REFINING AND EXPANDING HEROES:
A LITERACY INTERVENTION FOR YOUNG STUDENTS WITH IEPS

PROJECT NARRATIVE

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## A. SIGNIFICANCE

### A1. HEROES's Contribution: Scalable and Effective Strategies for Young Students with Diagnosed Reading Disabilities.

Despite 50 years of research, little is known about how to teach reading to the smallest percentage of students who have the most severe difficulty learning to read (Gersten et. al, 2008). Developing an effective instructional format for struggling readers and then disseminating that knowledge has been described as "One of the most daunting and clearly defined current challenges for both researchers and practicing educators…" (Torgesen et al. 2001, p.33). This paucity of knowledge is reflected in the dismal numbers of school-age students with diagnosed specific learning disabilities; a staggering 2,339,866 last year (USDOE, 2018). Experts estimate that between 80-90% (or 2.1 million) students with an SLD have diagnosed reading disabilities (Fuchs & Fuchs, 2006; Shaywitz & Shaywitz, 2003); an alarming 13% of the entire US population of school age children.

Even more troubling is the fact that once placed in Special Education, very few students ever make enough progress to catch up and return to regular instruction. In fact, recent statistics show that in 2015-2016 just 9% of students placed in special education were transferred back to regular education; while 91% remained there (USDOE, 2018, p. 179). The lack of progress of so many children, nearly two million, is difficult to understand given that placement in special education ought to mean more intensive, specialized, and individualized instruction for students having the greatest difficulty learning to read. Yet, instead of making progress, students tend to remain in special education for the rest of their schooling; meanwhile the achievement gap continues to widen over the years (Denton, Vaughn & Fletcher, 2003).

For the last four years, with the support of an early-phase grant, we developed and tested a literacy intervention which we call HEROES (Helping Early Readers Obtain Excellence in Special Education) to better address the needs of students with diagnosed reading disabilities. The results of our four-year early-phase grant work were very positive. While testing and finalizing a lesson structure, we expanded from 15 special education teachers in three states during Year 1 to 117 special education teachers in four states in Year 4. This early scaling is notable given that educational innovations typically remain localized to a few schools or districts and rarely expand beyond them even if they are effective (Rodgers, 2016). Moreover, the external early-phase evaluation, which exceeded What Works Clearing House standards for moderate evidence, yielded a statistically significant effect for HEROES. Thus, with the successful completion of our early-phase grant work, we are now eager to begin a mid-phase project to refine and further scale HEROES in the US.

**A2. The Unmet Demand for HEROES**

**The Demand for HEROES.** The unmet demand for HEROES is evident in the growing number of students identified with reading disabilities and the paucity of interventions that work. As described, approximately 2.1 million school-aged children have diagnosed reading disabilities in the US. This figure is consistent with 2017 data which indicate that 13 percent of fourth grade students received special education services; a figure that has steadily increased since 1998 when only six percent of fourth grade students received such services (NAEP, 2017). The same percentage holds for English Language Learners (ELs); of the nearly five million students identified as EL, 14 percent received special education services in 2014 (McFarland et al., 2017). The size of the problem is a critical issue because of the severity of the consequences. Once young students fall behind in reading, the achievement gap between them and their higher achieving peers continues to widen over the years and they fall further behind (D'Agostino &

Rodgers, 2017; Denton, Vaughn & Fletcher, 2003). Furthermore, the cost of literacy failure extends beyond the individual to society. Fuchs and Fuchs (2006) estimate that it costs two to three times more to teach children with disabilities, and in New York City for example, that cost translates into 22 cents of every dollar spent on education (Fuchs & Fuchs, 2006).

**The Unmet Need**. One may conjecture that, given the fiscal resources allocated for special education in the country, there are plenty of effective interventions available to meet the needs of those two million students. The available evidence from WWC reports on interventions targeted for students with specific learning disabilities, however, reveals an unmet demand for interventions that work. The WWC has reviewed 12 interventions with the following three relevant terms, “Literacy”, “Students with a Specific learning Disability”, and “Grades 1-4.” Two of those 12 interventions actually were intended for different target populations; children and students with an intellectual disability, and children with or at risk for an emotional disturbance respectively. Of the 10 remaining interventions, three had no studies that met WWC standards, two others produced no discernible effects on any reading domain, and two targeted writing only and not reading, leaving three interventions with “potentially positive” effects on at least one dimension (see Table 1).

Note that two of the three programs in Table 1 had “potentially negative” effects in a domain, and only one of the three had studies with sample sizes greater than 100. Only PALS had “potentially positive” effects on all reported domains, but the extent of evidence was rather small—the available study did not find statistically positive effects in the reported domains. Moreover, two widely used and popular programs, Wilson Reading System and Orton-Gillingham, have no studies that meet WWC evidence standards. The conclusion from the review of WWC evidence is rather clear—there is a paucity of effective interventions backed with evidence to meet the needs of students with learning disabilities.

**Table 1**. WWC Interventions for Students with Specific Learning Disabilities

| Intervention | Outcome | Studies | Grades | Students | Effectiveness | Effect Size |
|---|---|---|---|---|---|---|
| Peer-assisted Learning Strategies | Comprehension | 2 | 2-6 | 60 | Potentially positive | .74 |
| | Reading Fluency | 2 | 2-6 | 60 | Potentially positive | .36 |
| Lindamood Phoneme Sequencing | Alphabetics | 1 | 4 | 50 | Potentially positive | .23 |
| | Comprehension | 1 | 4 | 50 | No discernible | - |
| | Reading Fluency | 1 | 4 | 50 | Potentially positive | .44 |
| | Writing achievement | 1 | 4 | 50 | Potentially negative | -.58 |
| Read Naturally | Alphabetics | 2 | 3 | 264 | No discernible | - |
| | Comprehension | 4 | 2-4 | 439 | Potentially negative | 0 |
| | Reading Achievement | 2 | 2-4 | 126 | Potentially positive | .23 |
| | Reading Fluency | 4 | 2-4 | 20 | Mixed effects | - |

Within this educational landscape, HEROES' contribution to understanding and scaling effective reading instructional strategies for students with diagnosed reading disabilities is even more pronounced and dramatic. The early-phase HEROES development project provided convincing evidence that HEROES can address the daunting challenge of developing an effective instructional format for struggling readers. This proposed mid-phase project can assure that the knowledge to design and deliver this effective intervention can be disseminated to other educators.

## B. PROJECT DESIGN

The overall goal of our project is to expand and refine HEROES. First, we describe the design of HEROES and then we describe our goals and objectives for expanding and refining the intervention during the mid-phase period.

