Using Intensive Interventions to Improve Mathematics Skills of Students With Disabilities

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Absolute Priority 3—Improving Academic Outcomes for Students With Disabilities

The proposed project addresses the Department of Education’s Investing in Innovation and Improvement Development Grant Program’s absolute priority three subpart A by implementing and evaluating a coherent system of support using the data-based individualization (DBI) approach to providing intensive intervention in mathematics to appropriately coordinate and integrate programs to address the needs of students with disabilities (SWDs) and improve the quality of service for these students and their families. DBI integrates assessment and intervention to design individualized, responsive intervention for students with severe and persistent learning needs. Specifically, the project will coordinate and integrate system supports to (1) address students’ individual needs, (2) strengthen mathematics instruction, (3) increase mathematics achievement among students with severe and persistent learning needs, particularly SWDs, and (4) improve the quality of special education programs for students and families. We will use a cohort-design randomized-control trial (RCT) to evaluate impact on mathematics achievement among elementary school SWDs, as well as other students with severe and persistent mathematics learning needs. In addition, we will evaluate the impact of training and support on DBI implementation quality, schoolwide multitiered systems of support (MTSS), and family collaboration.

Significance

To help address the need to improve mathematics achievement among SWDs, American Institutes for Research (AIR), the nonprofit organization managing the National Center on Intensive Intervention (NCII), and the Franklin Pierce Schools (FPS)¹ near Tacoma, Washington, which is recognized for its commitment to effective special education and response to intervention (RTI), will partner to improve mathematics achievement for SWDs and other

¹ see Appendix G for Memorandum of Understanding
students with severe, persistent learning needs. NCII’s process of DBI applied to mathematics will be combined with implementation support that includes proactive family collaboration.

**National Need.** The 2013 National Assessment of Educational Progress (NAEP) results revealed that a mere 18 percent of SWDs met or exceeded proficiency targets in mathematics at fourth grade, compared to 45 percent of students without disabilities; for eighth graders, these numbers dropped to 8 and 39 percent, respectively (NCES, 2013a). These achievement trends for SWDs have been persistently low since the late 1990s, despite the fact that the general student population has made steady progress during that time. SWDs also fail to graduate at twice the rate of their peers and are more than twice as likely to be arrested by early adulthood (Stetser & Stillwell, 2014; Sanford et al., 2011). Taken together, these data suggest schoolwide efforts to improve outcomes for all students may be insufficient for SWDs. In this era of high standards for all, and given the Office of Special Education Programs’ (OSEP) recent shift to results driven accountability (OSEP, 2012) in its monitoring and oversight, SWDs need access to more intensive interventions, and schools must be equipped to provide them.

Recent research suggests that intervention can be successful at improving achievement for many, but not all, at-risk learners (e.g., Connor, Alberto, Compton, & O’Connor, 2014; Fuchs et al., 2005; Fuchs et al., 2008). Reviews of intervention responsiveness data indicate that even when programs are successful overall, they may not yield an effect for about 20 percent of the at-risk learners, many of whom have disabilities. This percentage corresponds to roughly 3 percent to 5 percent of the total student population (NCII, 2013a). One potential explanation for this trend is that “at-risk” designations in intervention studies often are based on teacher judgment, demographic factors, or achievement cut scores as high as the 40th percentile (NCII, 2013b). Also, many of these students do not have disabilities. This creates a large achievement range and
introduces the possibility that intervention may not be consistently effective across the achievement continuum. That is, it is possible—and even likely given differences in typical and at-risk students’ growth trajectories (Zumeta, Compton, & Fuchs, 2012)—that an at-risk student who has achievement at the 30th or 40th percentile has markedly different instructional needs than a student with achievement below the 10th percentile. Review of the NCII’s Intervention Tools Chart (NCII, 2013b) showed most studies do not report disaggregated response data by achievement level. Thus, intensity of intervention required to facilitate progress for students with very low achievement, including SWDs, warrants further study. DBI, the approach we propose here, is a systematic process for intensifying intervention to meet individual needs.

**DBI.** DBI is a framework for intensifying intervention in which systematic student-level assessment data are used to determine when and how a student’s intervention should be modified (NCII, 2013a). DBI often is implemented within an MTSS framework such as RTI to support students for whom core instruction (i.e., Tier 1) and secondary intervention (i.e., Tier 2) have been insufficient to facilitate adequate progress.

