Accelerating Literacy through Self-Regulation, Collaboration and Persistence: Reading Apprenticeship in North Carolina

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INTRODUCTION

WestEd seeks to improve the academic achievement and social-emotional abilities of high school students in 50 rural, low-wealth North Carolina districts by providing evidence-based professional learning to teachers. The project addresses **Absolute Priority 3** by promoting the development of 9th and 10th grade students' academic literacy proficiencies and social-emotional learning skills so they can lead more productive and fulfilling lives. The project meets a documented and urgent need to improve literacy outcomes and teacher professional development in rural North Carolina. Approximately 600 teachers of English language arts, history, and science will engage in evidence-based, professional learning. These teachers will serve an estimated 25,000 high school students. The project will build on and expand Reading Apprenticeship, an evidence-based intervention for increasing students' learning skills, particularly historically underserved students; provide effective professional learning for teachers; and evaluate the intervention's effectiveness in rural settings.

Multiple research studies with strong experimental designs have demonstrated the effectiveness of Reading Apprenticeship, which is both a professional development model and instructional framework, to shift teacher practice in ways that improve student outcomes in content area learning and literacy (Greenleaf, et al., 2009; Greenleaf, et al., 2011a; Greenleaf, et al., 2011b; Kemple, et al., 2008; Somers, et al., 2010; Fancsali, et al., 2015), thus meeting requirements for Absolute Priority 1. Three of these also show positive impacts on social-emotional learning factors that this project would allow us to investigate in new settings: attendance and course completion (Somers, et al., 2010) as well as collaboration and self-regulation (Greenleaf, et al. 2009; Fancsali, et al., 2015). This evidence has earned Reading Apprenticeship a Strong rating in Evidence for ESSA and resulted in being listed as a [SELect program](#) by the Collaborative for Academic, Social and Emotional Learning.

A. SIGNIFICANCE

Social-emotional factors have strong effects on academic performance and reading achievement: as students become more self-aware, collaborative and confident, they do better in

school (e.g., Farrington et al., 2012; Snipes, Fancsali, & Stoker, 2012). Over time, developing these social-emotional factors also builds the "people skills" needed for success in today's workplace (Farrington et al., 2012) and financial success (Belfield, et al., 2015). Student ability to develop both social-emotional and literacy skills is critical for their financial stability in adulthood. The Program for International Assessment of Adult Competencies estimates that adults who were proficient in literacy and math earned nearly double their counterparts with low skills. Adults proficient in literacy were also twice as likely to participate in ongoing learning, which is crucial in a rapidly changing economy (Batalova & Fix, 2015). Our project focuses on improving students' outcomes during the critical years of 9th and 10th grade; students' success in these grades, as measured by attendance, grades, and course completion, predicts high school graduation and future success (Allensworth & Easton, 2007; Easton, Johnson, & Sartain, 2017).

Problem Addressed: High School Students' Literacy and Social-Emotional Factors

Rural North Carolina high schools face both literacy and perseverance challenges. In November 2019, the Rural School and Community Trust identified North Carolina, where 20.7% of rural children live in poverty, as its number two priority state. The report finds, "Unlike in most other states, North Carolina's rural students have much lower achievement than non-rural students. The most pronounced area of concern is reading, a subject on the NAEP exam for which the difference between 4th and 8th grade scores is less than that of all but two other states" (Showalter, et al., 2019, p.4). Thus, North Carolina students are entering high school unprepared for the literacy demands in their content area courses. Only 20% of high school students in North Carolina's low-wealth districts meet reading proficiency standards (WestEd, et al., 2019b, p. 18). These low levels of literacy translate into lower academic persistence and engagement: five-year graduation rates are 8 percentage points lower in low-wealth districts (84%) than in higher wealth districts (92%) (WestEd, et al., 2019a, p. 27).

Solution: Integrated Literacy and Social-Emotional Learning

Reading Apprenticeship (RA) professional development and classroom practice, which are guided by the RA Framework (Exhibit 1), closely align with the student outcomes outlined in Priority 3. Prior research demonstrates that RA builds students' opportunities to collaborate with peers, abilities to persevere through challenging tasks, belief that effort contributes to growth, and literacy skills. In the **Personal Dimension**, students develop the *ability to overcome obstacles*. By the time they enter high school, students with limited literacy success often give up on trying to improve their reading. Through this dimension, teachers help students see themselves as readers, gain awareness of their reading challenges and become willing to persist.

Exhibit 1. Reading Apprenticeship Framework for Professional Development and Instruction
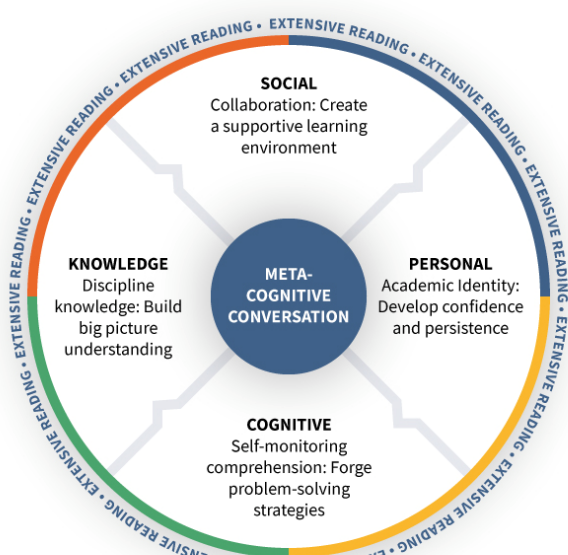
RA's **Cognitive and Knowledge Dimensions** offer specific strategies and background knowledge that support students in *developing problem-solving skills*. Experienced readers automatically put a wide range of mental tools and knowledge to work when they read difficult text. Teachers learn to explicitly teach students how to use these tools. For example, a science teacher can demonstrate how she interprets graphs to understand scientific results.

RA's **Social Dimension** supports students in *developing positive personal relationships*. Teachers work with students to establish norms and routines that encourage sharing ideas and confusions about content and reading as well as interesting texts.

RA's central practice, **metacognitive conversation,** ties these dimensions together and supports students in developing relationships, persistence, self-awareness, and problem-solving. Students' success is fueled by expanded in-class opportunities to apply reading skills to

increasingly complex text. RA's Framework integrates the social-emotional and cognitive factors recognized by the final synthesis of the $120 million national, Reading for Understanding initiative as critical to improving reading comprehension: strong supportive professional learning communities for teachers; engaging and challenging practices for both teachers and students; and collaborative student discussions about interesting text that feed into applying what is learned to explanations and arguments about relevant ideas and issues (Pearson, et al. 2020).

Project Contribution: Improve Literacy and Social-Emotional Outcomes Simultaneously

Few studies show how teachers can build social-emotional assets as they teach content and skills (Farrington et al., 2012; Yeager, Paunesku, Walton, & Dweck, 2013), especially with students beyond the elementary grades (Alexander & Fox, 2011). This project aims to do just that while also building upon research that shows that students who place a high value on the work in a class and *who believe they will be successful* at it are more likely to use metacognitive and self-regulated learning strategies when doing that work (Farrington, et al., 2012).