**University hub-based professional development.** Figure 1 depicts the structure of the HEROES hub system. School-based HEROES coaches are affiliated with universities in an

adjunct role to offer two graduate courses to train special education teachers in HEROES. The model depicts the first year for a university training hub in HEROES; one coach working with one university to offer training to a cohort of one class of 12 teachers. In the following year, the coach provides ongoing professional development to the cohort of trained teachers, and concurrently begins training a second cohort. With the addition of a new coach (a formerly trained HEROES teacher) to the hub, another training cohort begins. This hub design allows for the exponential scaling of HEROES.

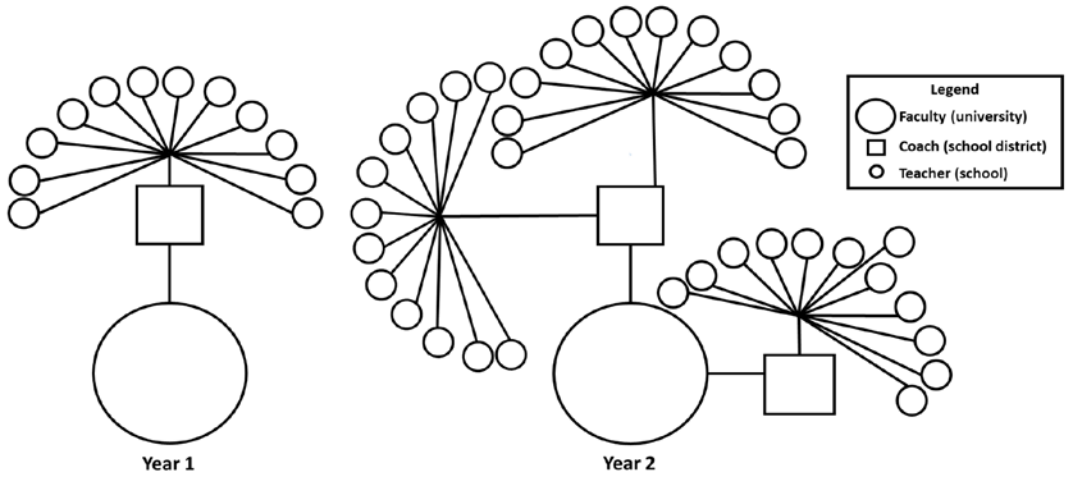


**Figure 1.** HEROES Hub Training Model

**HEROES's Instructional Format**. The university faculty at each hub collaborate to produce and refine common syllabi; already developed during the early-phase period. Teachers learn to use formative assessments, how to design and deliver instruction in fluency, and how to scaffold word solving during reading. Student lessons are offered one-to-one (one teacher and one student) at least 3 times a week for about 40 minutes.

Figure 2 shows the early-phase testing of HEROES lesson components; the last model at the top right shows the resulting lesson format that is ready now for mid-phase refinement. Note that the original HEROES design in Year 1 of early-phase work included writing messages with scaffolded teacher support however, because we found that more time spent on writing seemed

to be negatively correlated with progress on reading measures, we decided to drop the writing component in the last year of the early-phase work. Likewise, we found that more time spent on word work in isolation was negatively correlated with reading achievement, thus the model for mid-phase includes word-solving instruction while reading connected text.

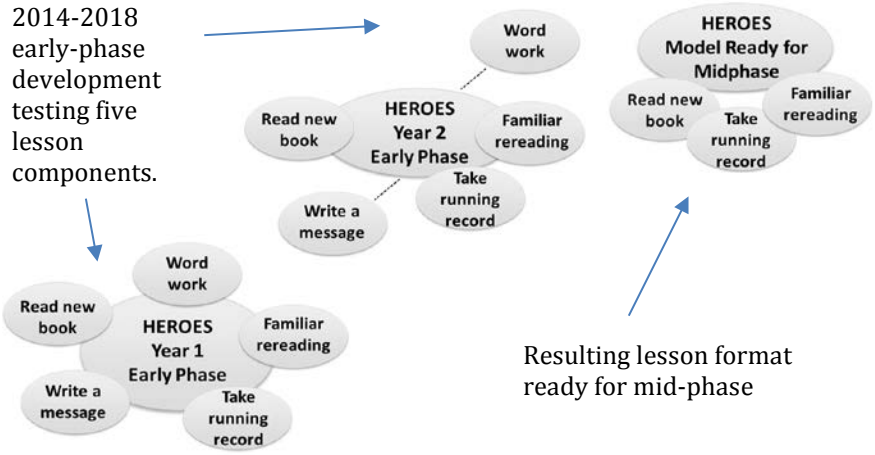


**Figure 2.** HEROES's Lesson Format Development: Early-phase to Ready for Mid-phase.

The mid-phase components and targeted skills are shown in Table 2. Each lesson includes a progress monitoring tool, Word Identification Fluency (WIF). Reliability and validity evidence are reported in Zumeta, Compton & Fuchs, 2012.

**Table 2**. Mid-phase Lesson Components and Targeted Skills Grouped by Activity Type

| Lesson Component | Targeted Skills |
|---|---|
| Activity: Reading Connected Text | |
| 1. Familiar rereading | Fluency, word recognition |
| 2. Read a new book | Scaffolded decoding skills and strategies |
| 3. Take a running record *Administer the Word Identification Fluency (WIF) measure | Formative assessment, obtain text level |

*The WIF is a progress monitoring tool which measures the number of high frequency words identified in one-minute.

## B1. HEROES's Goals, Objectives and Outcomes for the Mid-phase Period

Our four-year plan for the mid-phase of HEROES's development is guided by two major goals: to expand and refine HEROES.

**Goal 1: Expanding HEROES.** Our expansion work will be guided by three objectives (see Table 3). We will add a fourth university hub during the mid-phase (St. Mary's College) thereby increasing the number of districts, schools, teachers, and students that receive HEROES.

***Objective 1.*** During this mid-phase project, we expect to expand HEROES to 1,820 students over four training years, which averages 455 students per year, or nearly a 33% increase in project size (see Table 4). ***Objective 2.*** Over four years and four university training hubs, this mid-phase project will involve the training of 192 special education teachers, each offering HEROES to at least four students annually. Table 4 presents the number of active teachers and schools each project year, along with the number of students served by those teachers. Each of the four university training hubs will prepare 12 new teachers per year resulting in 48 total teachers per cohort. ***Objective 3.*** In Year 2, four coaches also will be trained to (1) ensure future scale up, (2) prepare the additional teachers, and (3) teach four students each (see Table 3). We learned from our early-phase work, that we can expect about 1.5 teachers per school, and an estimated annual teacher attrition rate of 10 percent (which matches national estimates). Thus, we expect each cohort to lose about four to five teachers annually, which is depicted across the rows in the table. HEROES will expand yearly as newly trained cohorts join continuing teachers in delivering the intervention. By Year 4, we anticipate that there will be 168 teachers in 112 schools in OH, SC, GA, TN, and CA offering the intervention, which will be in addition to the 92 currently active teachers who were trained during the early-phase project.