DBI may supplement or supplant Tier 1 and 2 supports depending on student need and may be applied to a specific skill area. That is, a student may master numeracy through core instruction and achieve computational fluency with secondary intervention, but require DBI to improve problem-solving skills. Alternatively, a student with global math difficulties may require DBI in all areas. Powell and Stecker (2014) provided a useful illustration of this process applied to math. We will focus on math because MTSS is less widely implemented in math than in reading, particularly at the intensive level (NCII, 2013d). Also, there is a more limited body of evidence-based intervention and assessment materials in math compared to reading (e.g., Gersten et al., 2009; NCII 2013b; NCII 2013c), contributing novelty and innovation to the project.

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2 We refer to RTI and MTSS interchangeably in the remaining text.
DBI includes five iterative steps (see Figure 1). The process initiates when data show a student is not responding to a secondary intervention (e.g., Tier 2 or other remediation program) implemented with fidelity. First, program intensity is increased (e.g., more time). Next, valid reliable progress monitoring data (i.e., curriculum-based measurement, CBM) determine response to the intensified program. Third, diagnostic assessment identifies skill deficits of nonresponsive students to allow teachers to develop a hypothesis about potentially effective intervention changes. Fourth, the data are used by interventionists, in consultation with others, to adapt the program to meet observed needs. Fifth, progress monitoring identifies if and when more adaptations should occur.

Figure 1. DBI Process (NCII, 2013a)

Evidence of Promise. Research tells us that students who have intensive needs benefit from more practice and different instructional approaches to learn new information. In fact, these students require up to 10–30 times more practice than their peers do to acquire new reading and mathematics skills (Fuchs et al., 2008; Gersten et al., 2008). In other words, standard teaching
techniques are simply not enough. Educators must organize their time to maximize students’ learning opportunities, including focused instruction and engaging, varied practice. Furthermore, they must regularly evaluate their efforts to determine whether the current program is working. Two meta-analyses found that providing teachers with ongoing student performance data, an important component of DBI, strengthens the effects of mathematics instruction (Baker, Gersten, & Lee, 2002; Gersten et al., 2009). Importantly, a review by Stecker, Fuchs, and Fuchs (2005) noted that frequent progress monitoring with curriculum-based measurement (CBM) is not enough, by itself, to improve student achievement. Instead, progress monitoring must be combined with systematic rules for using data to make decisions, analysis of students’ skills, and guidance on making appropriate program modifications.

The DBI process combines these strategies, and evidence suggests it is a promising approach. Research using components similar to DBI demonstrated positive effects on student reading achievement and teachers’ instructional decision making (Capizzi & Fuchs, 2005; Deno & Mirkin, 1977; Fuchs, Deno, & Mirkin, 1984; Fuchs, Fuchs, & Hamlett, 1989a; Vaughn, Wanzek, Murray, & Roberts, 2012; Wanzek et al., 2013). In addition, Fuchs, Fuchs, Hamlett, and Stecker (1991) showed in an RCT that implementing a process with elements included in DBI (e.g., progress monitoring with CBM, support for data-driven instructional changes) could improve mathematics operations skills for SWDs in Grades 2–8 with chronic low achievement (see Appendix D for a review of the design and evidence). In this random assignment study, teachers in a control group were asked to use their standard procedures for monitoring progress and adjusting instruction. Two treatment groups used CBM to monitor progress for 20 weeks. A computer program assisted teachers with setting goals, automatically graphed student progress, analyzed skills, and prompted teachers to modify the student’s program according to decision
rules. One treatment group adjusted instruction independently. The second treatment group received expert consultation, consisting of guidance from the computer program on problem types to teach and instructional strategies. Both treatment groups revised student programs more frequently than the control group, but only the group receiving instructional consultation showed improved student achievement (effect sizes were .84 for problems and .94 for digits, compared to the control group). A difference between the treatment groups was also observed in the higher average weekly CBM slopes for the consultation group (.70) compared to the CBM-only group (.49), an effect size of 1.11.

Furthermore, Fuchs, Fuchs, and Hamlett (1989b) (see Appendix D) found when teachers increased CBM goals when data warranted, the result was increased student math achievement, compared to controls. In a related way, Stecker and Fuchs (2000) found that SWDs who received individualized instruction based on their own CBM data evidenced greater mathematics operations improvement than matched pairs whose instructional adjustments were not based on their own data. Such data-driven individualization data is fundamental to DBI.