RA classrooms develop students' learning strategies, in part through dialogue and collaboration, that is achieved in part by raising teachers' ability to foster students' emotional and cognitive engagement (See Appendix I-1, Features of RA). One study (Fancsali, et al., 2015) demonstrates this kind of engagement and impact; RA teachers reported creating more opportunities for collaboration, which prepared students to engage in metacognitive conversation. Metacognition matters because "…more accomplished learners know what they know and they know what they have yet to learn; hence, they can tell when they need to put in more effort to accomplish a goal" (Farrington, et al., 2012, p.41). Echoing this, Fancsali (2015) reported that RA students participated more frequently in metacognitive conversations which provide mental tools to *solve problems* and *persevere* when facing reading challenges.

This project builds the field by examining the impact of high school students' beliefs, confidence and self-regulation and metacognition on academic outcomes, specifically in rural settings where little research about this question has been conducted and schools have less access

and greater need for evidence-based teacher professional learning. Concurrently, this project will support the improved learning of thousands of students served by rural and low wealth schools, building the skills essential for their future success.
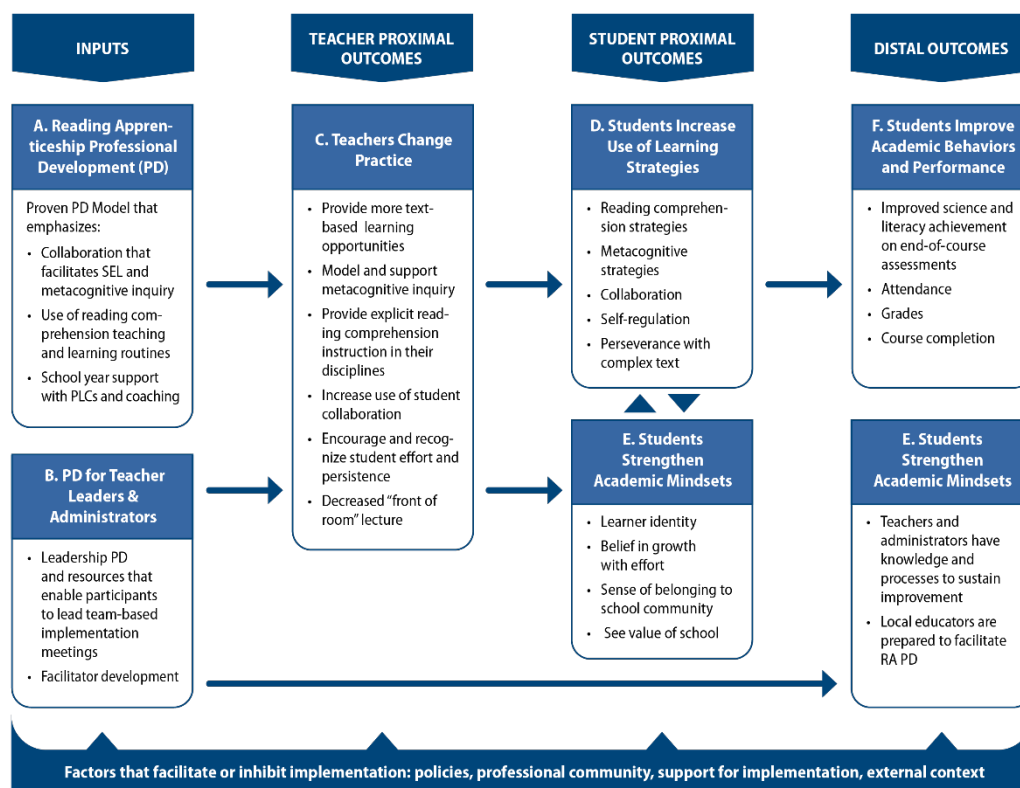
B. PROJECT DESIGN

Introduction: Reading Apprenticeship Theory of Action and Logic Model

Reading Apprenticeship supports changes in teacher practice and student learning through professional learning that features design elements of highly effective professional development (**bolded phrases)** (Darling-Hammond, Hyler, and Gardener, 2017). The logic model (Exhibit 2) shows that RA (**A**)[1] focuses on two, interwoven strands of **content**: social-emotional factors and content-area literacy practices. Teachers learn how to tackle social-emotional barriers by actively engaging in the kinds of learning experiences they will offer students (e.g., share what they find confusing or off-putting in challenging texts, solve comprehension challenges). Simultaneously, teachers come to view reading as supporting content-area learning and enhance their ability to develop students' reading comprehension in their content areas. Cross-disciplinary district teams engage in collaborative learning in multiple forums. During face-to-face and online sessions, expert RA facilitators **model** practice, engage teachers in **active learning**, and support teams to plan for implementation. During online, small group coaching sessions, teachers receive **expert support for implementation**. At school team meetings, teachers engage in **feedback and reflection** to refine implementation and analyze formative assessment data.

Teacher-leaders and administrators learn (**B**) to provide **job-embedded** support for implementation. Sessions focus on integrating RA practices with existing curriculum and promoting sustainability (**G**). Together, professional learning and support from instructional leaders leads to significant shifts in instructional practices (**C**). Teachers support social-emotional learning by increasing the use of classroom routines that engage students in actively

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[1] Bolded letters in parentheses refer to logic model components in Exhibit 2.

Exhibit 2. Reading Apprenticeship Logic Model

INPUTS | TEACHER PROXIMAL OUTCOMES | STUDENT PROXIMAL OUTCOMES | DISTAL OUTCOMES

A. Reading Apprenticeship Professional Development (PD)

Proven PD Model that emphasizes:
- Collaboration that facilitates SEL and metacognitive inquiry
- Use of reading comprehension teaching and learning routines
- School year support with PLCs and coaching

B. PD for Teacher Leaders & Administrators
- Leadership PD and resources that enable participants to lead team-based implementation meetings
- Facilitator development

C. Teachers Change Practice
- Provide more text-based learning opportunities
- Model and support metacognitive inquiry
- Provide explicit reading comprehension instruction in their disciplines
- Increase use of student collaboration
- Encourage and recognize student effort and persistence
- Decreased "front of room" lecture

D. Students Increase Use of Learning Strategies
- Reading comprehension strategies
- Metacognitive strategies
- Collaboration
- Self-regulation
- Perseverance with complex text

E. Students Strengthen Academic Mindsets
- Learner identity
- Belief in growth with effort
- Sense of belonging to school community
- See value of school

F. Students Improve Academic Behaviors and Performance
- Improved science and literacy achievement on end-of-course assessments
- Attendance
- Grades
- Course completion

E. Students Strengthen Academic Mindsets
- Teachers and administrators have knowledge and processes to sustain improvement
- Local educators are prepared to facilitate RA PD

Factors that facilitate or inhibit implementation: policies, professional community, support for implementation, external context

collaborating to understand challenging academic content, recognizing students' effort and perseverance, and explicitly teaching comprehension and metacognitive strategies.

Teachers support content-area learning by providing more opportunities for students to read authentic disciplinary texts (e.g., primary sources in history). Rather than lecturing, teachers model how to learn from texts and have students use similar routines individually and in small groups. For example, a science teacher explicitly models how to interpret a graph to build understanding of a phenomenon, then has students use the same approach to interpret other graphs. These classroom practice changes lead to proximal student outcomes aligned with Priority 3: increased use of learning strategies (**D**) and improved academic mindsets (**E**). Both the broader social-emotional learning literature and research on RA's impact, show that these skills and mindsets ultimately strengthen students' academic outcomes (**F**).

