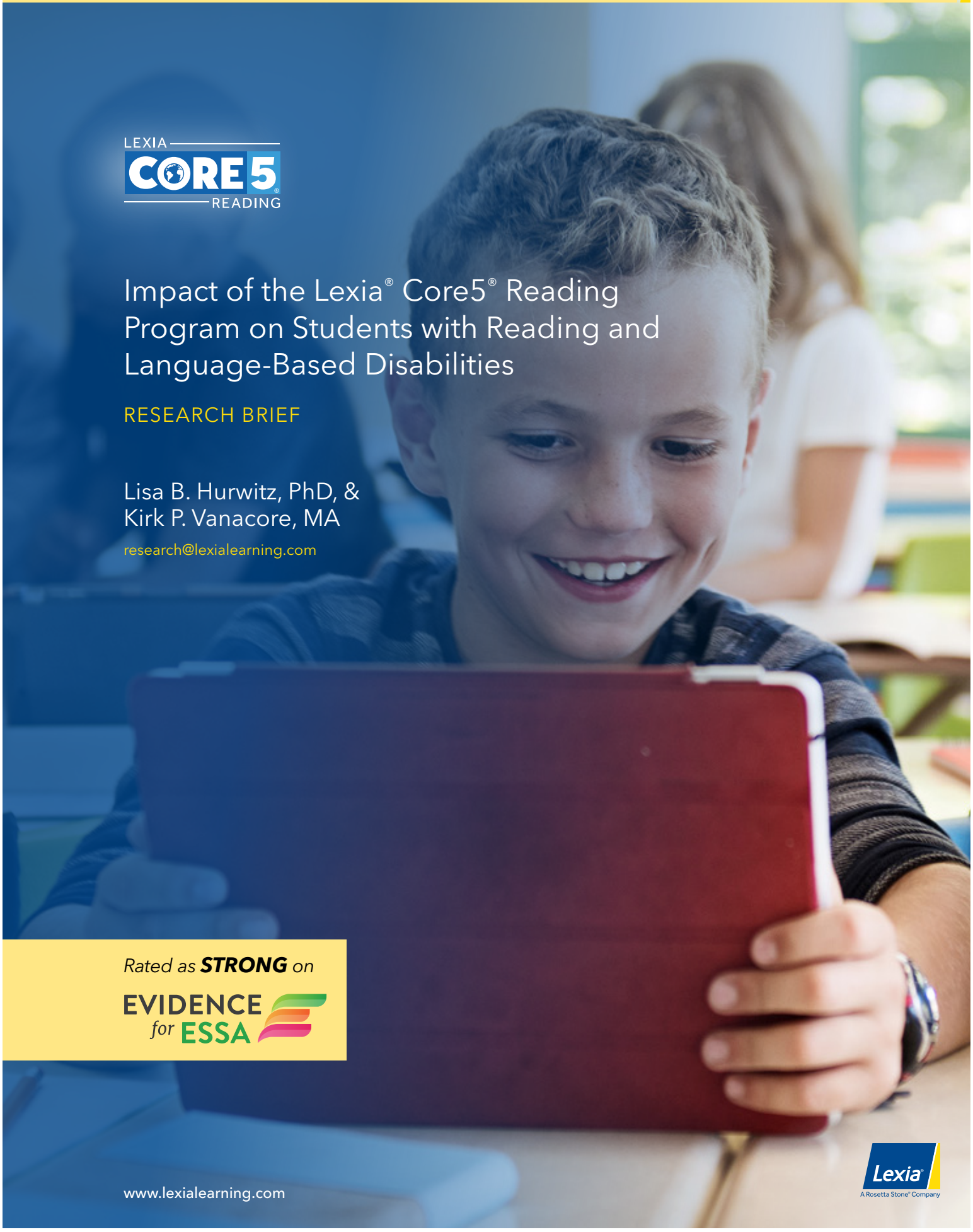

LEXIA CORE5 READING

Impact of the Lexia® Core5® Reading Program on Students with Reading and Language-Based Disabilities

RESEARCH BRIEF

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EVIDENCE *for* ESSA

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A Rosetta Stone® Company

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Lexia Research Brief

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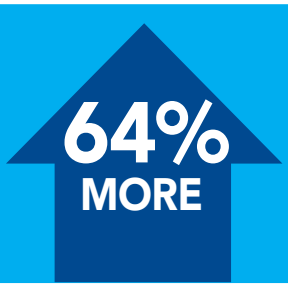
Study Highlights

ESSA STRONG LEVEL

This evaluation is a gold standard, randomized control trial (RCT) that meets ESSA standards for **STRONG** research — the highest level of evidence outlined by federal law.