This body of promising research, combined with the persistently low achievement of SWDs, underscore the need for educators to use data to plan individualized programs that employ evidence-based strategies to address students’ unique needs and provide multiple and varied opportunities for practice with feedback. However, while there is evidence for these strategies, they have not been studied in combination as laid out in the proposed project. This innovative project would enlarge the current evidence base by (1) evaluating the impact on mathematics achievement in the context of the Common Core State Standards and MTSS, and (2) including a focus on implementation that includes family collaboration to support development of an intensive intervention model that may be widely disseminated in real schools.
Innovative and Structured Implementation Supports. As noted, this project will include a focus on implementation, which contributes to both its novelty and significance by investigating how to ensure high-quality intervention and assessment practices make their way into real schools. Thus, this project will not only include training on technical elements of DBI but will also provide structured implementation support to improve the mathematics achievement of elementary SWDs and others with intensive mathematics learning needs. The focus on implementation adds to the novelty and innovation of the project because special education is rife with efficacious research that is not implemented, reducing potential positive impact for students (Flay et al., 2005; McInerney, Zumeta, Gandhi, & Gersten, 2014).

Furthermore, research has shown that variation in delivery affects a program’s outcomes (Dusenbury, Brannigan, Falco, & Hansen, 2003; Ialongo et al., 1999). For example, Hulleman and Cordray (2009) compared the implementation of a motivation intervention in two settings, the laboratory and classroom, and found it was implemented with higher fidelity and evidenced a larger effect in the laboratory. Similar findings were observed for mathematics interventions. Both Fuchs et al. (2005) and Rolfhus et al. (2012) implemented Number Rockets as a supplemental intervention for first graders, with the former being an efficacy study and the latter an effectiveness study. Rolfhus et al. (2012) reported that their study had lower fidelity than the original Fuchs et al. study and, further, that this contributed to a lower intervention effect.

Taken together, these findings underscore the notion that training in knowledge and skills alone is unlikely to change student outcomes. Thus, we believe the explicit emphasis on implementation will be crucial to the success of DBI in this project. Given the importance of fidelity of implementation to a program’s impact on student outcomes, the NCII developed a
DBI fidelity rubric\(^3\) and interview process to assess implementation in sites receiving intensive technical assistance. This rubric was piloted in 13 schools in spring 2014. Initial analyses of these interviews indicated that schools’ mean implementation rating across items was 2.93 on a 5-point scale, indicating initial but inconsistent DBI implementation. Interviews showed that although many schools have added to their knowledge and skills about DBI, systemic barriers, such as lack of leadership support and access to appropriate assessment tools as well as poor integration of general and special education programs, have impeded implementation at some sites. In addition, less than half of interviewed schools implemented DBI in mathematics. These observations suggest that schools may require more focused implementation support for sustained DBI implementation in math to occur, contributing to the rationale for this project.

As we describe later, a fundamental component of our implementation supports will be increasing family involvement. The DBI implementation rubric described previously included an item on family involvement and feedback from the interview sample indicated that communication and collaboration with families is an area where nearly all school teams lacked consistent processes (\(M = 2.46\)). At the same time, when NCII (2013d) interviewed stakeholders from five districts nationally that reported high achievement for SWDs, a major theme was that meaningful family involvement in intervention planning and decision making was key to success. Thus, the proposed project will embed specific supports to enhance family collaboration during the implementation process.

Importantly, our subgrant partner (FPS) has identified mathematics intervention as an academic area where they need additional support throughout elementary schools in the district. FPS has been actively developing and implementing RTI structures for at least 10 years, which makes it an excellent candidate for the project because it will allow for supports to focus on

\(^3\) See Appendix J.
students with intensive needs (rather than issues at lower tiers). The components of universal screening, multilevel prevention systems, progress monitoring, and data-based decision making are implanted in all schools to varying levels of implementation fidelity. Table 1 lists several of FPS’ accomplishments, and district leaders attribute these successes to implementation of RTI.

**Table 1. FPS Achievements Since RTI and MTSS Implementation**

<table>
<thead>
<tr>
<th>School</th>
<th>Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brookdale Elementary</td>
<td>High Progress in Mathematics</td>
</tr>
<tr>
<td>Central Avenue Elementary</td>
<td>English Language Acquisition; Four Time School of Distinction</td>
</tr>
<tr>
<td>Christensen Elementary</td>
<td>Reading and Mathematics Growth; English Language Acquisition</td>
</tr>
<tr>
<td>Elmhurst Elementary</td>
<td>English Language Acquisition</td>
</tr>
<tr>
<td>James Sales Elementary</td>
<td>School of Distinction</td>
</tr>
<tr>
<td>Harvard Elementary</td>
<td>School of Distinction</td>
</tr>
<tr>
<td>Franklin Pierce High School</td>
<td>High Progress</td>
</tr>
</tbody>
</table>

FPS, like most districts implementing RTI systems, has students who receive special education services but do not respond sufficiently to program supports. These students continue to receive special education services, but progress is very slow. FPS is very interested in participating in this grant to learn how to provide intensive interventions to students with identified disabilities who do not respond to existing interventions. FPS further anticipates that students with other significant learning problems may also benefit because the DBI approach will help staff better understand what can be done to intensify intervention for all students. Ultimately, FPS believes the skills and knowledge that staff will obtain will help all teachers work with students in all three tiers. Also, they are willing to share their learning and train staff in other districts throughout the state.