Project Overview

WestEd will engage high school teachers, teacher leaders, and administrators from 50 rural, low-wealth North Carolina districts (focus districts) in Reading Apprenticeship professional learning. WestEd will provide integrated supports to insure high-quality professional learning, classroom implementation of RA routines, and sustainability beyond the life of the grant. This **intensive and sustained** professional learning model (See Appendix I-2) includes:

- Annual, regional meetings of administrative and instructional leaders that support the integration of RA into participating districts' core practices;

- Blended professional learning for all 9th and 10th grade ELA, social studies, and science teachers over two school years (82 hours);

- New teacher- and student-facing formative assessment tools that track students' increased use of effective learning strategies and growth in academic mindset;

- Leadership training for teacher leaders to support implementation (50 hours) to sustain the effective use of RA in focus districts; and,

- Preparation of at least 10 teacher-leaders to become WestEd-certified, RA Facilitators to further expand RA in North Carolina and beyond.

Clearly Specified and Measurable Goals, Objectives, and Outcomes (B.1)

As shown in the logic model (Exhibit 2), this project will shift teacher practice and thereby improve students' social-emotional and academic outcomes. We will measure the project's progress through the goals and objectives described in Exhibit 3. (Measures details in Section E and Appendix I-4.)

Exhibit 3. Goals, SMART Objectives, and Measures

Goal 1: Provide Professional Learning (A).[a] Increase the number of North Carolina teachers who have participated in evidence-based RA professional learning.	
Objectives	Measures and Documentation
Objective 1.1. Professional Learning. 80% of 9th and 10th grade English Language Arts (ELA), Social Studies, and Science teachers in	-Attendance records and coaching logs -Approximately 550 teachers

two cohorts of 25 focus districts (50 districts total) participate in 82 hours of professional learning over two years.	in two cohorts will participate, with 440 meeting thresholds
Objective 1.2. Formative Assessment Tools. WestEd will develop and refine formative assessment tools and processes for using them in the classroom that will support teachers in integrating RA routines into their teaching during the first two years of the project.	OER assessment tools on Reading Apprenticeship website
Goal 2. Provide Leadership Development Opportunities (B). Build local capacity to support teachers' professional learning by developing teacher and administrative instructional leadership.	
Objective 2.1. Teacher Leadership. Fifty teacher leaders participate in 51 hours of leadership PD and facilitate district team meetings focused on classroom implementation over two years.	Attendance records for teacher leader meetings and district team meetings
Objective 2.2. Administrative Instructional Leadership. At least <u>one</u> administrator or secondary instructional coach from each participating district or school, participates in literacy leadership PD that will assist them in supporting classroom implementation.	Attendance records
Goal 3. Improve Teacher Practice (C). Increase the number of teachers who support students' use of learning strategies (SEL), academic mindsets (SEL), and literacy outcomes.	
Objective 3.1. Teacher Support for Social-Emotional Learning (SEL) Outcomes. After two years of professional development, 70% of participating teachers will use RA routines of collaboration and metacognitive conversation at least once per week to support students' use of learning strategies and positive academic mindsets.	-Monthly teacher logs -Observations using CLASS-S *(Teacher Emotional Support & Classroom Organization)* -Interviews
Objective 3.2. Teacher Support for Reading Comprehension in Disciplines. After two years of professional development, 70% of participating teachers will implement discipline-specific, RA comprehension routines at least once per week and increase the amount and range of text students read.	-Monthly teacher logs -Observations using CLASS-S *(Teacher Instructional Support)* -Interviews
Goal 4. Improve Student Learning Outcomes (D, E, & F). Improve high school students' reading comprehension, academic achievement, use of learning strategies, and academic mindsets by increasing opportunities to learn.	
Objective 4.1. Improved Use of Learning Strategies (SEL). Students in RA classrooms report using learning strategies (reading comprehensions and metacognitive strategies, collaboration, self-	-Student SEL survey -Observations, CLASS-S *(Student Engagement)*

regulation) that support them in persevering through challenging texts more frequently than students in control classrooms.	
Objective 4.2. Improved Academic Mindsets (SEL). Students in RA classrooms report improved academic mindsets (learner identity, belief in growth through effort, sense of belonging, value of school) that contribute to perseverance and academic success more frequently than students in control classrooms.	Student SEL survey
Objective 4.3. Improved Academic Outcomes. Students improve attendance, literacy assessment outcomes, and completion of core academic courses.	-Attendance -Course completion for ELA, History, Science -End-of-course assessments, Biology and English II
Goal 5. Sustainability (G). Build local and regional capacity to sustain and disseminate this work.	
Objective 5.1. Develop local processes and structures to sustain RA. Administrators and teacher leaders will develop plans to use staff planning time to sustain implementation.	District sustainability plans developed at regional meetings
Objective 5.2. Increase the number of certified RA facilitators in NC. At least 10 participating teacher leaders complete a Facilitator Academy to join the national network of certified RA Facilitators.	-Attendance records -Certificates-of-completion for Facilitator Training
Objective 5.3. Regional sustainability. WestEd will work with three NC Regional Education Service Alliances to provide support for RA beyond grant funding.	RESA sustainability plans

ᵃ Letters refer to the logic model components in Exhibit 2.

Project Will Successfully Meet the Needs of Participating Students and Teachers (B.2)

In 2018, the Supreme Court of North Carolina found that students in its low-wealth districts continue to be denied an equal opportunity to receive a sound basic education more than 20 years after its decision in *Leandro v. the State of North Carolina* (1997) (WestEd, et al., 2019b). As part of its ongoing oversight for the *Leandro* decision, North Carolina's Supreme Court appointed WestEd to "develop detailed, comprehensive, written recommendations for specific actions necessary to achieve sustained compliance with the constitutional mandates articulated in the *Leandro* decision" (WestEd, et al., 2019b, p.1). The Action Plan documents substantial

differences in student outcomes between low- and high-wealth districts, identifies factors that contribute to differential outcomes, and makes recommendations. Our proposed project addresses three areas of challenge by providing professional development to improve teacher quality in 50 focus districts:

- Large disparities in high school students' literacy and science outcomes,
- Limited access to high-quality, effective professional learning for teachers, and
- Limited opportunities for teachers to take on leadership roles that support retention.

Reading Apprenticeship Meets Demonstrated Student Needs

Only 20% of students in North Carolina's low-wealth districts achieve proficient scores on their high school literacy tests and only 68% are proficient in science. These low achievement scores contribute to lower graduation rates and indicate a gap in students' ability to persevere through challenging academic work. RA will successfully meet these students' needs by offering an integrated approach to social-emotional learning and literacy. Over the past 15 years, five studies that meet What Works Clearinghouse standards with or without reservation demonstrate that Reading Apprenticeship has a positive impact on non-cognitive outcomes: students' literacy outcomes (Fancsali, et al., 2015; Goldman, et al., 2017; Greenleaf, et al., 2011a; Greenleaf, et al., 2011b; Somers et al., 2010; Somers et al., 2012). In addition, three of these studies demonstrate that Reading Apprenticeship also has a positive impact on students' grades and credit accumulation (Somers, et al., 2010), use of high-leverage learning strategies (Fancsali, et al., 2015), and improved academic mindsets (Greenleaf, et al., 2009). These studies were conducted with students who faced similar challenges to the students served by this project, including those entering 9th grade two to five years below grade level.