After using Core5 for the school year, students were **2x** more likely than non-users to be proficient readers.



Core5 was **64% more effective** than comparable programs as measured by standardized assessment growth.

All participants in this study were special education students with IEPs documenting **reading and/or language-based disabilities, including dyslexia**.

Background

About 1 out of every 7 public school students in the U.S. receives special education support through the Individuals with Disabilities Education Act (IDEA).[1] Over 2 million students are diagnosed with specific learning disabilities (SLD) such as dyslexia, over 1 million have speech or language impairments (SLI), and nearly half a million have documented developmental delays (DD) wherein they are slow to reach developmental milestones in areas like communication. Students with these reading and language disabilities might struggle to master literacy skills such as letter-sound knowledge,[2,3] word recognition,[3,4,5] and reading comprehension.[5]

Moreover, diagnoses of reading and/or language-based disabilities co-occur with other kinds of learning difficulties. For example, students with dyslexia also may have difficulties with attention and executive functioning (a set of cognitive processes including planning, organization, working memory, and self-regulation).[2,6] Students who show reading, language-based and/or other cognitive disabilities in early elementary school may face continued difficulties throughout their years of formal education. Only 12% of students with disabilities meet Department of Education elementary reading proficiency criteria,[7] and these students are 3x less likely to graduate high school than their peers in general education.[8] Intervening and providing these students with high quality reading instruction in elementary school is therefore of utmost importance.

Core5 is designed for all students in grades preK-5, including students with reading and language-based disabilities.

The Lexia® Core5® Reading adaptive blended learning program (Core5) is designed to supplement the reading instruction of all students in grades preK-5, including students with reading and language-based disabilities. Core5's scope and sequence covers phonological awareness, phonics, structural analysis, automaticity/fluency, vocabulary, and comprehension. At the beginning of their Core5 experience, students take an online auto placement assessment that places them into one of 21 levels based on their individual reading ability. Moving at their own pace, students then work through a series of online activities organized in levels.

[1] IES National Center for Education Statistics. (2019). Fast facts: *Students with disabilities*. Retrieved from https://nces.ed.gov/fastfacts/display.asp?id=64

[2] Centre of Excellence. (2017). *Understanding dyslexia*. Manchester, UK: Centre of Excellence.

[3] Lyon, G. R., Shaywitz, S. E., & Shaywitz, B. A. (2003). A definition of dyslexia. *Annals of Dyslexia*, 53, 1-14. doi:10.1007/s11881-003-0001-9

[4] International Dyslexia Association. (2019). *Adolescents and adults with dyslexia*. Retrieved from https://dyslexiaida.org/adolescents-and-adults-with-dyslexia/

[5] Catts, H. W., Fey, M. E., Tomblin, J. B., & Zhang, X. (2002). A longitudinal investigation of reading outcomes in children with language impairments. *Journal of Speech, Language & Hearing Research*, 45, 1142-1157. doi:10.1044/1092-4388(2002/093)

[6] Varvara, P., Varuzza, C., Sorrentino, A. C., Vicari, S., & Menghini, D. (2014). Executive functions in developmental dyslexia. *Frontiers in Human Neuroscience, 8*. doi:10.3389/fnhum.2014.00120

[7] National Assessment of Educational Progress (NAEP). (2019). *NAEP report card: Reading*. Retrieved from https://www.nationsreportcard.gov/reading/nation/achievement/?grade=4

[8] Horowitz, S. H., Rawe, J., & Whittaker, M. C. (2017). *The state of learning disabilities: Understanding the 1 in 5*. New York: National Center for Learning Disabilities.

