

***Blinded Abstract Body***  
**Impact of the Core Knowledge Language Arts' Read-Aloud Program on Kindergarteners' Vocabulary, Listening Comprehension, and General Knowledge**

**Purpose**

This paper reports on two randomized controlled trials examining the effects of the *Core Knowledge Language Arts: Knowledge Strand* (CKLA) literacy curriculum on kindergarteners' vocabulary, listening comprehension, and content knowledge. The CKLA read-aloud program is widely used in the United States. It is one of the few widely used English Language Arts (ELA) curricula that feature systematic knowledge building in science and social studies topics. CKLA is a unique approach because it follows a planned sequence of specific topics and views children's comprehension skills (e.g., forming predictions, answering inferential questions) as resulting from the knowledge and vocabulary they acquire from hearing texts read aloud. The view has a grounding in cognitive science, positing that children who have a wider breadth of knowledge and vocabulary have an advantage as they have wider and stronger semantic networks of information to draw upon when comprehending a text (Willingham, 2006). In this work, we examine the curriculum's impact on children's oral language and knowledge after one semester of the program in kindergarten classrooms. This work is important because our nation is facing a reading crisis, as two-thirds of all 4<sup>th</sup> graders cannot comprehend texts with proficiency (National Assessment of Education Progress, 2019). It is therefore critical to evaluate widely-used, content-rich ELA programs to test their impact on children's vocabulary and listening comprehension ability.

**Background and Context**

Over the past two decades, public elementary school education in the United States has focused attention on improving the reading achievement of children in the primary grades. One consequence of this heightened attention has been the increase in the amount of classroom time devoted to English Language Arts (ELA) instruction, with instructional blocks of up to two hours in length in K-3 classrooms. Despite the increased time spent in ELA instruction, reading comprehension scores among 4th grade students, including minoritized students and those living in poverty, have remained flat in national assessments for years and have most recently declined in the past two years (NAEP, 2019).

Some experts argue that the increased instructional time spent in ELA has been at the expense of instructional time for content area learning in science and social studies (Center on Education Policy, 2006) and that this reduction in content area learning during the early years ultimately affects children's later reading comprehension which relies in part on children's language skills (i.e., vocabulary, listening comprehension) and background knowledge of the texts being read. Unfortunately, most widely used ELA curricula do not systematically build the important knowledge needed that sets the stage for later reading comprehension success.

Extant studies provide corroborating evidence of this lack of content-area knowledge building. For kindergarten students specifically, shifts from half to full day kindergarten in the US from 1998-2011 did not result in corresponding increases in science or social studies instructional time, and there was a marked decrease in student exposure to a range of science topics during that time period (Bassok, Latham, & Rorem, 2016). Moreover, observational

studies point to the fact that very little informational text—a key source from which young students access content knowledge—is read aloud to kindergarteners (Duke, 2000), despite revised standards that emphasize this kind of experience for children (Wright & Neuman, 2014). And access to content knowledge teaching and vocabulary teaching is more limited for students living in poverty (Duke, 2000; Wright & Neuman, 2014).

In recent years, ELA program developers have sought to develop approaches that integrate content-area knowledge into ELA instruction. *Core Knowledge Language Arts: Knowledge Strand* (CKLA) is one such widely used program that systematically builds children’s knowledge in science and social studies topics through interactive read-alouds. These read-alouds also seek to develop children’s oral language skills, which is a key goal of early reading instruction because of the influence of early language skills on later reading comprehension. Through sequenced interactive read-alouds focused on science and social studies topics, CKLA provides opportunities for children to engage with vocabulary words that are semantically related to one another and thus are more likely to be learned. In addition, the program builds listening comprehension through discussion before, during, and after the read-aloud.