Refinement goals will be carried out either in the field in participating schools, or in a lab at Ohio State, depending on the nature of the work (see Table 5).

**Goal 2: Refining HEROES: Field-Based Refinement Activities.** The refinement activities conducted in the field in participating schools will focus on key implementation questions that arose during our prior funded work: increasing access to professional development, examining intervention impact as a function of lesson time per week, and studying the differential impact of teaching two students simultaneously versus the one-to-one model. The results from these activities will help fine-tune the efficiency of HEROES and make it a more powerful and flexible intervention, which will enhance scaling and sustainability. Besides sampling schools that will not partake in the external evaluation, the data collection and analysis design of the field-based studies will differ from the evaluation.

We will continue implementing the weekly log routine established during the early-phase project, in which teachers enter each student's text reading level (TRL) and word identification fluency (WIF) scores on a weekly basis into the online data system. From those scores, we develop each student's TRL and WIF intervention-long growth trajectories using hierarchical linear modeling (HLM). After assigning teachers to various experimental groups, we will compare the teachers' average student growth rates to determine effects. In Cohort 2 of mid-phase, we will examine the impact of distance training, followed by the study of time and teaching pairs of students in Cohorts 3 and 4 respectively.

**Table 3.** Expansion Goals, Objectives, and Outcomes for HEROES

| Goal | Objectives | Outcomes |
|---|---|---|
| 1. Expand HEROES | 1. Increase the number of students served by HEROES teachers. | At least 1,820 high needs students will be served: 192 in Year 1, 380 in Year 2, 576 in Year 3 and 672 in Year 4. |
| | 2. Increase the number of special education teachers trained in HEROES. | 192 additional special education teachers (48 each year) will be trained in HEROES. In Year 1, add St. Mary's University in CA to the existing cadre of 3 university partners that initially developed HEROES. |
| | 3. Increase the number of literacy coaches trained to offer HEROES. | In Year 2, four new literacy coaches will be prepared each year; one at each university partner site OH, SC, CA and GA. They will each offer training classes of 12 teachers in Year 3. |

***Objective 4: Training teachers at a distance.*** Currently our training model requires face-to-face professional development in two graduate courses across the school year. We think the model would be more efficient if we could deliver the same professional development by distance. This capability to train by distance would be especially beneficial for two key sub-populations that we are expanding to in the mid-phase: English Learners and students in rural communities. We are purposively expanding to California by introducing a new partner, Saint Mary's College, and beginning a partnership with Ohio Small Rural Collaborative (a consortium of over 36 small rural school districts in Ohio) to increase participation of both sub-populations.

**Table 4.** Teachers Trained per Cohort, Active per Year, and Students and Schools Served

| Teachers Recruited | Year 1 Active | Year 2 Active | Year 3 Active | Year 4 Active |
|---|---|---|---|---|
| Cohort 1: 48 | 48 | 43 | 39 | 35 |
| Cohort 2: 48 (plus 4 coaches) | | 52 | 47 | 42 |
| Cohort 3: 48 | | | 48 | 43 |
| Cohort 4: 48<br>Total recruited: 192 (plus 4 coaches) | | | | 48 |
| Total Active by Year | 48 | 95 | 134 | 168 |
| Students (1,820 total) | 192 | 380 | 576 | 672 |
| Schools (96 total new schools) | 32 | 163 | 89 | 112 |

We recognize that large concentrations of both sub-populations are situated miles from training hubs or are in hard-to-reach urban centers with major traffic problems. Consequently, sustained scale-up will entail creating and implementing a distance training model that reduces the amount of face-to-face time by moving at least half the training onto web-based platforms. We have developed and implemented hybrid training models successfully in other contexts, especially during our scale up grant, and will build and improve on that work during this project.

One key question that will arise, however, is whether teachers trained via distance are as effective as teachers trained in the conventional face-to-face model. It will not be possible to assign teachers randomly to training modes because the type of training received will depend on need. Thus, we will conduct a quasi-experimental design by controlling for baseline measures.

Our hypothesis is that this type of training will have little to no effect on student progress; hence, we expect to find no negative consequence with training via distance.

***Objective 5: Finding the optimal time that maximizes student learning*.** We found during our early-phase project that both lesson time and number of lessons per week for each student were good predictors of their text reading and word-identification growth rates. The analyses, however, was based on natural variation among the students, so it is difficult to determine the causal role time and number of lessons play in determining effects. In the mid-phase project, we will conduct a more rigorous analysis of time by randomly assigning teachers to various conditions based on number of lessons and time per lesson. We will use the text reading and word-identification growth rates as the key outcome measures. We assume diminished returns on time—there likely will be a number of lessons and minutes per week that leads to our established learning rates that define student success (one text level and one new WIF word every two weeks), and adding more lessons and time past those points likely will result in smaller increments of growth. We seek to identify that tipping point.

***Objective 6: Testing the value-added of paired instruction*.** Some teachers reported that it was difficult to find time to work one-to-one with students. Though prior research has revealed that one-to-one produces the largest effect, we realize the need to examine the "value-lost" of teaching students in pairs. In Cohort 4 of mid-phase, we will randomly assign the continuing teachers to either teach 1-1 or 1-2 to compare the differential effects. Teaching in pairs is expected to produce smaller effects, but if the effect remains impressive, it likely will be offset by reaching more students and having greater likelihood of staying power in schools.

**Goal 3: Refining HEROES: Lab-Based Refinement Activities.** To continuously improve HEROES, we have established a Reading Lab at OSU where we serve Columbus-area students after school and during the summer. We test various instructional features using a

SMART design method where participants are given a certain treatment condition, and if students meet our one test level and one new WIF word every two weeks growth objectives after a month, we continue with the treatment, and if they do not, we alter the treatment. Using the SMART design, we will test three key instructional approaches that we hypothesize can maximize HEROES effectiveness.

