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Response to intervention with older students with reading difficulties

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ABSTRACT

Addressing the literacy needs of secondary school students involves efforts to raise the achievement levels of all students and to address specifically the needs of struggling readers. One approach to this problem is to consider the application of a Response to Intervention (RTI) model with older students. We describe an approach to enhanced literacy instruction for middle school students that includes the essential components of any RTI model: universal screening, progress monitoring, and multi-tiered instructional service delivery. We use screening and progress-monitoring tools specifically tied to state accountability tests and a multi-tiered instructional framework that addresses the literacy needs of all middle school students, including struggling readers. Presently a large-scale, multi-site randomized trial is under way to evaluate the feasibility and effectiveness of this RTI model for middle school students.

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Response to Intervention (RTI) is an approach to enhancing classroom instruction and systematically implementing more intensive interventions to meet the instructional needs of struggling learners. Fundamental to the implementation of an RTI approach are the following components: (a) accurate universal screening to assure that all students at-risk for reading difficulties are identified as early as possible, (b) valid and reliable progress monitoring to determine students' response to instruction that may vary in intensity and differentiation, and (c) multi-tiered research-based reading interventions to provide confidence that students whose response is less than expected have been provided with the most effective instruction and intervention protocols available. In addition, implementation requires knowledge about effective school and student factors that contribute to RTI models. Thus, RTI introduces instruction-driven assessments and a layered approach to instructional service delivery that begins in the classroom with all students (Tier I); supplements instruction with secondary interventions that provide greater intensity, differentiation, and time on task for some students (Tier II); and provides intensive intervention for a smaller number of students who have not benefited adequately from classroom instruction and secondary interventions (Tier III). Determination of the level of intervention needed is based on the results of progress-monitoring assessments of instructional response. When these components are in place, RTI represents a school-wide change model that requires a close working relationship among general education, special education, and other instructional resources in a school and district.

Although there is a need to expand the knowledge base on RTI with elementary students, much is known about universal screening, progress monitoring, and multi-tiered intervention with younger students at risk for reading difficulties (Blachman et al., 2004; Denton, Fletcher, Anthony, & Francis, 2006; Felton, 1993; Fletcher, Lyon, Fuchs, & Barnes, 2006; Jenkins & O'Connor, 2002; Lovett et al., 2000; Mathes et al., 2005; McMaster, Fuchs, Fuchs, & Compton, 2005; Torgesen et al., 1999; Vellutino et al., 1996). However, considerably less is known about the factors associated with effective screening, progress monitoring, and intervention for older students. There is currently little guidance for the applicability or effectiveness of RTI models for students in secondary school. In part, this is because the variation in reading-related difficulties is greater in older students; some students require many of the elements related to reading difficulties in younger students (e.g., alphabetic principle, word-reading strategies, fluency), while other students may struggle as a result of the accumulated negative outcomes associated with low levels of reading. These factors include limited vocabulary and concept knowledge, lack of knowledge of comprehension strategies for reading diverse text types (particularly expository/information texts), and low motivation for reading (Biancarosa & Snow, 2004). The goal of any RTI approach is to raise the achievement levels of *all* students, which requires a multi-tiered approach beginning in general education settings that provides increasingly intense and differentiated interventions for students who struggle with reading and learning from text.

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In this paper, we describe an approach to screening, progress monitoring, and multi-tiered intervention that we are implementing and evaluating as a part of a large-scale randomized experimental study of RTI with struggling readers in middle school. This study is funded through a Learning Disability Research Center grant from the National Institute of Child Health and Human Development and through additional funds from the Texas Education Agency. Prior to describing the study, we will review some of the current research on reading instruction with middle school students, identify some of the problems related to intervention for adolescents with reading difficulties, and then explain our plan for resolving some of the issues related to screening, progress monitoring, and intervention in an RTI model with middle school students.