Finally, FPS also has prior experience participating in federal training and evaluation projects, including the *Evaluation of Response to Intervention Practices for Elementary School*.
Reading study and as a partner with the University of Washington Tacoma in an OSEP 325T grant supporting teacher preparation. This experience makes the district well positioned to understand the time commitment and requirements of the current project and evaluation.

In summary, although evidence supports various components of the DBI process, this innovative project will contribute to the field by studying their impact, in combination, on additional areas of mathematics achievement. Although we will focus on the outcomes of SWDs with intensive needs in mathematics, we will also look for broader impacts, such as changes in special education and intensive intervention practices (e.g., related to family involvement, general RTI processes) and impact on mathematics outcomes or instruction for students without disabilities who have intensive learning needs. Furthermore, this project will focus on implementation by teachers in typical schools, investigating the supports needed to achieve high-quality implementation. Upon project completion, we hope to have developed a model of training and structured implementation support for DBI that not only improves mathematics achievement, but can also be readily disseminated and replicated in other sites nationally.

**Project Design**

The primary objective of the proposed project is to implement and evaluate a program of intensive intervention that increases mathematics achievement among SWDs and other students with intensive learning needs who have not responded to prior intervention or special education, and that improves special education program quality in mathematics for SWDs and their families. The project has five goals: (1) provide readiness assessments and staff training that enhances knowledge, skill, and ability to implement DBI to support SWDs and other at-risk students who require intensive intervention support in mathematics; (2) support installation of DBI components; (3) promote collaboration with families with regard to DBI; (4) conduct
formative evaluation to understand implementation barriers and devise solutions; (5) evaluate project implementation and impact on mathematics achievement and special education quality.

This project has four sets of activities to accomplish its objective and goals: (1) implementation of readiness activities and training to develop educators’ knowledge and skills about DBI, (2) structured support for implementation of DBI, (3) collaboration with families regarding DBI processes, and (4) independent evaluation of project implementation and impact on students’ mathematics achievement. As Figure 5 in the Evaluation section depicts, implementation will occur across two cohorts to facilitate random assignment for evaluation, with four elementary schools per cohort.

DBI implementation will occur during three school years (2015–16, 2016–17, and 2017–18). January to September 2015 will be used for project planning and Cohort 1 readiness activities. The project will be implemented with intervention teams of general and special educators who work with SWDs and other at-risk students in the eight elementary schools (grades K-5) in FPS, an urban school district near Tacoma, Washington. FPS serves a diverse student population, with 28 different languages spoken in the district, 73 percent of students receiving free or reduced price lunch, and 12.3 percent SWDs. The district’s population of SWDs falls in the range of the national average of 13 percent (NCES, 2013b) and given the existing RTI procedures in the district noted previously, we are confident this prevalence rate is an accurate estimate of SWDs in the district. Due to the focus of this project, we anticipate specifically working with the SWDs who have intensive mathematics learning needs.

**Activity One: Readiness Activities.** This activity will address school readiness and critical implementation features that need to be present to support successful DBI. As an added benefit, these readiness activities will help ensure that all students, both with and without disabilities,
receive proper screening and referral to intervention when needed. This benefit extends potential project impact to include all students in the schools, approximately 3500 students, despite the primary focus on intensive intervention for SWDs. During the initial months of Project Year 1, school readiness in Cohort 1 will be evaluated using a needs assessment and readiness training module. The needs assessment, which will occur prior to initial training, will determine the school’s current resources and practices in mathematics instruction, intervention, assessment, and data-based decision making. Cohort 2 will receive readiness support during Project Year 2.

The readiness phase will present and discuss a series of “nonnegotiables” or critical implementation features, which include (1) school leaders and administration commitment and involvement, (2) development of school-based teams who hold regular, ongoing meetings, (3) involvement of SWDs in intensive interventions, (4) progress monitoring using a valid and reliable tool, (5) documented, student-focused plans, and (6) willingness to collect outcome data. Our knowledge of these critical features has emerged from initial work on implementation of DBI. The features are expressly related to extending staff skills beyond a level of “know-how” to a greater depth of understanding of the necessary systems and structures that must be in place to support DBI implementation. A needs assessment and subsequent training focused on identified features of implementation will aim to address the schools’ specific needs in building systems to support DBI. Training sessions will occur one or two times monthly on a schedule that works for school and district staff. Most training will occur in the first implementation year, although additional training may occur in the second year as needed.