**Table 5.** Refinement Goals, Objectives, and Outcomes for HEROES

| Goal | Objectives | Outcomes |
|---|---|---|
| 2. Refine HEROES: Field-Based Inquiry | 4. Test HEROES' face-to face-teacher training method against a hybrid model that includes distance learning. | Teacher training will be offered as a hybrid model if effect sizes on the two outcomes measures are at least .30. |
| | 5. Identify the optimal number of lessons per week and the time per lesson. | HEROES will be refined to the smallest number of weekly lessons and time per lesson that achieves a .30 effect. |
| | 6. Test HEROES' 1-1 instructional setting against 1:2. | HEROES will be refined to be a 1:2 intervention if effect sizes on the two outcomes measures are at least .30. |
| 3. Refine HEROES: Lab-Based Inquiry | 7. Test a gradient of text level difficulty for introducing new challenging books | Teachers will increase text level gradient if we find one associated with one text level and one new WIF word every two weeks. |
| | 8. Test instructional procedures for fluent and phrased reading. | Teachers will change instructional procedures for fluent and phrased reading if we find procedures that lead to one text level and one new WIF word every two weeks. |
| | 9. Test if the addition of writing in the lesson framework increases HEROES' effect. | Lesson framework will be refined to include writing component if we find it leads to significantly greater text level and WIF gains. |

O***bjective 7: Finding the best text level gradient.*** We learned during our early-phase project that some teachers followed a slow schedule of introducing successively more difficult books while other teachers challenged students more by increasing the pace of the text gradient. We found that a 91 percent accuracy was a dividing line between children who made substantial progress and those who did not, suggesting that many children would have benefited more if their teachers increased the pace of introducing more challenging books. Yet those studies were

correlational, and suggestive at best. We will assign children randomly to book level gradient conditions from slower to faster to identify the most optimal gradient under certain conditions.

***Objective 8: Fluency and comprehension.*** There is a good deal of research on the positive relationship between fluency and comprehension, so it is possible that following a steeper book level gradient could compromise comprehension. We will test this in our lab by studying the relationship between fluency and comprehension, and develop instructional methods that encourage students to read more fluently.

***Objective 9: Re-examine writing.*** Follow-up analysis informed us that writing may have negatively predicted student growth because teachers were not prepared properly to teach it. Thus, we have decided to reconsider the role of writing by randomly assigning students to a writing or non-writing condition, and explore the forms of writing instruction that lead to the greatest impact.

**B2. Underlying Conceptual Framework for the Research**

Undergirding our conceptual framework are these 5 key inputs: (1) an intervention's design should go beyond creating a lesson format, but should also include a mechanism for scaling, (2) professional development can make a difference to instruction, (3) evidence-based reading instruction is critical, (4) ongoing data collection for formative assessment is necessary for instructional decision-making, and finally, (5) any educational innovation, no matter how successful, ought to be constantly scrutinized, refined and enhanced.

HEROES provides special education teachers with advanced training in reading assessment and evidence-based instruction; expertise that most special education teachers do not possess even though they work with students most in need of expert reading instruction (Vaughn et al., 2002). HEROES also provides students with truly individualized instruction: one teacher and one student. This is a revolutionary idea for special education in that most instruction is not

individualized and not delivered by an expert in reading problems. Instead, reading instruction is carried out in small groups or, when it is one-to-one, the expert other is a peer (as in Peers Assisted Learning, PALS) or a computer (as in Read Naturally).

HEROES provides students with evidence-based reading instruction: each lesson includes instruction in fluent reading to increase automaticity and support comprehension (Baker et al. 2008; Hudson et al. 2009), and teacher-scaffolded support to recognize and decode unfamiliar words while reading connected text (Tunmer & Nicholson, 2011). Fluency, word solving, and reading connected text are just the kinds of instructional ingredients that special education experts have argued for but are rarely present in special education settings (Kucan & Palinscar, 2011) where reading instruction has been characterized as typically low quality (Vaughn et al., 2002). Teachers will also administer a running record each lesson (an assessment of oral reading behaviors) (Clay, 2001) and the Word Identification Fluency measure (WIF; Zumeta, Compton & Fuchs, 2012) to monitor progress. These formative data will be stored and available to teachers on-demand in the form of charts and grids for their analysis and planning.

Although the lesson components are the same for each lesson, the lessons are not scripted, and teachers will learn how to scaffold students to read increasingly more complex text using a scaffolding approach described in Rodgers et al. (2016). HEROES will provide sustained teacher education in the form of two graduate courses taught by expert literacy coaches using a common syllabi based in four university sites, ongoing progress monitoring of students and teacher progress, and teaching key reading skills that are supported by strong theory.

Finally, our work is informed by the notion of an “evidence-practice” loop (Peurach & Glazer, 2016) in that we include a deliberate approach to refine and improve the intervention as may be seen in our plan to carry out ongoing lab- and field-based research to further refine the

lesson components and intervention design. Appendix H contains the logic model for the HEROES intervention.

## C. STRATEGY TO SCALE

### C1. Strategies to Address Barriers to Scale

The ultimate purpose of our mid-phase project will be to address the barriers to scale that we identified during the early-phase project. Appendix I contains our model that will guide HEROES scale up, which consists of three general scaling strategies; (1) expanding the number of states, districts, schools, teachers, and students reached by the HEROES, (2) identifying and monitoring student and teacher progress, and (3) continually improving the intervention. Next, we discuss specific barriers and our strategies to address them.

**Barrier: Educational innovations, Even Effective Ones, Rarely Scale.**

**Strategy: A Hub-Based Training Network Will Address Capacity to Scale.** As we know, scaling is difficult work; most educational innovations, even effective ones, never expand beyond the few school districts where they were initially developed (Rodgers, 2016). A university hub-based training model means that with each university added to the network, multiple school districts, schools and teachers join as well. In the mid-phase, we have a four-part strategy to capitalize on the hub-design in order to scale.

(1). We strategically add St. Mary's College to the HEROES's network. Professor Adria Klein at St. Mary's has extensive experience recruiting and sustaining district partnerships. St. Mary's location in the Bay Area of CA situates them near districts with large concentrations of EL students with reading IEPs, which is a target population we wish to reach. Klein has developed coaching partnerships with them and with school districts in western and central states. Partnering with St Mary's provides HEROES immediate entree to districts with a more varied population than we currently have in Ohio, Georgia, South Carolina, and Tennessee.

(2). The three existing university hubs have committed to recruiting two new districts (or one larger district) each year to reach the goal of preparing twelve new HEROES teachers each year. For example, OSU has established a partnership with the Ohio Small Rural Collaborative, which is a network of 36 hard-to-reach districts in rural Ohio. Thus, over the four recruitment years, each hub will have established six to eight district partnerships, at least 18 in all.

(3). By the end of the grant period, we will have established a royalty-free license through OSU's licensing office to use HEROES. The royalty-free license will be granted to new university hubs provided they agree to meet established standards of fidelity: teaching 1-1, using the lesson components, providing two graduate courses to special education teachers in training, training HEROES's coaches to do the training, and joining the HEROES's university network. Universities and faculty will be attracted to the idea of establishing HEROES's Learning Centers because they will bring teachers interested in graduate level training and improving practice.

(4). Currently our training model requires face-to-face professional development in two graduate courses across the school year. We think the model would be more efficient if we could deliver the same professional development by distance using hybrid-training models to reach more districts. This capability to train by distance would be especially beneficial for two key sub-populations that we are expanding to in the mid-phase: English Learners and students in rural communities. D'Agostino and Rodgers, director and co-director, developed and implemented hybrid-training models, specifically during our expansion grant (2010-2014).

