attrition, as well as reasons for the observed attrition when possible, at the school-, teacher-, and student-level. We will also track the out-migration and in-

migration of the students based on school attendance data. Baseline equivalence between the two conditions will be established based on students' initial GMRT scores. To analyze the effect of the intervention on learning outcomes, the research team will model data for all students and separately for English Learner students using a three-level hierarchical linear regression model (students nested within teachers within schools). Moderator analyses will be used to examine the impact of the intervention on the learning of students with different baseline literacy levels, gender, and different socioeconomic backgrounds. Finally, we will use mediation analyses to explore the link between changes in teacher practices and student learning outcomes.