Reading Apprenticeship Meets Demonstrated Teacher Needs

Like their students, teachers in the focus districts face significant challenges. Only 80% of high school teachers in low-wealth districts are fully certified, and all of these teachers lack access to high-quality professional learning. Our project aligns with the Action Plan's

recommendations for improving teacher quality, "Working conditions and staffing structures should enable all staff members to do their job effectively and *grow professionally while supporting the academic, personal, and social growth of all their students*" (WestEd, 2019a, p.32, *emphasis added*). This project will provide effective, RA professional learning proven to grow teachers' capacity to support their students' academic, personal, and social growth.

Reading Apprenticeship Meets Leadership Development Needs

The project will also develop teacher leaders' capacity to facilitate school and district team meetings for participating teachers. Building teachers' leadership capacity addresses the *Leandro* Action Plan's findings about workplace opportunities that predict teacher retention – strong teacher and school leadership, high-quality professional learning and collaboration, and teachers' high self-efficacy and collective efficacy (WestEd, et al., 2019a). Teacher leaders will gain valuable facilitation skills and build their districts' collaborative culture by engaging the teacher peers in examining implementation of RA routines and student learning.

Project Constitutes a Coherent, Sustained Program of Research and Development (B.3)

Reading Apprenticeship has remained effective and relevant because of ongoing cycles of research and development that have been carried out through partnerships between teachers, staff development professionals, content experts and researchers. This project leverages a proven intervention and provides the opportunity to conduct new research on its effects on improving students' social-emotional development in rural, low wealth settings. Although the RA Framework (Exhibit 1) explicitly addresses social-emotional skills, teachers sometimes report they need more tools, processes and language to assess progress and respond to students.

With matching funds from the Chan Zuckerberg Initiative (CZI), we will refine and develop formative assessment tools focused on social-emotional outcomes. For example, RA has a rubric for Student Self-Assessment of Collaborative Work (See Appendix I-3) which makes important dimensions of positive personal relationships visible: use of time, contribution of ideas, listening, participating, and encouraging others. We will develop processes for introducing such rubrics,

and easily collecting and analyzing data to identify where students need additional support. Building more opportunities for formative assessment enhances teachers' implementation of new practices (Darling-Hammond, Hyler, and Gardener, 2017) and builds students' agency. Enhancing formative tools represents a substantial addition to RA.

Project Increases Efficiency for Participating Districts and Project Staff (B.4)

Overall this project increases efficiency in the use of WestEd staff and participant time by refining and streamlining the successful RA intervention. Because RA improves students' literacy, social-emotional skills, and subject area achievement simultaneously, it reduces the need for holding many separate trainings that do not build to a coherent, lasting, and evidence-based approach. Prior RA iterations that had significant impact on student outcomes required 10 days of face-to-face PD in discipline-specific groups, plus additional classroom coaching. Gathering subject specific groups for consecutive days of professional development is not scalable or cost effective, especially for rural districts. To achieve comparable impacts with fewer days, we have identified the highest leverage content and professional learning activities to share. Thus, the professional development will be provided more efficiently, with additional support for implementation be provided by trained district-based teacher and instructional leaders.

We will increase access to teacher collaboration and expert support by providing online professional learning communities (PLCs) and virtual coaching. Because internet access can be limited in rural communities, we will use tools such as Zoom, which has voice-only options, and Canvas, which can be accessed with lower-bandwidth connectivity.

Finally, we will test a small-group coaching model rather than using a one-on-one coaching approach, enabling substantial cross-disciplinary interactions focused on classroom practice in less time and fewer in-person trips to individual districts. We will also build the capacity of administrative and teacher leaders to support implementation through online leadership PD. This approach reduces costs for RA facilitators and strengthens long-term support for sustainability.

C. STRATEGY TO SCALE

Reading Apprenticeship's approach to scale involves both spreading the approach to more settings and supporting teachers to make deep and lasting change (Coburn, 2003). Over the past 10 years, RA has reached thousands of teachers annually across the U.S., both through grant-funded projects and fee-for-service contracts. Despite these successes, it is difficult to reach rural districts that serve high proportions of students living in poverty.

Strategies for Addressing Barriers to Scale (C.1)

We have identified and address four barriers to scaling.

Barrier 1. Rural, Low-wealth Districts Can't Afford Professional Learning

North Carolina's rural, low-wealth districts have limited access to high quality professional development. The *Leandro* Action Plan studies found that the past decade in North Carolina has experienced substantial decreases in funding and support for teachers' professional learning over the last decade. Superintendents named lack of state funding and fewer local funds to pay for substitutes or time outside school as significant financial barriers to high-quality, professional learning (WestEd, et al., 2019a). This project addresses the funding barrier by budgeting the full costs of facilitation, teacher, and travel costs. In addition, the focus districts don't have a sufficient number of consecutive days to engage teachers in professional development of sufficient intensity and duration to support significant change in practice. Therefore, we spread intensive face-to-face meetings over two years to match district's available professional development time.

Because our focus districts have extremely limited funding for professional learning and serve a high proportion of students living in poverty (on average 56% are eligible for Free or Reduced-Price Lunch), we are applying for a partial cost-match waiver for years 2-5 of the project. We have fully secured our first-year match of $200,746 with funding from the Chan Zuckerberg Initiative. We will continue to work with district partners to document in-kind

contributions and seek additional philanthropic support in order to meet the match requirements. (See Appendix D for detail.)

Barrier 2. Rural Districts Have Smaller Faculty and Limited Whole-School Release Time

To provide a robust learning experience and be cost effective, RA requires a minimum of 20 participants at teacher PD sessions. Many rural districts, including those interested in participating, have few 9th and 10th grade teachers. By bringing teachers from multiple rural districts in a region together, participants have the opportunity to gain insight from colleagues working in similar settings. For example, if a district has only two science teachers, this cross-district model allows them to share how they teach students to comprehend and interpret complex science texts, such as process diagrams, with science teachers from other districts.

Barrier 3. Support for Classroom Implementation through Formative Assessment Tools

Reading Apprenticeship asks high school teachers to make substantial shifts in how their classrooms typically operate. First, the primary work in the classroom shifts from the teacher expending the most effort to the students actively learning. Second, the teacher's role shifts from delivering information to supporting students in learning content from rich disciplinary texts. Third, teachers shift from rewarding students for correct answers to recognizing students for sharing confusions and thinking. Each shift requires teachers to identify evidence of impact on students' learning. This project will develop and refine formative assessment tools to generate evidence of students' use of learning strategies and development of growth mindsets. By analyzing formative data, teachers learn what works and how to further refine their practice.