There are very few studies in the extant literature that evaluate a knowledge-rich ELA program (e.g., Connor et al., 2017; Neuman & Kaefer, 2018). Yet these programs are being widely used in the U.S. This ground-breaking study presents the findings of two randomized controlled trials that examined the effects of CKLA on kindergarteners’ vocabulary, listening comprehension, and content knowledge across two large urban districts in the United States. Understanding whether a reading program that integrates content knowledge into ELA instruction improves children’s outcomes is a pressing issue in today’s educational climate.

## **Method**

Two studies conducted in two large urban districts in the U.S. were represented in this work. Both studies followed identical procedures, in 2017-2018 and 2018-2019, respectively. In the first study, 23 schools in a district in a mid-Atlantic state were randomly assigned to either the treatment (n=11) or business-as-usual control condition (n=12). In the second study, 24 schools in a district in a Southern state were randomly assigned to either the treatment (n = 12) or the business-as-usual control condition (n=12). Both districts had high poverty rates (82% and 44% free/reduced lunch, respectively). Kindergarten teachers (n=66) in treatment schools implemented the CKLA read-aloud program for one hour daily over the course of one semester, focusing on science and social studies topics, specifically Five Senses, Plants, Farms, Native Americans, and Seasons and Weather. Kindergarten teachers in control schools (n=69) implemented business-as-usual practices with regard to their read-alouds during the ELA block, often following their prescribed district guidelines, which included some integration of science and social studies topics.

Students (n=1,194) were individually tested in the fall (prior to randomization) and spring (post intervention) on a battery of proximal and standardized assessments of oral language and knowledge. Because the fall pre-test occurred prior to randomization, a true baseline was achieved. Treatment and control groups exhibited baseline equivalence across measures. Proximal research-created measures examined whether children learned the words and knowledge they were taught in the curriculum. For the latter, children were asked, “Tell me everything you know about plants (or Native Americans).” Distal standardized measures

included: Peabody Picture Vocabulary Test (PPVT-IV; receptive vocabulary); Woodcock-Johnson Tests of Achievement (WJ-III) Picture Vocabulary (expressive vocabulary); Test of Narrative Language (listening comprehension); CELF Sentence Structure (listening comprehension); WJ-III Science (knowledge); and WJ-III Social Studies (knowledge).

**Curriculum Overview.** CKLA was designed to ensure that the texts and topics of the texts (called domains) follow a systematic and coherent order. That is, the primary approach with the CKLA read aloud program is to: (1) engage children on a series of texts on a single domain or topic (such as Ancient Early Civilizations, Farming, Plants and Animals, Kings and Queens); (2) sequence domains in a coherent order so that topics can build upon each other within and across years; and (3) allow skills in comprehension to evolve as children are guided to engage in the content of the texts through questions, discussions, and embedded vocabulary support.

Daily instructional format included 60 minutes that consisted of an interactive read-aloud, with before, during, and after reading supports, such as setting a purpose for listening, introducing the read-aloud, posing discussion questions, and vocabulary work. This was followed by an application activity that extended understanding of the concepts learned during the read-aloud.

**Teacher Training and Intervention Fidelity.** Teachers received two full days of training on the use of the curriculum. The first training took place in late fall of the school year. The second training took place early during the spring semester, after teachers had begun to use the curriculum. Teachers also met with a facilitator as a grade level once every two weeks to aid their planning efforts. Fidelity data showed that teachers generally adhered to curricular principles while delivering read-aloud lessons, although pacing of the curriculum varied.

## Findings or Results

All analyses used an intent-to-treat framework and employed multi-level modeling with students nested within schools. Fall scores were used as covariates in all analyses. Minimal data were missing, and no significant differential attrition was found.

**Study 1.** Results of multilevel modeling indicated that children in the treatment condition learned the words taught ( $d = 0.47$ ) and knowledge taught, with significant medium- and large-sized effects on children's knowledge of particular domains, namely plants ( $d = 0.34$ ) and Native Americans ( $d = 1.16$ ). Both treatment and control group teachers indicated that they taught about plants during the kindergarten school year, making this a robust proximal measure of knowledge.