As indicated in the project logic model (see Figure 2), school and district readiness will lead directly into a cycle of building successful processes to support DBI, understanding the knowledge and skills needed to monitor progress and adapt instruction, and actual DBI

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4 See Appendix G for a district memorandum of understanding and letters of support from all building principals.
implementation. These activities will occur in a cyclic fashion with formative evaluation efforts at their core. Ongoing staff training in the three main implementation focus areas (processes, knowledge and skills, and DBI) will occur as well as periodic “pulse checks” to note how districts are progressing throughout the school year. The information gleaned from the pulse checks and staff training activities will inform and drive Year 2 training, which will be targeted to meet specific sites’ needs. Outcomes of these processes are outlined as a direct result of the cycle of implementation activities and include results at the student (e.g., increased mathematics achievement), the teacher (e.g., increased teacher capacity for implementation), and the school levels (e.g., comprehensive implementation of RTI and MTSS across tiers, improved communication with parents regarding the DBI process). Additional specifics about outcomes can be found within the description of activities two and three.

**Figure 2. Project Logic Model**
Activity Two: Supporting DBI Implementation. Knowledge of the DBI process alone is unlikely to result in significant changes in school practice or student mathematics outcomes. Thus, we propose a package of on-site and distance intensive implementation supports, guided by a needs assessment, which addresses DBI knowledge and skills, initial installation, and development of the policies and structures needed to facilitate sustained implementation. As our project logic model indicates (see Figure 2), we believe that these implementation supports, combined with teachers’ DBI knowledge and skill, will facilitate improved special education program quality and mathematics achievement for SWDs.

Guidance will focus on providing schools with the resources needed to use DBI and will emphasize critical implementation features. School-based teams will be expected to meet regularly and focus their efforts on a target group of students in need of the most intensive levels of intervention in mathematics. Because preliminary RTI structures are in place in FPS, teams will begin developing student plans during the first year of DBI implementation. School intervention teams will be expected to have documented, student-focused plans for at least five students per school during implementation Year 1, with intentions to add at least five additional students during implementation Year 2 (i.e., at least 10 students per school across eight schools; 80 total students\(^5\)). Supports for team data-based decision making may include refining progress monitoring systems in mathematics, creating meeting formats, identifying strategies, and formatively evaluating fidelity. When needed, we will support the purchase of a validated progress monitoring tool (e.g., CBM with software) and training on its administration, graphing, and analysis. On-site coaching support may include meeting facilitation, feedback on implementation, or data review.

\(^5\) This number of students per school is consistent with the values reported in the power analysis in Figure 6 of the Evaluation section.
Activity Three: Supporting Families. We value family involvement in all arenas of the educational process and believe that proactive communication and collaboration with families plays a critical role in the success of SWDs and other at-risk students. Starting during DBI implementation Year 1 (for each cohort, respectively) and continuing throughout implementation, educators in FPS will receive support in increasing the involvement and skill level of parents who have students requiring intensive intervention in mathematics. This support will focus on communicating about DBI to families, collaborating to help them support interventions at home, and in guiding both parents and teachers to further develop relationships that foster the growth of students receiving intensive intervention. This guidance will include training on how to present data, update progress, set ambitious goals, and include parents in planning. It also will include information briefs designed for parents and sample meeting and communication documents. Materials will be developed in collaboration with OSEP’s National Center on Parent Information and Resources\textsuperscript{6} and will consider the diversity of FPS families.

Following installation, schools’ DBI implementation will be assessed using the rubric described previously. This formative evaluation will serve as the centerpiece of the implementation cycle (processes, knowledge and skills, and DBI) and will allow us to identify remaining areas of need (e.g., scheduling intervention) and barriers to sustained implementation (e.g., poor communication among stakeholders).

Management Plan

As one of the largest applied behavioral and social science research consulting firms, AIR has extensive experience managing technical assistance, research, and evaluation projects that connect research and practice with the goal of improving outcomes for all students, particularly SWDs. NCII is one of approximately 12 national centers that AIR has successfully managed for

\textsuperscript{6} See Appendix G for letter of support from Director Debra Jennings.
the U.S. Department of Education. Notable complex tasks include (1) providing expert consultation and professional development to local education agencies and state education agencies; (2) designing and disseminating research-based training modules; and (3) conducting train-the-trainer workshops, webinars, and other seminars both in-person and online. AIR’s successful management of these centers demonstrates our expertise in managing complex, growing projects comparable to the proposed project. We describe several of these and other AIR projects and note evidence of impact (e.g., increased student achievement) in Appendix C.