Students see and hear concepts presented visually and auditorily, and spend more time focused on skills that they find challenging. If students make a small number of errors in the online program, they receive additional scaffolded support or explicit instruction. If they continue to struggle in the online program, teachers are alerted to deliver a Lexia Lesson,® a scripted traditional lesson designed to target problem areas. When students complete a level, the program generates a paper-and-pencil Lexia Skill Builder® worksheet designed to help them reinforce and generalize what they learned online, as well as a Certificate to display at school or send home. Core5's effectiveness has been demonstrated via 20 peer-reviewed publications,[9] including one focused on students at-risk for dyslexia.[10]

The current study evaluated Core5's effectiveness for elementary school students with documented reading and/or language-based disabilities. This study was designed to meet the criteria for **strong** research as outlined by the Every Student Succeeds (ESSA) act.[11] Under ESSA, only "evidence-based" interventions can be purchased with certain federal funds, including Title I and Comprehensive Support and Improvement grants. ESSA outlines a framework for choosing programs backed by evidence of effectiveness.

Strong research is the highest level of evidence in this framework. Programs backed by **strong** evidence have been evaluated via well-designed and implemented experimental research studies, with students randomly assigned to use either a target program or receive alternative instruction. Few edtech programs have been evaluated at the **strong** level with students with disabilities.[12] As such, this **strong** evaluation of Core5 helps to meet an urgent need to identify effective interventions for these students.

STRONG
RESEARCH
is the highest level of evidence under ESSA.

[9] See Lexia Learning. (2020). *Evidence-based, research-proven: Measuring Lexia's impact*. Retrieved from https://www.lexialearning.com/why-lexia/research-proven

[10] McMurray, S. (2013). An evaluation of the use of Lexia Reading software with children in Year 3, Northern Ireland (6- to 7-year olds). *Journal of Research in Special Educational Needs, 13*, 15-25. doi:10.1111/j.1471-3802.2012.01238.x

[11] Every Student Succeeds Act (ESSA), Pub. L. 114-95, 114 Stat. 1177 (2015-2016).

[12] Kim, M. K., McKenna, J. W., & Park, Y. (2017). The use of computer-assisted instruction to improve the reading comprehension of students with learning disabilities: An evaluation of the evidence base according to the What Works Clearinghouse standards. *Remedial and Special Education, 38*, 233-245. doi:10.1177/0741932517693396

Method

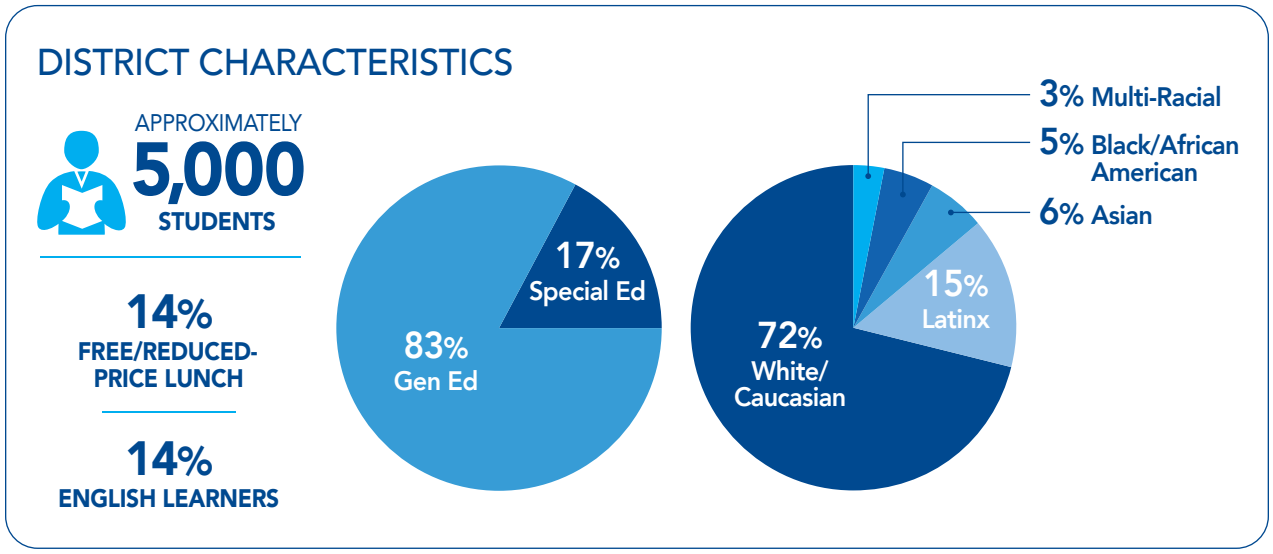
Study Design

At the beginning of the school year after a Fall reading assessment, 3 schools (65 students) were randomly assigned to a treatment group that would use Core5 during push-in and pull-out supplemental instruction. An additional 2 schools (50 students) were randomly assigned to a control group and were tasked with delivering supplemental reading instruction without Core5 (business as usual).[13] Towards the end of the school year, all of these students participated in a Spring reading assessment.