**Barrier: Teacher Attrition Impedes Scaling.**

**Strategy: Attrition is Expected and Incorporated in to our Scaling Plans.**

We learned from early-phase HEROES that annual attrition should be expected and projected. According to national statistics, 9% of teachers leave the profession each year for

personal or professional reasons a statistic that we also found in early-phase HEROES, thus we have built into our mid-phase goals a ten percent yearly attrition rate.

A second reason for attrition from early-phase HEROES had to do with an administrator at the school level making a decision to change a teacher's caseload such that the teacher no longer had time in the schedule to teach HEROES students. To address this kind of attrition, we will request that a school or district administrator sign an MOU in the spring before the teacher's training year agreeing to allow the teacher to participate in the grant for the entire four years of the project. Students will be assigned to teachers in May and then, in August when the school year begins and schedules begin to change with new students enrolling, we will work closely at the school level to advocate for the teacher to keep the caseload as planned in spring.

**Barrier: Practical Constraints Make it Challenging to Refine Educational Innovations.**

**Strategy: Refinement Work Will be Carried Out in Field and Lab Settings.**

We realized during the early-phase project that attempting to improve the intervention was extremely difficult to accomplish in schools. Isolating effective components requires maximum levels of fidelity and ensuring that teachers follow a strict protocol, which they found hard to do given schedule conflicts and other school factors outside of their control. To address this barrier, and as we described in the Design section of this proposal, we will conduct three field-based and three lab-based studies that have been informed by identified barriers in our early-phase project.

**Barrier: Scaling and Increasing Size Makes Continuous Improvement Challenging.**

**Strategy: Deepen Resources and Strengthen Communication**

Scaling is much more likely in programs that maintain a persistent quest for getting better, as opposed to programs that insist on the status quo and are resistant to change. Intervention improvement begins with increasing the capacity of teachers to implement the

intervention with fidelity, but to uphold a growth mindset by embracing self-improvement. We will enhance teacher development by deepening our base of teacher resources that we will make accessible through an online web portal. The portal will contain instructional and assessment resources, including videos of expert teaching on each instructional component, and samples of how to develop an instructional approach given student strengths and weaknesses gleaned from diagnostic testing. Teachers also will be able to share successful methods with other teachers.

Programs that scale are successful at developing teachers who have a strong sense of identity with and ownership of the intervention; and increasing size and distance can impeded this sense of community. The online resource center will be a start towards achieving teacher identification and buy-in, but to ensure participation, we will integrate cross-district and ongoing communication between teachers and with the project leadership team. Training will involve scheduled and frequent teleconference calls between teachers and university leadership to review student progress, discuss fidelity, and communicate recent updates to the intervention that will be informed by field- and lab-based studies.

We also will improve ongoing communication and feedback with teachers on students' progress and evidence-based modifications to the intervention. The early-phase project provided the opportunity to build an online data entry and student tracking system, but we did not have an establish mechanism in place to foster teachers use of the data. We will provide on line training for teachers that includes preparation on data entry, interpretations of the graphical output, and instructional methods to increase student progress based on graphical output.

**Barrier: Ineligible Students May be Selected for the Intervention.**

**Strategy: Clearly Articulate Eligibility Criteria**

Fidelity begins at the point of contact with students, and we learned during our early-phase project that identifying eligible students is critical to ensure program effectiveness and

districts impression of the interventions role in improving achievement. We will address this issue by more clearly articulating eligibility criteria in the memo of understanding (MOU) that school administrators sign to participate in the project: Students: (1) have an IEP for reading; (2) are between the ages of 6-9; (3) may be labeled learning disabled (reading) or reading disabled (depending on state policy regarding labels); (4) are reading text levels lower than a first grade level; (5) may be scoring at the Preprimer, primer levels on word identification tasks; (6) may have a handicapping condition (ADHD, speech/language, other health impairment); (7) are not cognitively delayed; and (8) do not have an emotional disorder (see Appendix J).

Communicating the criteria to administrators will not be sufficient to ensure that we reach targeted students. We will enhance our online portal to require teachers to enroll students. They will enter the information on the criteria, and we will verify with the teacher that selected students are indeed eligible to receive services.

**C2. Increasing Efficiency and Improving Productivity**

The cornerstone of the HEROES mid-phase project will be fine-tuning the intervention and making it a more efficient and productive intervention, which will enhance expansion and sustainability. We will improve efficiency and maximize the intervention's impact through three key activities: (1) field-based tweaks to the intervention, (2) lab-based studies designed to increase the effect, and (3) conduct yearly cost-effectiveness analyses to examine costs related to benefits over time.

**Field-and Lab-based Work Increase Efficiency and Productivity.** The reason we need field- and lab-based work (described in the Design section) is that some practices need to be tested within the school context for which the program is situated, while other practices are best tested in a laboratory setting under tighter control. Thus, we are modeling our HEROES

innovation after successful business ventures, which concurrently test ideas in-house as well as in the field.

The mission of our scale up activities is to improve efficiency in terms of time, staffing, money, and other resources and at the same time increase the effectiveness of HEROES. Much of the resource consumption is in our intensive professional development. Coaches and teachers travel weekly to a central location for weekly meetings, which amounts to additional travel and staffing time, especially in rural and traffic-congested urban areas. We will develop a distance training module as part of our field-based efforts, (described previously in the Design section) to cut costs, increase accessibility, and reduce travel time.

Our other two field-based goals, finding the optimal amount of instructional time and examining the intervention impact in a paired instructional format (see the design section for a fuller description), are geared toward making HEROES a more nimble intervention that can fit more efficiently into the caseloads of special education teachers. Teachers may not need to work with each eligible child three days a week for two hours total—we may find the same effect with less time on task. We also may find that allowing teachers to work with two children at a time can lead to similar effects with double the time savings.

The activities are anticipated to make HEROES a leaner intervention, but we not only do not want to compromise effects, we want to increase HEROES's impact. Our lab-based studies (described in the design section) are designed to reach that goal by identifying those instructional components and approaches that lead to the best payoff, and thus, increase the productivity of a school's special education program. Ultimately, HEROES serves to increase efficiency and productivity. If special education specialists become more powerful reading teachers, they will be more likely to move children off of reading IEPs, which will lessen their already burdened

caseloads and decrease the amount of money spent on keeping the students in special education over several school years.