**Personnel**

AIR is pleased to propose an experienced team of highly skilled project staff. Figure 3 summarizes the project management structure, including key leadership.

**Figure 3. Project Management Chart**

![Project Management Chart](image)

, principal investigator, will have overall project oversight and fiscal accountability. He will devote 10 percent time in Years 1–4. has decades of experience managing and overseeing large special education research and technical assistance
projects, as the former director of the Research to Practice Division of OSEP, the current director of OSEP’s NCII, and principal investigator of the Institute for Education Sciences grant, Enhancing Accessibility for Students with Disabilities in Large-Scale Reading Assessments.

[Name], the project director, will oversee daily management of all aspects of the project, including fiscal oversight. She will devote 38 percent time in Years 1–4. [Name] brings extensive experience managing and directing large, complex, and rapidly growing projects, including two federally funded national technical assistance centers. As the deputy director of NCII, [Name] manages a team of more than 40 internal staff and external consultants and oversees all centerwide activities, including technical assistance planning, implementation, and product development. [Name] advises on all NCII activities, including evaluation, strategic planning, knowledge development, marketing, budget, and staffing. She previously coordinated technical assistance for the National Center on Response to Intervention (2011–13) and currently directs the service line for AIR’s Center on Response to Intervention. She oversees the budget and strategic plans for the Center while providing oversight on training materials and products while developing the knowledge and skills of existing Center staff. [Name] experiences managing technical assistance for a variety of stakeholders including state, district, and school staff and her research background in mathematics intervention and assessment while at Vanderbilt University underscore her qualifications as project director.

[Name], implementation coordinator, will oversee the planning and provision of implementation support to participating districts. She will devote 22 percent time in Year 1, and 27 percent in Years 2–4. [Name] has more than 20 years of experience in education, training, technical assistance, and coordinating implementation efforts related to SWDs. She currently leads the Vermont Universal Design for Learning (UDL) project, overseeing training,
technical assistance, and implementation of UDL as a Tier 1 approach in the state of Vermont. Previously, served as task leader for technical assistance on two OSEP-funded projects, The Access Center: Improving Outcomes for All Students K–8 and the NCII, providing oversight for all technical assistance activities and coordinating implementation of evidence-based practices at the state and local level.

, product development coordinator, will oversee the development of products and materials to be used for training and coaching. She will devote 27 percent time in Year 1, and 22 percent in Years 2–4. has experience leading the development of products designed to help educators meet the needs of students with intensive academic and behavioral needs through her work with OSEP’s NCII and the Collaboration for Effective Educator Development, Accountability, and Reform Center.

, product specialist, will support product development, contributing her expertise in effective instruction for English language learners (ELLs), given the large number of languages (28) spoken in FPS. She will devote 10 percent time throughout the project. Prior to AIR, managed research projects, developed curriculum, and facilitated professional development at the Center for Applied Linguistics and University of Maryland.

, quality reviewer, will conduct a final quality review of all products and implementation support materials and plans. brings a depth of experience managing reviews of evidence-based interventions and assessment tools and serving as project director and lead of numerous special education studies and projects, including OSEP’s NCII and National Center on Response to Intervention.

A research assistant will support and senior staff in carrying out the day-to-day tasks of this project and will devote 33 percent time throughout the project.
**Subgrant Partner: Franklin Pierce Schools**

[Name] will serve as the subgrant coordinator for FPS. [Name] has worked at FPS for 15 years and is the executive director of Learning Support Services, including special education, Title I, learning assistance program, ELL, Section 504, health services, and Head Start. Prior to FPS, [Name] worked for the Seattle Public Schools, the Sumner School District, and the White River School District, all in Washington state. He also has been a special education consultant at an Iowa area education agency and a special education teacher in Illinois. [Name] serves on the Washington State Safety Net Oversight Committee and teaches instructional leadership in the Expanding Capacity for Special Education Leadership program at the University of Washington-Bothell.