Sample

For this study, Lexia partnered with a mid-sized school district located in the Chicago metropolitan area.

The district had a one-to-one iPad program for students in grades 1 and above. Students in grades 3 and above were allowed to take home iPads for homework purposes. In Kindergarten, students had access to shared devices in the classroom.



[13] In both the Core5 and control schools, special education teachers used commercial reading curricula during supplemental push-in and pull-out sessions. The district did not mandate a uniform special education curriculum, and individual schools had liberty to select interventions. All of the teachers in both the Core5 and control schools who provided survey data used at least one program by Wilson: Fundations, Just Words, and/or Wilson Reading System. In addition, 3 control teachers used Fountas and Pinnell Leveled Literacy Intervention System and 5 teachers (4 treatment and 1 control) used Words Their Way. All treatment teachers also used Core5.

As part of the regular education curriculum, all students also used Schoolwide's reading program. In addition, many students used Freckle and Epic Reading during regular education reading sessions, and a small number used IXL Language Arts, Read Theory, ReadWorks, Learning Ally, and Tumble Books.

Each school building was staffed with a school psychologist who oversaw special education case management, specialists (e.g., speech-language pathologists), and special education teachers tasked with supporting students in core subject areas like reading.

Twenty (20) special education teachers participated in the study. Of these, 11 provided the research team with information on their teaching practices and demographics. These teachers were highly experienced. All but one had Masters degrees, and 82% (9 teachers) had more than 20 years of teaching experience. All were White females.

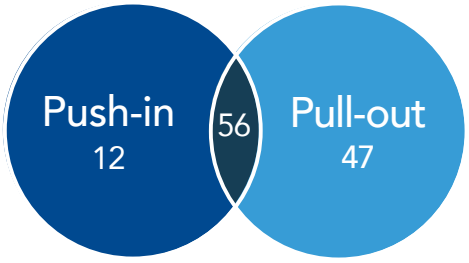
This study focused on 115 students in grades K-5 receiving special education support for reading difficulties. All students had IEP designations of "Specific Learning Disability" (or SLD), "Speech or Language Impairment" (or SLI), and/or "Developmental Delay" (DD). The table on the following page indicates how many students were in each grade, and the Venn diagram denotes how many students had each designation, as well as the number of cases with multiple designations.

District IEP Category Definitions	
Specific Learning Disability (SLD)	A disorder in one or more of the psychological processes involved in using or understanding written or spoken language. This may manifest in an imperfect ability to read, write, spell, listen, or think. Conditions include dyslexia, developmental aphasia, brain injury, perceptual difficulties, and minimal brain dysfunction.
Speech or Language Impairment (SLI)	Communication disorders, including language or voice impairments, stuttering, or impaired articulation.
Developmental Delay (DD)	A delay in one or more of the following areas of development: physical, cognitive, communication, social or emotional, or adaptive.

STUDENT CHARACTERISTICS

Grade Level	Number of Students
K	8
1	6
2	9
3	24
4	35
5	33

115 K–5
SPECIAL EDUCATION STUDENTS



All students in the sample received "push-in" and/or "pull-out" support from a special education teacher. The diagram to the right indicates how many students received one or both forms of instruction. Students receiving push-in support participated in regular education activities, but a special education teacher would join their reading classes to provide them extra support (on average 184 min per week). In contrast, students receiving pull-out support left their regular education classes to receive additional small group (2-6 students) reading instruction in a separate space (on average 190 min per week). During these times with the special education teacher, students in the treatment group would work on Core5 and use other reading curricula.[14]