Barrier 4. Sustainability

Sustainability of reform represents a particular challenge in the focus districts, which experience high levels of teacher and administrator turnover. In 2018-19, teacher turnover across North Carolina was 12%, a slight improvement from the previous year (Hui, 2020). However, turnover remains a serious issue especially given that fewer college students are pursuing teaching degrees (WestEd, 2019a). To mitigate these effects by encouraging teachers to remain

in the profession and in their districts, this project invests in leadership development at multiple levels. First, it provides professional learning for one teacher leader per district to support local implementation. Second, the project invites district instructional leaders (administrators or literacy coaches) to participate alongside teachers in the professional learning and offers annual, regional convenings where they can learn to better support teachers. Third, we are partnering with the three Regional Education Service Alliances (RESA) that serve the majority of rural, low-wealth districts in North Carolina. The Western RESA will help finalize district recruitment, build teacher and administrative leaders' capacity to support implementation, and serve as a hub to support for newly certified, local RA Facilitators after the grant ends. Multiple leadership layers will help ensure sustainability.

Mechanisms for Dissemination (C.2)

In addition to building supports for sustaining RA, WestEd will integrate new knowledge, strategies, and materials from this project into our robust service line. WestEd will incorporate the new social-emotional assessment resources into future professional development offerings. Our national cadre of 70 certified Reading Apprenticeship facilitators, who lead our national professional development services work, will be introduced to the changes in order to ensure that new learning is disseminated widely and with fidelity.

WestEd will use its outreach structures to ensure new knowledge and resources from this project reaches a broad audience of educators. These include outreach we conduct through our work in Regional Education Labs, Comprehensive Centers, and technical assistance projects -- such as the [Center to Improve Social Emotional Learning](#) whose aim is to expand the knowledge and capacity of the field to integrate evidence-based SEL and school safety practices to support student success. These projects and centers serve teachers, districts, state education agencies and policy makers nationally. WestEd and RA have strong educator networks, websites, publications and social media ([www.readingapprenticeship.org;](http://www.readingapprenticeship.org) www.facebook.com/readapprentice). For example, Reading Apprenticeship's website has about 3,000 users per month. Finally, WestEd

takes an entrepreneurial approach to scaling RA through fee-for-service contracts; we have built an infrastructure to support outreach to school, district, and states, reaching 2,500 educators through $1.6 million in contracts with LEAs during fiscal year 2019 alone.

The evaluation staff will also disseminate findings. They will prepare three peer-reviewed articles, infographics, blogs, and a policy brief. The team has budgeted to attend three conferences where they can present preliminary findings. This will ensure that both researchers and practitioners have access to what we learn from the evaluation about program impacts as well as what we learn about scaling RA in rural North Carolina.

D. RESOURCES AND QUALITY OF MANAGEMENT PLAN

Organizational and Staff Capacity (D.1)

WestEd is an educational research, development, and service organization with over 700 employees in offices around the country. WestEd is a leader in moving research into practice by providing training and technical assistance, and by working with policymakers and practitioners. During 2015 - 2019, WestEd carried out over 2,600 new contracts representing major contributions to the nation's R&D resources. In 2020, the agency expects to operate on program funding of approximately $174 million. Funding comes from diverse sources including U.S. federal agencies, state departments of education, international entities, universities, school districts and foundations. This large variety of funding provides stable base and organizational structure for carrying out this project.

Reading Apprenticeship, founded in 1995, is one of WestEd's flagship programs. Our project team includes literacy, staff development, and evaluation experts with a strong track record of bringing teacher professional learning interventions to scale, working in partnership with regional and local education leaders. The project director and lead evaluator have collaborated on several large randomized controlled trials, and WestEd staff have strong experience working with rural districts and educators to improve literacy teaching and learning. The RA team has extensive expertise in building face-to-face, online, and blended professional learning, and each

member has years of experience in their project roles (see Exhibit 4 and Appendix B).

Exhibit 4. Qualified Personnel: Roles and Responsibilities

Person, Role	Responsibilities and Qualifications
Linda Friedrich, PhD *Project Director*	**Friedrich, Director of Literacy at WestEd,** will provide overall leadership for the project, meeting regularly with the project management and evaluation teams. Over 30 years, she has led six federal i3 and SEED grants focused on improving the teaching of reading and writing. Prior to joining WestEd, she served as the Project Director for two rural i3 grants, which reached 80 rural districts in multiple states. Her current projects include a Chan Zuckerberg Initiative grant focused on whole child outcomes. Friedrich holds a PhD from Stanford University School of Education in Administration and Policy Analysis.
Nicole Arshan, PhD *Evaluation Lead, SRI International*	**Arshan** is a Principal Researcher and Evaluation Methods lead at SRI Education. Arshan studies the implementation, impacts, and scaling of interventions designed to improve student outcomes through improved instructional quality. Arshan has led six RCTs with program implementors at the National Writing Project, the University of California at Irvine, and New Leaders. She currently leads two national scale-up evaluations of PD programs to support literacy instruction. She has a PhD in Policy Analysis from Stanford University School of Education.
Mary Stump *Project Manager Dissemination*	**Stump** will work with the PD and project leadership team to manage project implementation and assure the team and participants are making progress toward goals and objectives as planned. Stump has served as project manager and dissemination lead for five federal i3 and SEED projects at WestEd which produced and disseminated Reading Apprenticeship in 10 states. She has an MA in Composition and Rhetoric from San Francisco State University and 20+ years of experience in management, teaching English, and conducting literacy research in education settings.
Sharon Sáez *District Recruitment &*	**Sáez** will work closely with education leaders in North Carolina to understand the project benefits and commitments. She will work with district leaders to complete needs assessment and plan districts' local implementation, capacity building and sustainability. Sáez has worked with

Sustainability Lead	districts in North Carolina and all over the world to develop multi-year comprehensive literacy plans. Sáez has 20+ years of experience in education, with an emphasis on English Learners, curriculum, and education leadership. She holds an MA from Chapman University.
Irisa Charney-Sirott and Heather Howlett, *PD Design & Teacher Leader Development and Capacity*	**Charney-Sirott and Howlett** will be responsible for developing the formative assessment tools, leading facilitator development activities, and monitoring the intervention's fidelity and quality. Charney-Sirott has lead RA design and improvement work for more than 14 years. She leads the Facilitator Development program and PD Design Team. Howlett, who taught in rural settings, has been facilitating teacher PD online since 2013 and is currently working with science teachers in MI to develop open source RA text-based investigations for a 2018 SEED grant. She led an i3 development grant focused on online science PD. Charney-Sirott and Howlett have worked on six federal grants. They taught History and Science, respectively, for many years in public schools before joining WestEd.
Diane Lee, *Financial Analyst and Senior Project Coordinator*	**Lee** will monitor and produce budgets, subcontracts, MOUs, stipends, and financial reports, as well as working as the project's coordinator to assure clear communication with teacher participants and district leaders. Lee has been SLI's Financial Analyst and Program Coordinator since 2011 and has successfully managed finance for six large SEED and i3 grants, as well as vendor relationships that assure high quality PD production at scale.

Dr. Arshan will lead a team of researchers at SRI Education. SRI Education is an independent not-for-profit organization, which houses education policy researchers, computer scientists, cognitive scientists, statisticians, assessment specialists, programmers, and other staff. The Education Division's interdisciplinary teams are engaged in projects to (1) systematically study and rigorously evaluate the outcomes of educational innovations; (2) seek to understand the mechanisms that lead to better teaching and learning; (3) develop state-of-the-art assessments that align with national standards; and (4) organize workshops and conferences on topics of national importance, analyze and synthesize the research literature, and develop recommendations and reports for educational leaders.