FPS is located in unincorporated Pierce County adjacent to Tacoma, Washington, and consists of both of urban and suburban settings (see Table 2 for demographics). It serves 7,437 students in eight elementary schools, two middle schools, two comprehensive high schools, and alternative programs. All eight elementary schools are Title I schoolwide programs, and the district has a mobility rate of approximately 30 percent. FPS has the highest percentage of students receiving free or reduced-price lunch in Pierce County, and in three elementary schools, more than 90 percent of students are eligible for free or reduced price lunch.

**Table 2. Franklin Pierce Schools Demographics**

<table>
<thead>
<tr>
<th>Race or ethnicity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subsidized lunch</td>
<td>72%</td>
</tr>
<tr>
<td>Special education</td>
<td>12.3%</td>
</tr>
<tr>
<td>ELL</td>
<td>9%</td>
</tr>
<tr>
<td>Number of languages</td>
<td>28</td>
</tr>
<tr>
<td>White</td>
<td>41.6%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>22.4%</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>12.1%</td>
</tr>
<tr>
<td>African American</td>
<td>10.9%</td>
</tr>
<tr>
<td>American Indian/Alaska Native</td>
<td>0.8%</td>
</tr>
<tr>
<td>Two or more races</td>
<td>12.3%</td>
</tr>
</tbody>
</table>
Consultants and Advisors

AIR is pleased to work with several consultants and advisors with nationally recognized expertise in DBI and evaluation. As indicated in Figure 3, [Name] of Vanderbilt University and [Name] of the University of Texas at Austin will serve as senior advisors to the project on issues related to training content and evaluation. In addition, all of the training consultants noted in the management chart have relevant expertise in elements of DBI (e.g., CBM progress monitoring, mathematics intervention, implementation) and will be available to provide training and support to FPS. [Name], the director of OSEP’s National Center on Parent Information and Resources, will provide consultation on training, information, and evaluation materials targeting families. Appendix G includes letters of support from these individuals, and Appendix F includes their curriculum vitae. Finally, senior special education leaders, [Name], provided support letters (see Appendix G) and agreed to serve in an advisory capacity as needed.

[Name], who will lead the project evaluation, is a senior research associate at the Regional Educational Laboratory Southeast and the director of research at the Florida Center for Reading Research. He has published more than 100 peer-reviewed articles, book chapters, and technical reports. [Name] specializes in applied quantitative methods in literacy research and has served as principal investigator or co-principal investigator on 15 federal and state grants and contracts. He is the recipient of the Rebecca Sandak Young Investigator Award from the Society for the Scientific Study of Reading, the Dina Feitelson Research Award from the International Reading Association, and an Article of the Year award from the journal *Assessment for Effective Intervention*. [Name] presently serves on several editorial boards,
including *Journal of Educational Psychology*, *Journal of Research on Educational Effectiveness*, *Annals of Dyslexia*, and *International Journal of Behavioral Development*.

**Resources to Complete the Work**

AIR’s management structure will provide with five tools for efficient management.

1. **Project Timeline.** will closely monitor the project timeline to ensure all milestones are achieved.

2. **Communication.** will regularly discuss project progress with the project officer using an annual kick-off meeting and monthly conference calls. also will meet weekly with staff and at least monthly with the evaluator and subgrant manager at FPS through conference calls.

3. **Subcontracts and Consultants.** Subcontractor *teaming agreements* and consultant *personal services contracts* will specify what work is to be done, by when, and at what cost. AIR closely monitors and retains responsibility for the quality of outside work.

4. **Employment.** AIR is committed to a diverse workforce and does not discriminate in its hiring practices on the basis of race, color, national origin, sex, age, disability, religion, pregnancy, Vietnam-era veteran status, or any other basis prohibited by law.

5. **Performance Management System (PMS).** will use a three-part PMS system: (1) **Staff management.** AIR’s *Corporate Project Planning and Reporting System tool* compares projected and used staff hours per month. (2) **Cost control.** AIR’s *Costpoint Accounting System* monitors monthly and cumulative costs by task, comparing spending to budgeted amounts. During management meetings, will review these staff and cost data and adjust future projections as needed to meet timeline and
budget goals. (3) Quality control. All products will undergo a three-level review. Coordinators monitor development, the director reviews drafts, and AIR senior managers conduct final review.

In sum, we believe that this proven management structure and tools will ensure that our project has effective leadership and efficient access to an experienced team of professionals to ensure that all project work is completed as proposed with quality, on time, and within budget.