Reading Achievement Measure

Reading achievement was tested with Measures of Academic Progress® (MAP) Growth™ Reading. MAP is a computer-adaptive assessment that students typically complete in about 45-60 minutes. For grades K-2, MAP measures a) Foundational Skills (phonological awareness and phonics), b) Vocabulary Use and Functions, c) Literature and Informational Text, and d) Language and Writing. For grades 3-5, MAP measures a) Word Meaning and Vocabulary Knowledge, b) Understanding and Integrating Key Ideas and Details for Literature and Informational Text, and c) Understanding and Interpreting Craft and Structure for Literature and Informational Text. MAP generates a composite scale score in Rasch Units (RIT), which can range from 100 to 350, as well as a percentile score. Students who scored at or above the 40th percentile at either time point were categorized as "proficient" readers.[14]

[14] The 40th percentile cut-off is based on precedent set by Petscher, Y., & Kim, Y. (2011). Efficiency of predicting risk in word reading using fewer, easier letters. *Assessment for Effective Intervention, 37*, 17-25. doi:10.1177/1534508411407761

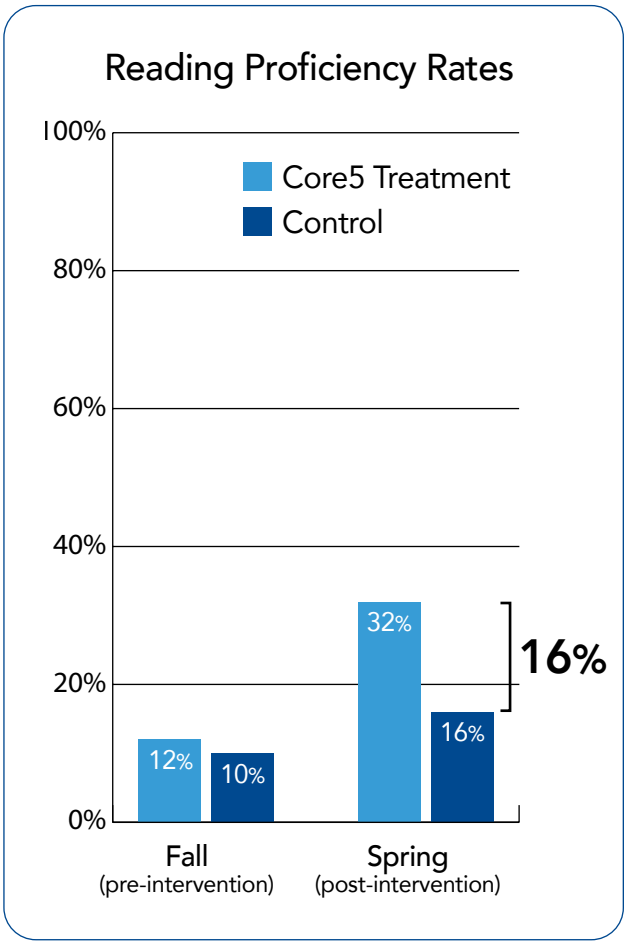
Results

Core5 Usage

Students in the treatment group began using Core5 in mid-October and continued using it through the end of the school year, excluding weeks with district-wide holidays or standardized testing. On average, **students used Core5 for 24 weeks with 60 minutes of online work per week**.

Reading Outcomes

Core5 users made solid progress towards achieving reading proficiency over the course of the school year. At the beginning of the school year before the intervention commenced, students in the treatment and control schools earned similar MAP scores. Only about 1 in 10 students were reading proficiently across both groups.



After a year of Core5 use, students in the treatment group earned significantly higher scores on MAP than students in the control group – the equivalent of about 8 percentile points. The proportion of proficient readers in the control group remained fairly constant over the course of the school year. In contrast, about 1 in 3 Core5 users earned proficient scores in the Spring – **a 20% increase** over the course of the school year. At the end of the school year, Core5 users were twice as likely to be proficient readers compared to control students.

Students who used Core5 for across the school year were **2x more likely** to be proficient readers.

Researchers calculate a metric called an effect size (Cohen's *d*) to quantify the impact of an intervention. If treatment students receive higher scores than control students, Cohen's *d* will be positive, with larger Cohen's *d* estimates indicating a larger treatment effect. Previous research has found that the average reading intervention for students with learning disabilities had an effect size of Cohen's *d* = .14.[15] Cohen's *d* in this study is .23. This means that **Core5 was 64% more effective than comparable programs**.

See the Technical Appendix for more information on the calculation of these results.