This project will also draw on codified and widely-disseminated RA resources to support implementation fidelity, provide an educative curriculum designed to shift teachers' instruction, and include tools for developing teacher leadership. These include two core books developed to support academic literacy that illustrate how social-emotional and academic practices can be productively woven together: *Reading for Understanding: How Reading Apprenticeship Improves Disciplinary Learning in Secondary and College Classrooms* (Schoenbach, Greenleaf, & Murphy, 2012) and *Leading for Literacy: A Reading Apprenticeship Approach* (Schoenbach, Greenleaf & Murphy, 2017). In addition, the refined professional learning sequence will build on existing facilitation guides, social-emotional learning resources, and online courses built in the Canvas learning management system.

Costs are Reasonable (D.2)

Reading Apprenticeship is inherently efficient in that it does not require the purchase of curriculum or hiring of additional staff as do many other interventions. A report comparing it to other literacy programs for adolescents concluded that RA's overall cost "is relatively modest because no additional personnel, materials, or facilities are needed" (Levin, Catlin & Elson, 2010). We will assess the cost of this instantiation of RA by identifying costs per participant; we will isolate costs that districts would not incur such as the RCT evaluation, staff travel for dissemination, and administrative costs related to tracking evaluation data, grant reporting, and financial expenditures such as cost-match documentation and teacher stipends. We estimate that the costs per student for this project will be approximately $240/student, excluding evaluation costs. These costs are in line with development of enhanced RA resources as well as the costs of other national organizations that provide professional development for teachers in rural settings. Should this project come in at a lower cost, it will prove to be a strong investment and candidate for further scaling. This project will focus on costs in relation to immediate impacts on teacher and student outcomes. Prior research, however, suggests that benefits will extend beyond the life of the grant. One recent study found that teachers continued using RA approaches in ways that

had significant impacts on student learning outcomes years after their initial experience (Greenleaf, Litman, & Marple, 2018).

Potential for Continued Support (D.3)

This project is well supported in North Carolina as demonstrated by the many letters of support from education leaders: County Superintendents, three Regional Education Service Alliances (RESA) serving most of the state's rural districts, the Association of North Carolina Principals and Assistant Principals, and the North Carolina School Superintendents Association. This strong support, and WestEd's track record of recruitment, confirms that we will successfully implement the project, and that districts will sustain the work when the grant ends. By working together toward common goals and analyzing data to inform implementation improvement, WestEd, the LEAs and RESAs will build capacity to continue the work of the project at the classroom, school and regional level. As described in the project plan (C.2), we will develop knowledge and, importantly, establish structures that support ongoing learning. By developing a cadre of facilitators who can lead the PD and be part of WestEd's national network of certified facilitators, local districts will not have to pay travel costs for experts to come to them and can schedule PD more quickly that fits local schedules and contexts. Additionally, these facilitators are part of an ongoing community which WestEd supports via its school and district services program and grant funding. The facilitator community develops and is trained in the use of resources that are continuously improved through ongoing research and development cycles.

At the regional and state level, the project will create buy-in and capacity and support sustainability by investing in a RA coordinator housed at the Western RESA (see letter of support in Appendix C). The Local Coordinator will become knowledgeable of RA, build understanding of best practices for implementing the intervention, and work with Teacher Leaders throughout the state, building a lasting network of ambassadors. By achieving success with students, engaging stakeholders at multiple levels in the state, and disseminating

information about the project as described in C.2, we anticipate participating districts will continue to invest in professional learning by leveraging resources such as North Carolina's Innovative Partnership Grants and Comprehensive State Literacy Development grants.

Adequacy of the Management Plan (D.4)

WestEd will meet the project goals in accordance with the timeline, budget, activities and responsibilities detailed below (See Appendix I-2). The project leadership team (Project Director, Project Manager, District Recruitment Lead, North Carolina Local Coordinator, and Professional Development Lead) will meet at least every other week prior to the launch of professional development to ensure that the project is on-track. During recruitment, the Project Director, Recruitment Lead, North Carolina Local Coordinator, Project Manager, and Lead Evaluator will meet at least every other week until random assignment has been completed. Once professional development begins the Leadership and Evaluation teams will meet monthly to ensure that the project stays on time and on budget. At least 3 times per year, the Leadership Team will meet with the evaluators to discuss findings that can shape upcoming professional learning and local support structures. WestEd's highly-experienced operations staff will use project and data management tools (e.g., Box, Smartsheet, Salesforce, Zoom and Canvas) to track recruitment, participation, and logistics for event planning. All teams use management and learning protocols to assess progress, improve the program, increase efficiency and document work. Given its funding amount and high profile, this project will be included in WestEd's top level Quality Assurance Process. Once the award is made, project leaders and financial analysts will meet quarterly with WestEd's Program Services team to review three areas of project quality: Contracts and Legal; Project Staffing, Quality Assurance, and Data Security; and Financial. This process mobilizes WestEd's infrastructure resources and ensures that the project is well managed and operated and any problems are addressed early.

Exhibit 5. Timeline of Activities, Measurable Objectives, and Responsibilities

Activity	Goal/Obj.	Who (When:)	Sp 20/21	Su 20/21	Fall 21/22	W 21/22	Sp 21/22	Su 21/22	Fall 22/23	W 22/23	Sp 22/23	Su 22/23	Fall 23/24	W 23/24	Sp 23/24	Su 23/24	Fall 24/25	W 24/25	Sp 24/25	Su 24/25	Fall 25/26	W 25/26
Study Design, Management, and Communication																						
IRB review		SRI	x					x				x				x				x		x
Pre-Register/update in REES		SRI		x				x				x				x				x		
Recruit districts and schools	1.1	WestEd, LEC, SRI	x																			
Randomize districts		SRI		x																		
Project management meetings	all	WestEd, SRI LEC	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Evaluation team meetings		WestEd, SRI	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
WestEd quality control review		WestEd	x		x				x				x				x				x	
Reading Apprenticeship Prof. Dev.																						
Summer session (2 days)	1.1 & 1.2	WestEd, LEC		ES				ES				LS				LS						
Online learning (2hr month)	1.1 & 1.2	WestEd			ES	ES	ES		ES	ES	ES		LS	LS	LS		LS	LS	LS			
Winter session/Coaching (1.5 days)	1.1 & 1.2	WestEd				ES				ES				LS				LS				x
School team meetings (1 hr/month)	1.1 & 1.2	Teacher Leaders			ES	ES	ES		ES	ES	ES		LS/ES	LS/ES	LS/ES		LS/ES	LS/ES	LS/ES		LS/ES	LS/ES
Regional teacher leader mtg (1 day)	2.1&2; 5.1&3	TLs; LEC				ES	ES		ES		ES		LS/ES	LS/ES	LS/ES		LS/ES	LS/ES	LS/ES		LS/ES	LS/ES
Leading for Literacy online course	2.1&2; 5.1&3	WestEd TLs, Admins							ES	ES	ES						LS	LS	LS			
Facilitator development	5.2	WestEd, Teachers						x		x		x	x	x	x	x		x		x		x
Admin and annual leadership meetings & sustainability planning	5.1	WestEd, LEC, Districts	ES				ES				ES				LS/ES				LS/ES			
Reading Apprenticeship Classroom Implementation																						
Teachers integrate RA routines into classroom	4	Teachers			ES	ES	ES		ES	ES	ES		LS/ES	LS/ES	LS/ES		LS/ES	LS/ES	LS/ES		LS/ES	LS/ES
Students learn and use RA routines	3	Teachers & Students			ES	ES	ES		ES	ES	ES		LS/ES	LS/ES	LS/ES		LS/ES	LS/ES	LS/ES		LS/ES	LS/ES
Implementation Data Collection																						
Site visits		SRI					x				x				x							
Observations of WestEd training		SRI		x			x	x		x												
Implementation fidelity artifacts		SRI			x	x	x	x	x	x	x	x										
Leader cost interviews & surveys		SRI					x				x											
Outcome Data Collection																						
Student-level extant data pull	4	SRI			B				Y1				Y2									
CLASS observations	3 & 4	SRI	B				Y1					Y2										
Monthly instructional log	3	Teachers	A	P	Y1	Y1	Y1		Y2	Y2	Y2											
Student SEL survey	4	SRI			B		Y1					Y2										
Reporting and Dissemination																						
Formative analyses & internal reporting		SRI & WestEd					x	x			x	x			x	x						
Summative analyses		SRI									x	x		x	x	x						
Dissemination		SRI & WestEd							x	x	x		x	x	x		x	x	x	x	x	x