There were no discernable main effects on standardized measures of vocabulary and listening comprehension. There was a non-significant, yet meaningful, main effect on a standardized measure of science knowledge ( $d = 0.12$ ), which was notable given the intervention's short duration.

**Study 2.** Results of multilevel modeling indicated that children in the treatment condition learned the words taught as measured by the proximal vocabulary measure ( $d = 0.65$ ) and knowledge taught, with significant medium- and large-sized effects on children's knowledge of plants ( $d = 0.45$ ) and Native Americans ( $d = 1.33$ ).

There were no discernable main effects on standardized measures of listening comprehension. However, there was a significant main effect of the intervention on expressive vocabulary ( $d = 0.11$ ). Again, there was a non-significant, yet meaningful, main effect on a standardized measure of science knowledge ( $d = 0.12$ ). Overall, there are consistently more positive results from Study 2 as compared with Study 1, statistically significant effects on a

standardized measure (WJ-III Picture Vocabulary), and larger effects on the proximal vocabulary measure.

**Pooled Results.** To increase precision across the Study 1 and Study 2 effect size estimates, we meta-analyzed the results across sites (and years). Thus, we combined Study 1 and Study 2 results and performed a meta-analysis of results across sites. Notably, the effect sizes for the proximal vocabulary measure ( $d = 0.559$ ), knowledge measures, and standardized measures of expressive vocabulary (WJ-III Picture Vocabulary;  $d = 0.085$ ), and science knowledge (WJ-III Science;  $d = 0.116$ ) are positive and statistically significant. The associated LL (lower limit) and UL (upper limit) around the 95% confidence interval, and the  $z$ -test and  $p$ -value are included in Table 1. Combining results from the two studies improved precision around the estimated treatment effect.

## Conclusions and Implications

These studies make an important contribution to the scarce literature on the effects of a knowledge-building English Language Arts curriculum on kindergarteners' skills. These curricula are being widely used in the United States, but there has been minimal work to test the efficacy of this approach. To date, there have only been a handful of experimental studies examining a kindergarten ELA curriculum that also aims to systematically build content knowledge (e.g., Connor et al., 2017; Neuman & Kaefer, 2018). Moreover, this the only experimental study, to our knowledge, that demonstrates a positive impact for kindergarteners, not only on proximal measures, but also on distal standardized measures of both vocabulary and knowledge.

We seek to place these findings into the larger context of randomized controlled trials in education. With regard to evaluations of content-rich ELA approaches, the average effect size of standardized measures is -0.05. Across all large-scale randomized controlled trials in education, the average effect size is 0.01 for kindergarten outcomes and 0.01 for language outcomes in particular (Lortie-Forgues & Inglis, 2019). Thus, the significant, positive effects found on kindergarten language and knowledge in the present study, though small, are very meaningful when viewed in a larger context.

It is important to note that Study 2 is currently continuing into first and second grade to more fully test whether systematic knowledge building using CKLA impacts reading comprehension. Our promising findings to date are aligned with our intervention's theory of change but there is more to understand about effects of the program longitudinally.

**Appendix A - References**  
*Not included in page count.*

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**Appendix B - Tables and Figures**  
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Table 1: Meta-analysis of Study 1 and Study 2 results

	ES	LL	UL	z	p
TNL	0.027	-0.092	0.147	0.45	0.655
PPVT	0.001	-0.068	0.069	0.02	0.988
CELF4	-0.031	-0.121	0.059	0.67	0.502
WJP	0.085	0.016	0.154	2.4	0.016
WJS	0.116	0.003	0.229	2.02	0.044
WJSS	0.01	-0.081	0.101	0.21	0.831
CSV T	0.559	0.433	0.686	8.7	<.001

Note: WJP and WJS represent the Woodcock-Johnson III picture vocabulary and science subtests, respectively. CSV T represents the proximal vocabulary test.