**Cost-Effectiveness Analysis Will Provide External Feedback**. The effects of the refinement activities will be evaluated by conducting yearly cost-effectiveness studies. Dr. Robert Shand, an expert in the area, will conduct the analyses using the ingredients method of cost analysis (Levin et al., 2017) in order to fully document the economic cost of the program in resource utilization or opportunity cost terms. Data on the amount and characteristics of personnel, facilities, materials and equipment will be collected, as well as other resources required to produce the measured effect of the program, in order to fully capture what is needed to replicate the program in other settings. The survey and coach rating data on implementation will be used to analyze variability in program implementation, resource usage, and effectiveness across sites, as well as to establish treatment contrast by comparing the costs of the intervention to the costs of the business as usual condition in an incremental cost analysis.

Costs will be paired with incremental estimates of effectiveness to estimate a cost-effectiveness ratio of the program, or cost per standard deviation increase in the outcome measure. Ingredients will then be paired with national average market prices based upon nationally representative surveys, such as the National Compensation Survey by the Bureau of Labor Statistics, to obtain a representative and generalizable estimate of total and per-student program costs.

## D. RESOURCES AND MANAGEMENT PLAN

### D1. The Management Plan

The management plan is designed so that key activities are linked to specific project goals and objectives. Individuals are assigned to tasks based on clearly-defined roles to fulfill the project aims. Tasks, timelines, and milestones linked to project goals are specified in Table 6.

Project members will have primary lines of communication, which are depicted in Figure 3, in order to operate in an efficient manner. Besides overseeing the yearly refinement and R&D activities, they along with the Program Manager, will manage the budget and review and approve all university partner expenses. D'Agostino will be the main line of communication with the evaluators, while Rodgers will be the key contact with the university partners to ensure expansion and implementation fidelity. She also will work closely with the Ohio districts that implement HEROES. While the university partners coordinate and oversee the district coaches (who are district staff), the coaches train and monitor the teachers. Abt will coordinate with the International Data Evaluation Center (IDEC) to collect and manage the evaluation data and share it with Dr. Shand (cost-effectiveness analyst).

**D2. Capacity to Bring the Project to Scale**

The Director (D'Agostino) and co-Director (Rodgers) have managed and directed a five-year i3 expansion program and a four-year i3 early phase project. Both projects yielded statistically and meaningful effects, and met program goals within budget. The i3 scale up external evaluation, which was coordinated by Dr. D'Agostino (working with the external evaluation team to execute the study) is one of the largest, if not the largest, educational randomized control trails in history. Drs. Rodgers, Bates, Duncan, and Klein all have extensive experience recruiting and working with school districts, as well as preparing reading coaches. They all are nationally and internationally known experts on the reading process and teacher professional development. Along with Dr. D'Agostino, they all have collaborated productively over the last ten years. All four universities (OSU, Clemson, Georgia State, and St. Mary's) have committed sufficient resources to carry out the work. Each university has an extant reading training center to prepare coaches for the project, and each training center has ongoing

collaborative arrangements with school districts to recruit special education teachers. Recruited districts also provide resources: training space and supplies, as well as time for teacher training.

**Table 6.** Project Timeline with Activities and Accompanying Objectives and Goals.

| Timeline | | Goal | Milestones | Responsible |
|---|---|---|---|---|
| 2019 | Oct – Dec. | Refine | Establish online data collection for the internal refinement studies | D'Agostino |
| | | Evaluate | Plan the external evaluation | D'Agostino, Abt |
| 2020 | Jan - June | Expand | Recruit teachers; establish training class sites in CA, GE, OH and SC | Rodgers, D'Agostino |
| | | Refine | Refine syllabi to include distance training in rural sites | Rodgers, Trainers |
| | July - Dec | Expand | First teacher cohort begins training (*n* = 48) | Coaches |
| | | Evaluate | Finalize external evaluation | Abt |
| 2021 | Jan – June | Expand | First teacher cohort completes training (*n* = 48) | Rodgers, Trainers |
| | July - Dec | Expand | First teacher cohort begins ongoing professional development (*n* =48) | Rodgers, Trainers, Coaches |
| | | Expand | Second teacher cohort begins training (*n* = 48) | Coaches |
| | | Expand | Coaches begin training (n=4) | Rodgers, Trainers |
| | | Refine | Distance training study begins | D'Agostino, Rodgers |
| 2022 | Jan – June | Expand | Second cohort of teachers completes training (*n* = 48) | Coaches |
| | | Expand | First teacher cohort continues professional development (*n* = 48) | Rodgers, Trainers, Coaches |
| | | Expand | Coaches complete training (n=4) | Rodgers, Trainers |
| | | Refine | Distance training study concludes | D'Agostino, Rodgers |
| | | Evaluate | Ongoing evaluation | Abt |
| | July - Dec | Expand | Third teacher cohort begins training (*n* = 48) | Coaches |
| | | Expand | Cohorts 1 and 2 in professional development (n=96) | Rodgers, Trainers |
| | | Refine | Time study begins | D'Agostino, Rodgers |
| | | Evaluate | Ongoing evaluation | Abt |
| 2023 | Jan – June | Expand | Third cohort of teachers completes training (*n* = 48) | Coaches |
| | | Expand | Cohorts 1 and 2 continue professional development (n=96) | Rodgers, Trainers |

| | | | | |
|---|---|---|---|---|
| | | Refine | Time study concludes | D'Agostino, Rodgers |
| | July - Dec | Expand | Fourth cohort of teachers begins training ($n$ = 48) | Coaches |
| | | Expand | Cohorts 1, 2 and 3 participate in professional development (n=144) | Rodgers, Trainers |
| | | Refine | 1-2 study begins | D'Agostino, Rodgers |
| | | Evaluate | Ongoing evaluation | Abt |
| 2024 | Jan – June | Expand | Fourth cohort of teachers completes training ($n$ = 48) | Coaches |
| | | Expand | Cohorts 1, 2 and 3 participate in professional development (n=144) | Rodgers, Trainers |
| | | Refine | 1-2 study concludes | D'Agostino, Rodgers |
| | | Evaluate | Ongoing evaluation | Abt |
| | July – Oct. | Evaluate | External evaluation completed | Abt |
| | | Refine | Lesson framework refined; intervention enhanced and scaled | D'Agostino, Rodgers |
| | | Refine | Final reports completed<br>Dissemination of findings<br>Plan for future scale-up<br>Subcontracts and budgets finalized | D'Agostino, Rodgers |