A = Adapt; P = Pilot; B = Baseline data collection; ES=Early Start (treatment); LS = Late Start (control). Y1 = Y1 Impact Data Collection; Y2 = Y2 Impact Data Collection; TL=Teacher Leaders; LEC=Local education coordinator; Sp=Spring, Su=Summer, W=Winter

E. QUALITY OF THE PROJECT EVALUATION

WestEd will contract with SRI International to conduct an implementation and impact study of the Reading Apprenticeship program aligned to the logic model (Exhibit 2) in the 50 participating districts. The evaluation's research questions are: *Implementation*: Was Reading Apprenticeship implemented with fidelity? What contextual factors facilitated or impeded local implementation? *Proximal outcomes*: What is the impact of Reading Apprenticeship on teacher practice and student academic mindsets and use of learning strategies? *Distal Outcomes:* What is the impact of Reading Apprenticeship on student academic performance and behaviors? *Moderation*: Do student impacts vary by sub-group? *Mediation:* How do proximal impacts on teachers and students mediate the impacts of Reading Apprenticeship on student academic performance and behaviors? *Cost effectiveness:* What are the ingredients required to implement Reading Apprenticeship and what is its cost effectiveness relative to the control condition? *Scaling:* How does WestEd replicate and scale Reading Apprenticeship in rural, low-wealth North Carolina while maintaining program fidelity? To what extent do local teachers and leaders develop the expertise, sense of ownership, and depth of change required for sustainability?

To answer these research questions, SRI will collect implementation data (site visits, observations of WestEd training, school leader cost interviews and surveys) and outcome data (a monthly instructional log, CLASS instructional observations, a student SEL survey, and student-level extant data). See Exhibit 5 and Appendix I-4 for a timeline of SRI's evaluation, including recruitment, randomization, data collection, and reporting. Due to space limitations, we also use this appendix to provide supporting details on: the specific thresholds chosen for implementation fidelity; additional measures of proximal outcomes; analysis of exploratory research questions; and the details of our cost effectiveness and scaling studies.

Meeting the What Works Clearinghouse (WWC) Standards Without Reservations (E.1)

SRI will conduct a **two-year cluster-randomized control trial** to estimate the effect of Reading Apprenticeship on teacher practice and student outcomes to provide evidence that will

meet WWC Evidence Standards without reservations. SRI will conduct the two-year RCT in the participating districts during SY2021-22 and SY2022-23. To implement the RCT, WestEd will recruit 50 rural, low-wealth districts in North Carolina.[1] SRI will then randomly assign half of the districts into treatment (receiving Reading Apprenticeship training SY2021-22 and SY2022-23) and half into control (business-as-usual condition during SY2021-22 and SY2022-23 and receiving the training in SY2023-24 and SY2024-25). Randomization will be blocked by region and prior achievement to ensure the treatment and control groups are balanced across contexts and that teacher leaders are evenly distributed throughout the state to improve program sustainability. SRI will work with WestEd to support district recruitment and communication with teachers and school leaders. This support will ensure WestEd and the study team develop relationships and buy-in with study participants, and proactively prevent attrition from the RCT. SRI will keep both overall and differential attrition low using incentives and regular meetings with the Local Coordinator as well as school and district staff to enlist support for communication and follow-up (Roschelle, et al., 2014).

The RCT design will include **outcomes** on two clustered levels of participants: teachers and students. Participating teachers will be those teaching grade 9 or 10 history, science, or ELA classes. Participating students will be identified prior to randomization by districts' spring 2021 grade 8 and 9 student rosters to prevent bias from in-moving students and allow for the study to meet WWC standards without reservations for impacts on student academic behavior and performance outcomes. All data will be collected and analyzed in accordance with WWC standards, including the use of baseline data to check for equivalence, similar collection across treatment and control conditions, and the use of Hierarchical Linear Models to reduce the risk of Type I error associated with clustered data.

Measurable Thresholds of Implementation, Key Project Components, Mediators, and Outcomes (E.2)

In SY2021-22 and SY2022-23, SRI will assess the **fidelity of program implementation** in all treatment districts, providing regular updates to WestEd and local program staff to inform continuous improvement. While WestEd expects all participants to be fully engaged in all aspects of Reading Apprenticeship, we have set minimum annual thresholds for engagement on components of implementation fidelity, provided in Appendix I-4, Exhibit I-4.2. We break study activities into three components: (1) active, sustained participation in professional development, (2) focus on collaboration and reading comprehension, (3) leadership training for program sustainability. Having annual, district-level thresholds allows SRI to provide site-specific implementation feedback and supports WestEd's ability to track implementation and adjust programming activities. For the project as a whole to meet implementation fidelity, 80% of districts must implement all three components with fidelity in each year. Data sources and thresholds are adapted from those set in Fancsali et al. (2015), a prior evaluation of Reading Apprenticeship implemented at a level of fidelity sufficient to demonstrate positive impacts for student achievement.

We align the **evaluation outcomes and mediators** with the program logic model (Exhibit 1). SRI hypothesizes that Reading Apprenticeship training and supports for teachers and teacher leaders will result in changes in teacher practice: providing more text-based learning opportunities, modeling and supporting metacognitive inquiry, providing explicit reading comprehension instruction, increasing use of student collaboration, recognizing student effort, and decreasing "front of the room" lecture. These new practices will lead to students' improved learning strategies (reading comprehension strategies, metacognitive strategies, collaboration, self-regulation, and perseverance with complex texts) and academic mindsets (learner identity, belief in growth with effort, sense of belonging to school community, sense of school's value). Improved instruction, student learning strategies, and student academic mindsets will mediate the

distal outcomes: improved student academic behaviors and performance (science and literacy achievement, course completion, and attendance).

Valid and Reliable Performance Data on Relevant Outcomes (E.3)

The proposed project includes a rich set of **valid, reliable measures** aligned to the program logic model. In this narrative, we provide supporting information for "common measures," as called for by IES's Standards for Excellence in Education Research (SEER). Common measures are not just valid and reliable, but also widely used, allowing for comparison of effect sizes between interventions that target similar outcomes. To ensure we also provide measures sensitive enough to capture any impacts of the Reading Apprenticeship logic model (e.g., the full scope of student learning strategies and mindsets), we propose additional measures of proximal teacher and student outcomes more closely tailored to the program; these are detailed in Appendix I-4.