Conclusion

We found that Core5 had a positive and statistically significant impact on the standardized reading scores of students with reading and/or language-based disabilities. Treatment students using Core5 were twice as likely to become proficient readers at the end of the school as control students who did not use Core5. Although this study is not the first to find positive effects for this student population, many previous studies using other programs either did not adhere to ESSA's standards for **strong** research or failed to find large, statistically significant effects.[11,12] Consequently, the results of this study provide valuable information for educational decision-makers. Results show Core5 is an effective supplement for an important at-risk population of readers.

Several program design characteristics may have contributed to Core5's effectiveness. Core5 provided systematic, sequential, and adaptive instruction across six areas of reading, including skills that are historically more challenging for students with reading and language disabilities such as phonics and comprehension.[3,5] Prior research points to the effectiveness of this instructional approach.[2,12] The online component of Core5 was able to provide students multimodal learning opportunities which may be more appealing than traditional print materials – features previous research suggests promote learning and engagement.[2] Core5 also encouraged teachers to provide in-person support when program data made it clear that students were struggling to master specific skills, another program element noted as effective in prior research.[12] Additionally, students may have derived satisfaction from completing levels in the online program and earning Certificates, which may have enhanced their reading motivation.[2] Together, these features contributed to strong learning.

The results of this study indicate that Core5 is an effective tool to support students with reading and/or language-based disabilities. This student population is known to have great difficulty mastering foundational reading skills,[3] which in turn has the potential to set them on a negative academic trajectory. Intervening in elementary school when students are still learning to read can have a profound impact on their school performance when later they are required to "read to learn."

[15] Scammacca, N. K., Roberts, G., Vaughn, S., & Stuebing, K. K. (2015). A meta-analysis of interventions for struggling readers in grades 4-12: 1980-2011. *Journal of learning disabilities, 48*, 369-390. doi:10.1177/0022219413504995

Technical Appendix

Below we provide descriptive information on students' MAP performance in the Fall (pretest) and Spring (post-test).

	Fall MAP RIT Scores *M* (*SD*)	Fall MAP Percentile Scores *M* (*SD*)	Fall Map Proficiency % (*n*)	Spring MAP RIT Scores *M* (*SD*)	Spring MAP Percentile Scores *M* (*SD*)	Spring MAP Proficiency % (*n*)
Core5 Treatment (*n* = 65)	176.46 (19.53)	21.49 (17.39)	12% (8)	189.77 (16.31)	29.86 (25.00)	32% (21)
Control (*n* = 50)	173.68 (18.68)	19.92 (14.99)	10% (5)	185.02 (15.84)	22.52 (15.00)	16% (8)

To test for differences in Spring MAP RIT scores between the Core5 treatment and control group, we initially attempted to run a multi-level model that accounted for the nested structure of our dataset (i.e., students nested within schools). However, there was no variance at the school level after controls were added. Therefore, we ran an analysis of covariance (ANCOVA) model. We compared Spring MAP RIT scores across conditions while also controlling for Fall MAP performance, IEP designation, instructional model (i.e., whether students received push-in support), and grade. The overall model was significant, $F(11, 103) = 11.89$, $p < .001$, $\eta^2 = .56$. Treatment students using Core5 scored significantly higher on MAP (adjusted $M = 192.36$, $SE = 1.71$) than control students (adjusted $M = 188.65$, $SE = 1.83$), $F(1, 103)$, $= 5.03$, $p = .027$, $\eta^2 = .05$, Cohen's $d = .23$. Results were similar when the model was repeated for MAP percentile score (adjusted $M_{Treatment} = 35.47$, $SE = 2.61$ vs $M_{Control} = 27.30$, $SE = 2.75$, $F(1, 103) = 7.55$, $p = .007$, $\eta^2 = .07$, Cohen's $d = .55$)

We next ran a series of χ^2 and McNemar's tests to compare proficiency rates for Core5 treatment and control students at the two test points. The proportion of proficient readers did not differ between treatment and control students in the Fall $\chi^2(1, N = 115) = .15$, $p > .05$, Cramer's $V = .04$. In contrast, there were more proficient readers in the Core5 treatment group than the control group in the Spring, $\chi^2(1, N = 115) = 3.99$, $p = .046$, Cramer's $V = .19$. McNemar's tests show that the increase in proficiency rates was significant for the treatment group ($p = .001$) but not for the control group ($p > .05$).

RES-C5-ESSA-STR-0720