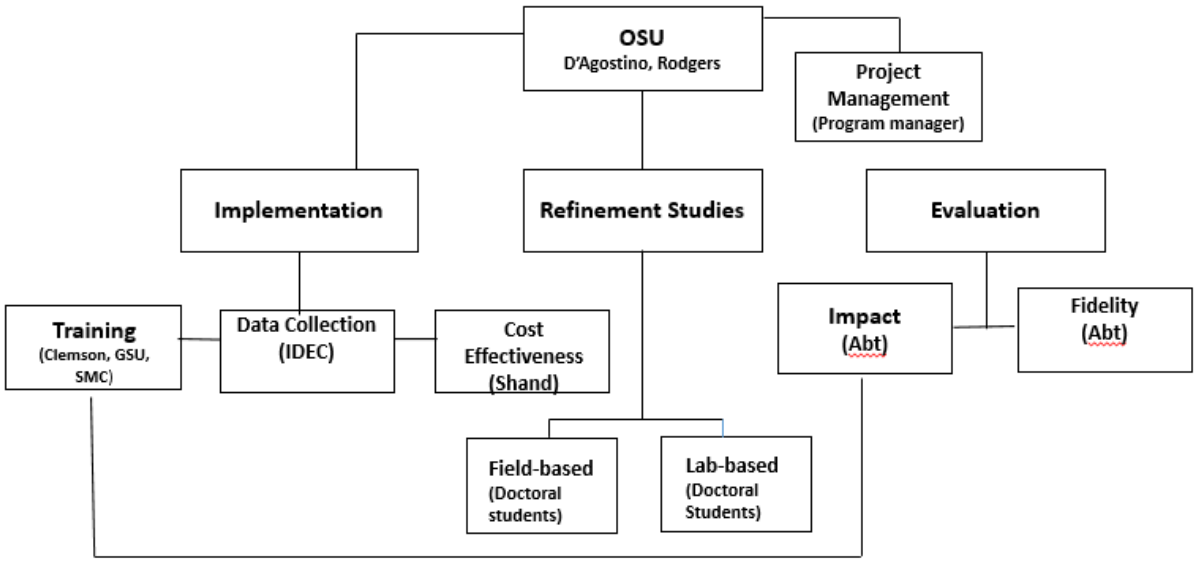


**Figure 3.** Organizational Chart

**D3. Potential for Continued Support**

HEROES will continue after the grant period because the design itself incorporates mechanisms to grow and sustain it; HEROES is not dependent on grant funding to sustain. At the end of the grant period, faculty in the HEROES's hub network will develop implementation standards together and a royalty-free license and trademark will be created at Ohio State. Royalty-free licenses will be issued annually to universities in the hub provided standards are maintained. (The co-director has experience with creating royalty-free licenses.) In the future, new universities will complete a free application process to join the hub and agree to follow the implementation standards. We anticipate that faculty in the university-hub network will annually set a research agenda, review progress and carry out the research activities as part of their faculty responsibilities at their universities. Any research findings will inform the implementation standards that will be created for HEROES post-grant. Current university deans have included in their letters of support a stated commitment to sustaining HEROES after the grant; and there are built-in incentives to do so. The faculty will be directors of HEROES's training centers where they will carry out training for school districts and be engaged with research about HEROES.

The districts have invested in the training of coaches, who typically are respected members of the districts. Part of their training is learning how to advocate locally for continuation and support for the intervention. By including district personnel into the administrative system of the intervention, and preparing them for advocacy, we increase the likelihood of sustainability, even in the face of ever-changing district personnel. There is no cost to a district to provide HEROES's ongoing professional development if the cost is in the district. HEROES's teachers provide ready supply for future HEROES's coaches, a role they can take on with faculty support at their affiliated university. We also have established a ten-year partnership with five book publishers, including large suppliers McGraw-Hill and Pearson. All have

consistently demonstrated commitment to continue providing teacher and student books at reduced costs for HEROES. We also have developed long-term support with private donors who have expressed interest in continued funding beyond the grant period, and faculty at their respective universities have interested donors.

As part of the project, we will enhance our teacher professional community by more systematically sharing resources, and opening up more productive lines of communication between trainers, coaches, and teachers. Doing so will lower teacher attrition and facilitate a greater sense of ownership and identity with the intervention, which will increase the sustainability capacity of HEROES. And as HEROES becomes more effective, districts will value the intervention more and be more likely to support it long term through changing district administrations.

**D4. Reasonable Costs in Relation to the Objectives, Design, & Significance**

Excluding the cost of the evaluation, over 70 percent of the budget goes directly to schools and teachers in the form of professional books, non-consumable teaching supplies (books for students, white board, magnetic letters), tuition for graduate credit, and a small fee per teacher for ongoing professional development ($[redacted] per year per teacher). These are all one-time expenses related to the start-up year. The teaching materials can be used with all students and have a long shelf life. The $[redacted] earmarked to purchase little books for reading from a range of publishers will assure that each teacher has a set of about 300 books to choose from for each lesson.

As such, the administrative overhead is minimal. The books are a one-time cost and can be used with all students. The two graduate courses that comprise the training are an investment in human capital. Indeed, teachers reported in our early-phase interviews that they used the strategies with other students not in HEROES. Thus, the cost per pupil decreases considerably

after the training year, most costs are one-time costs; the only cost going forward is for teachers outside their coach's district to pay for ongoing professional development. There is no PD cost for teachers who are in their coach's school district.

## E. PROJECT EVALUTION PLAN

### E1. Meeting WWC Standards

The independent evaluator, Abt, will test HEROES in a study including 90 schools (45 treatment and 45 control), 8 school districts across multiple regions, to establish the effectiveness of the intervention implemented at a broad scale. The research questions are in Table 7.

**Table 7.** Research Questions for the Evaluation of HEROES

| | |
|---|---|
| **Impacts on Student Outcomes** | |
| RQ1 | What is the impact of one year of exposure to HEROES on the reading performance of special education students ages 6 – 9 years with diagnosed reading disabilities? |
| RQ2 | What is the impact of one year of exposure to HEROES on the IEP status of special education students ages 6 – 9 years with diagnosed reading disabilities? |
| RQ3 | What is the impact of HEROES on the IEP status of special education students ages 6 – 9 years with diagnosed reading disabilities after one year of exposure to HEROES and at one or two years follow-up? |
| RQ4 | Does the impact of HEROES on reading achievement and IEP status vary as a function of student characteristics, such as type of IEP, gender, age/grade, economic disadvantage? |
| **Impacts on Instruction** | |
| RQ5 | What is the impact of HEROES on the reading instruction of special education teachers? |
| **Fidelity of Implementation of HEROES** | |
| RQ6 | To what extent does the grantee provide the professional development and coaching supports to HEROES special education teachers as designed? To what extent do special education teachers participate in the HEROES professional development and coaching? |
| RQ7 | Is the level of fidelity of implementation of HEROES similar for the special education teachers in the current study, when the intervention is being implemented at a broader scale, compared to fidelity under more controlled conditions in prior research? |
| **Fidelity, Instruction and Student Outcomes** | |
| RQ8 | What is the relationship between teachers' participation in the HEROES professional development and support and the extent to which their reading instruction uses the HEROES model? |
| RQ9 | What is the relationship between the extent to which teachers implement HEROES reading instruction as-designed and the amount of improvement students make in their reading performance? |
| **Effectiveness of Scale-up Strategies** | |
| RQ10 | To what extent were the scale-up strategies that were implemented effective at meeting the project scale-up goals? |