SRI will access **student-level data** through the North Carolina Education Research Data Center at Duke University to measure distal outcomes: literacy and science state standardized exams, attendance, and course completion in history, science, and ELA. North Carolina's high school state standardized exams in science and English will serve as our primary academic achievement outcomes. North Carolina's End-of-course exams (EOCs) in English II and Biology are aligned to state standards, used as accountability measures under the Every Student Succeeds Act (ESSA) and required by state law to comprise at least 20% of a student's final course grade. Both exams require students to read and respond to text (North Carolina Department of Public Instruction/Accountability Services, 2020a; North Carolina Department of Public Instruction/Accountability Services, 2020b). These assessments are therefore aligned to state policy goals, teacher and student course objectives, and Reading Apprenticeship's approach to disciplinary literacy. WWC standards recognize state standardized tests as valid and reliable measures (US Department of Education, 2016).

Improved instruction and students' improved learning strategies and academic mindsets should improve students' completion in history, science, and ELA, providing a broader insight

into the impacts of Reading Apprenticeship across all three disciplines. Further, students' improved behavior should include improvements in student attendance. Attendance and course completion in these three subject areas will therefore serve as additional distal student outcomes. WWC allows for course grades and attendance as eligible measures of secondary students' progression through school under the "student social-emotional learning and behavior" topic area (U. S. Department of Education, 2019).

Proximal Outcomes. Our common valid, reliable measure of teacher and student proximal outcomes will be provided by structured classroom observations using the Classroom Assessment Scoring System- Secondary rubric (CLASS-S; Pianta, Hamre, & Mintz, 2012). CLASS-S is a widely used measure with national benchmarking data, allowing both for comparisons of study effect sizes to other literacy and SEL interventions and the contextualizing of the study sample within a national context. CLASS-S has been shown to have predictive validity for student academic achievement across content areas in secondary schools and inter-rater reliabilities of .73 and above (Bill & Melinda Gates Foundation, 2012; Allen, et al, 2013).

The CLASS-S protocol covers **student engagement** and 11 elements of instruction clustered within three instructional domains (see Exhibit 6), providing four outcome measures. These elements are well aligned with the Reading Apprenticeship logic model: the student engagement domain captures students' on-task behavior, asking questions, sharing ideas, and self-regulation within a classroom context (Hafen, Hamre, Allen, et al., 2015); the teacher emotional support domain captures recognition of student effort and persistence, the teacher classroom organizational domain captures use of student collaboration and facilitation of adolescent self-regulation skills; and the teacher instructional support domain captures modeling and support of metacognitive inquiry and explicit reading comprehension instruction. To the extent Reading Apprenticeship leads to the kinds of changes in instruction hypothesized in the logic model, the student engagement measure would also capture impacts on students' willingness to perservere through complex work, engage in collaborative behavior, and use the reading and metacognitive strategies modeled by their teacher.

Exhibit 6. Domains and Elements of CLASS-S

Student Engagement	Teacher Emotional Support	Teacher Classroom Organization	Teacher Instructional Support
• On-task behavior • Participation and engagement with classroom activity	• Positive climate • Negative Climate • Teacher Sensitivity • Regard for Adolescent Perspective	• Behavior Management • Productivity • Instructional Learning Formats	• Content Understanding • Analysis and Problem Solving • Quality of Feedback • Instructional Dialogue

SRI researchers will complete the CLASS training program prior to baseline observations. Given the length of the study, SRI observers will also participate in follow up training and re-calibration before each round of data collection. Observers will double-score 15% of classrooms, allowing for calculations of inter-rater reliability within the analytic sample collected for impact analyses.

Methods of Evaluation to Provide Valid and Reliable Impact Estimates

SRI will estimate the impact of Reading Apprenticeship on **student outcomes using hierarchical linear models** to minimize the Type I error associated with nested models. SRI's planned confirmatory contrasts in academic achievement are the estimates of the impact of Reading Apprenticeship on student science and literacy achievement after two years of program implementation (i.e., for students in grade 8 in spring 2021, who experience the program in grade 9 and 10).[2] Assessment score for student i, in school district j as a function of j's assignment to treatment after two years of program implementation is given as

$$Y_{ij} = \beta_0 + \beta_1(Treatment_j) + (\overline{\boldsymbol{Baseline_i}})\boldsymbol{\beta_2} + \boldsymbol{\delta_j} + \eta_j + \rho_i.$$

Models will be run separately for impacts on literacy and science achievement. Random effects η_j and ρ_i allow for error at the district and student levels, respectively. Fixed block effects δ_j account for the blocked randomization. While randomization should account for all observable and unobservable differences between treatment and comparison groups, SRI will include a

vector of student controls, including demographic characteristics and available grade 8 achievement test scores in the aligned subject to improve precision of the estimates.[3] All control variables but the treatment indicator will be grand-mean centered. β_1 provides an estimate of the effect of student assignment to Reading Apprenticeship (the intent-to-treat effect). We estimate a Minimum Detectable Effect Sizes (MDES) of .16 in science and .17 in ELA.[4,5]Please see Appendix I-4 for details on all planned impact analyses, including: the full number of contrasts planned; models and power for impacts on other outcomes; models for impacts on student subgroups; models for mediation effects; and our strategy for multiple comparison corrections.

ENDNOTES

[1] SRI has written this proposal with the assumption that the study districts will be quite small: typically, one high school per district. The study sample may include some districts too large to randomize intact. In the instance a single district contributes four or more traditional high schools to the study, SRI's randomization blocks would use larger districts as a randomization block, randomizing high schools within that district. A similar approach was used for a prior i3 study, wherein some randomization blocks included teachers randomized within schools, and other randomization blocks included schools randomized against each other. In districts that are randomized intact, grade 8 rosters will be used in to establish the student sample. When randomizing schools within a district, SRI will use 9th grade enrollment during the first four weeks of school to establish the student sample, which still allows the study to meet What Works Clearinghouse design standards without reservations.

[2] Biology is typically taken by grade 10 students in North Carolina. SRI will include grade 10 students in the assigned sample who do not take biology as attrition. We will discuss science course-taking patterns with districts prior to randomization and determine if another solution (e.g., using rosters of student grade 9 science courses in fall 2021 to determine the analytic sample) would ensure a study with higher internal validity.

[3] SRI will also use these prior achievement scores to check for baseline equivalence between treatment and control groups in the analytic sample.

[4] Hedges & Hedberg, 2007. MDES is calculated using a two-level model, assuming the top-level N is 50 districts and an average of 120 tested students per school district. We use estimated ICCs and R^2s in reading including pre-test and demographic covariates for grade 10 in low-SES schools from Hedges & Hedberg (2007; for ELA, ICC=.05, ηB2=.16, ηW2=.47).

[5] MDES is calculated using a two-level model, assuming the top-level N is 50 rural school districts (low SES) and an average of 120 tested students per subject. We use estimated ICCs and R2s in reading including pre-test and demographic covariates for grade 9 science tests from Ye, 2013 (ICC=.12, ηB2=.74, ηW2=.12).

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