Project Evaluation.

will evaluate logic model outcomes (see Figure 4), including impact on student mathematics achievement, DBI and RTI implementation in math, and parent satisfaction. The project evaluation will involve three activities to address these questions:

1. What is the impact of DBI implementation on the mathematics achievement of SWDs and other students with severe and persistent mathematics learning needs?
2. Does DBI implementation fidelity (e.g., assessment, intervention, data use practices, and supportive policies) improve with sustained training and coaching support?
3. Does DBI implementation impact RTI quality at other tiers (e.g., Tier 1, Tier 2)?
4. Does parent satisfaction with special education or other remediation services improve as a result of DBI implementation?

Figure 4. Proposed Logic Model to Evaluate Project Impact
Design and Analysis

The effectiveness of the DBI implementation will be evaluated using a delayed-intervention design. By randomly assigning the eight schools to one of two cohorts (i.e., immediate intervention or delayed intervention), it is possible to use data from the three years of DBI to compare different components of the DBI development. Figure 5 provides an organizer of how DBI would be implemented in each cohort across project years to facilitate evaluation. The eight schools will be assigned to one of the two cohorts based on a randomized block design, where the blocking variable will be a function of a priori defined strata of free or reduced lunch eligibility, percentage black, white, and Hispanic students, and percentage of students who are identified as ELLs. Four groups of two schools each (N = 8) will be created, and one school within each block will be randomly assigned to Cohort 1 and the other to Cohort 2.

This design allows us to make three primary comparisons: (1) a comparison between DBI Year 1 in Cohort 1 and No DBI in Cohort 2; (2) a comparison between DBI Year 2 in Cohort 1 and No DBI in Cohort 2, and (3) a comparison between DBI Year 3 (i.e., the follow-up) and No DBI in Cohort 2. The flexibility of this design also allows us to evaluate exploratory questions such as the extent to which the two cohorts may differ at the same phase of DBI (e.g., DBI Phase 1: Cohort 1, Year 1 with Cohort 2, Year 2). A multilevel model of students nested within schools will be used to estimate the effectiveness for the three primary comparisons of interest. Using Optimal Design software, we estimated the minimum detectable effect size (MDES) we could obtain given our known design constraints. Assuming eight schools are included in the design with 10 students receiving DBI per school, an adjusted alpha level of 0.017 (adjusted for the three primary comparisons of interest; 0.05/3), as well as 32 percent of the variance would be explained by the blocking variables (using Hedges Variance Almanac), 50 percent of the
variance in the outcome explained by the pretest, and an effect size variance of .05, there would be an MDES of .62 with power = .80 (see Figure 6).

**Figure 5. Depiction of delayed intervention design.**

It should be noted that this represents a conservative estimate of the MDES as more student or variance explained by the blocking or covariates will increase power and improve our ability to detect a lower MDES. The multilevel model for evaluating the effectiveness of DBI on mathematics achievement will be:

\[ Y_{ij} = \gamma_{00} + \gamma_{01}(DBI \ Status_j) + \gamma_{10}(Pretest) + \gamma_{11}...\gamma_{1n}(Student \ Covariates) + u_{0j} + r_{ij} \]

where \( \gamma_{00} \) is the mean mathematics achievement posttest score, \( \gamma_{01}(DBI \ Status_j) \) is a dichotomous indicator to test whether a particular phase of DBI implementation differences from the No DBI group on the posttest, \( \gamma_{10}(Pretest) \) is the mean mathematics achievement pretest score, and \( \gamma_{11}...\gamma_{1n}(Student \ Covariates) \) represent a set of student covariates. The student-level variance (i.e., the variance of \( r_{ij} \)) has constant variance \( \sigma^2 \), and the school-level variance (i.e., variance of \( r_{0jk} \)) is constant at \( \tau_\beta \). Although other student- and school-level covariates may be included in the model to improve power, this model serves as the baseline. Hedges \( g \) will be used as the standardized effect size for group mean differences; moreover, we will consult Lipsey et al.’s (2012) report on communicating effect sizes in interpretable formats for practitioners, and we will report the unadjusted and adjusted \( p \)-values for each analysis.
Math improvement will be evaluated by examining changes in absolute achievement and in students’ growth rate on valid, reliable progress monitoring measures (i.e., CBM). Data collection will occur throughout implementation. Implementation fidelity will be evaluated using DBI and RTI implementation rubrics\(^7\) that include anchors describing full, partial, and low implementation across components (e.g., progress monitoring). Rubrics will guide interviews with school teams and allow evaluators to rate implementation across components. Data will be collected annually and used formatively for DBI and at the beginning and end of the project for RTI. Both rubrics include questions about family collaboration; therefore, scores on these elements will be used to evaluate parent satisfaction. We will also conduct surveys and focus groups at the beginning and end of the project to determine parents’ satisfaction with DBI.

\(^7\) See Appendix J for samples