We will conduct a blocked cluster RCT with school-level random assignment within districts to test the effectiveness of HEROES. Within eight districts, Abt Associates will randomly assign 90 schools to HEROES or to business as usual, over three cohorts (30 schools randomized in 2021-22, 30 in 2022-23 and 30 in 2023-24). In HEROES schools, all eligible students will receive the intervention, and in control schools, special education students with reading IEPs will receive the business-as-usual reading instruction. The proposed evaluation design has the potential to produce ***strong evidence of the effectiveness of HEROES*.** The cluster RCT, if well-implemented, has the potential to **meet *WWC standards without reservations*.** The analysis sample for the impact study includes, across treatment and control conditions, 90 schools, 135 special education teachers, and 720 elementary students ages 6 to 9 years with diagnosed reading disabilities. This sample will satisfy the requirements for a large (includes more than 350 students) and multi-site (multiple districts, with multiple schools and teachers in each district) sample, as laid out in the expectations for EIR mid-phase evaluations.

**Power Analysis.** Power was calculated for the comparisons between students in HEROES schools and those in control schools using the power equations for a blocked cluster randomized design (Dong & Maynard, 2013). With 90 schools, and an average of 1.5 special education teachers and six students per school, an assumed between-school (level 2) variance of .15, power of .80, alpha level of .05, and a two-tailed test, we estimate the study has power to detect a minimum effect of .228 standard deviations as statistically significant (see Appendix K). For the outcomes measured at the end of one year, we assume lower cluster and individual attrition. For impacts measured one or two years after the end of the student's receipt of HEROES, we assume up to 15% student attrition. If this level of attrition is encountered, the power calculations indicate that the study will still be able to detect a small effect size of .24 standard deviations.

**E2. Guidance about Effective Strategies**

The evaluation will also examine questions about the feasibility and affordability of scale-up of the HEROES program. This study will measure the extent to which HEROES is implemented with fidelity to the model in different district and school contexts (district/school size, urban/city, proportion of disadvantaged students, district achievement; special education practices in district). The study will calculate the costs of HEROES, which will be paired with estimates of effectiveness to estimate a cost-effectiveness ratio of the program, or cost per standard deviation increase in the outcome measure. Ingredients will then be paired with national average market prices based upon nationally representative surveys, such as the National Compensation Survey by the Bureau of Labor Statistics, to obtain a representative and generalizable estimate of total and per-student program costs. This study is also expected to inform the grantee about the kind of infrastructure that will be needed for scale-up at a more national level and the challenges/barriers that will need to be addressed. The evaluation will examine the success of the scale up in terms of fidelity and cost, barriers or challenges that were encountered, and lessons learned about strategies to support broader scale-up in the future.

**E3. Valid and Reliable Student Outcomes**

The key student outcomes are reading achievement and IEP status. Reading performance at the end of the intervention will be assessed with two standardized measures that produce scores on different reading skills (Table 8). These standardized measures meet WWC outcome standards for reliability and validity (WWC, 2017). The reading tests will be individually administered to students at baseline (fall 2021, 2022 or 2023), before students receive HEROES or business as usual, and again at the end of the school year. Reading baseline measures are important for two reasons: they will improve the precision of the impact estimates and they will ensure if high attrition occurs, the study will have the potential to meet WWC standards with

reservations and thereby produce *moderate evidence*. Per WWC standards, we will establish baseline equivalence for all measures in the same domain, if one measure has a difference from .05 and .25, we will include baseline covariates in analyses of all measures in that domain.

For the measure of IEP status, the WWC does not provide guidance on an acceptable relevant baseline measure for assessing equivalence if the study has high attrition. For other educational indicators without natural baselines, the WWC requires equivalence to be assessed on a combination of measures, including a baseline measure of achievement and multiple measures of student demographics, data which the proposed study will be collecting. Data will be entered by field staff into an online portal system that is tailored to the SORT-R and OSELA measures. The inter-rater reliability of the instructional observation rubric that was used in the HEROES early-phase evaluation measure will be assessed during the pilot period, ensuring that the measure meets WWC reliability standards. One reading lesson delivered by all special education teachers in treatment and control schools will be observed twice a year. The assessments and observations will be conducted by graduate students hired, trained, and supervised by Abt.

**Approach to Statistical Analysis of Impacts.** Our main impact analysis estimates the effect of instruction by a HEROES-trained special education teacher versus a control teacher using an intent-to-treat analysis. The model employs a two-level regression model with school level random intercepts to account for the clustering of students within schools (see Appendix L for technical details about the analytic models). In addition, to improve the precision of the impact estimate, the model will adjust for blocking by district and for baseline student covariates (fall reading scores and other student demographics). Finally, we will conduct descriptive analyses of implementation fidelity data and exploratory analyses of the relationship of fidelity of implementation of the HEROES intervention and student outcomes.

**Table 8.** Study Measures for Student Outcomes

| Domain: Reading Achievement | Measure | Reliability | Timing of Outcome Data | Baseline Measure |
|---|---|---|---|---|
| • Sight vocabulary<br>• Reading grade equivalence | The Slosson Oral Reading Test – Revised (SORT-R) 3rd Edition [study-administered] | Kuder–Richardson 21 (internal consistency) for ages 6 to 7 = .98 (Schwartz, 2005). | Spring 2021, 2022, 2023, for three cohorts (1 year post-RA; 1 year of exposure) | Fall 2021, 2022, 2023, for three cohorts |
| • Early Literacy (Total)<br>• Letter Identification<br>• Writing Vocabulary<br>• Word Reading<br>• Concepts About Print<br>• Hearing Recording Sounds in Words<br>• Text Reading Level | Observation of Early Literacy Achievement (OSELA; Clay 2013) [study-administered] | Cronbach's alpha<br>LI = .85<br>WR = .92<br>COP = .78<br>TRL = .86<br>Test-retest<br>WV = .97 | | |
| • IEP status | District records | In WWC, standard educational indicators are assumed to meet reliability and validity standards | End of intervention, one or two years follow-up, depending on cohort) | No relevant baseline measure |

**E4. Components, Mediators, and Outcomes.**

The evaluation will assess the fidelity of HEROES implementation using a fidelity measure developed and used in the prior HEROES study (see Appendix M). The fidelity measurement focuses on the three key components in the HEROES logic model: (1) training of special education teachers, (2) student instruction, and (3) coaching of teachers. Implementation data will be collected for all four cohorts. This fidelity measure includes quantifiable indicators for each of the key components and establishes thresholds for the levels of implementation of these indicators that represent fidelity to the model. Fidelity of implementation will be measured for all treatment schools. The expected HEROES instructional practices will be observed in-person in both treatment and control schools.

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