1. Response to intervention with older students with reading difficulties

There are many excellent reasons for providing reading interventions early in schooling (Fletcher et al., 2006). However, older students may have difficulty with reading for several reasons: (a) not all students are provided with substantive early intervention, (b) some students are provided with inadequate early intervention, (c) some students who are provided with effective intervention early struggle later when text and knowledge demands increase, and (d) some students manifest reading difficulties later in their schooling who did not have reading difficulties early (Leach, Scarborough, & Rescorla, 2003; Lipka, Lesaux, & Siegel, 2006). For these reasons, improved knowledge about effective interventions for older students is needed.

Much of the writing about students with reading difficulties suggests that early intervention is necessary, in part, because as students get older, remediation is more difficult (Torgesen et al., 2001). Nonetheless, several recent studies with older students with reading difficulties suggest that interventions may yield effect sizes equivalent to or even higher than in studies of intervention with younger students (Klingner & Vaughn, 2004; Moats, 2004; Olson & Wise, 2006; Torgesen, Rashotte, Alexander, Alexander, & MacPhee, 2003). In fact, in a meta-analysis of one-on-one interventions for students with reading difficulties, older students (grades 4–6) demonstrated higher effect sizes on average than younger students (Elbaum, Vaughn, Hughes, & Moody, 2000). However, the range in effect sizes for students in grades 4–6 was from −.37 to 3.34, revealing that while on average older students benefited from intervention, effect sizes were not consistently positive for older students. Additionally, since older students are so far behind, the amount of intervention needed so that they perform “on par” with peers and/or meet grade-level benchmarks (e.g., state performance standards) will be more extensive, given both the complexity of the information that older students are expected to know and the longer period of time that some of these students have struggled with reading. If students with reading difficulties are struggling primarily because they have previously been provided inadequate instruction, they may respond well to an intervention (Torgesen et al., 2003).

1.1. Overview of reading intervention with older students

Validating effective interventions for older learners is critical not only for the utility of an RTI approach, but also for any effort to increase levels of reading achievement in secondary school students. There are many reasons why instructional issues in reading are different for secondary school students. As students advance through the grades, reading demands increase with the need for understanding more complex vocabulary and concepts. A major focus for teachers and researchers alike has been finding ways to improve the vocabulary knowledge and reading comprehension of students with reading difficulties (Baumann & Kame'enui, 2004; McKeown & Beck, 2004; Stahl & Fairbanks, 1986). However, many older readers have also not mastered the basic reading skills (i.e., decoding and fluency) needed to effectively benefit from instruction that focuses solely on reading for meaning (Leach et al., 2003). Students who read slowly and laboriously read fewer words overall and often become reluctant readers who struggle to learn from text and do not read for pleasure, thus widening the gap between poor and proficient readers (Stanovich, 1986). Furthermore, the ability to read quickly and accurately is related to improved reading comprehension because students can devote more attention during reading to the mental processes involved in understanding text (Homan, Klesius, & Hite, 1993; Kuhn & Stahl, 2000; National Institute of Child Health and Human Development [NICHD], 2000; Reutzel & Hollingsworth, 1993; Shinn, Good, & Knutson, 1992).

Evidence from intervention studies with older students who exhibit deficits in decoding and fluency suggest that these students benefit from receiving instruction in the basic elements of word reading, regardless of how old they are (Abbott & Berninger, 1999; NICHD, 2000). Research findings point to the use of systematic, explicit instruction in comprehension strategies and vocabulary, opportunities for practice in text geared to the students' reading level with corrective feedback, and explicit instruction in the use of strategies to read words quickly and accurately (Swanson, 1999; Vaughn, Gersten, & Chard, 2000). Older students with reading difficulties may need instruction in any of a range of reading components from beginning phonics skills to decoding multi-syllabic words and practicing reading for fluency, depending on their degree of development and corresponding areas of need. In addition, many students benefit from multiple opportunities to read text aloud and to engage in activities that involve improving reading fluency (e.g., Archer, Gleason, & Vachon, 2003; see for review Chard, Vaughn, & Tyler, 2002). Thus, all secondary-level students with reading difficulties need explicit instruction in vocabulary and the application of comprehension strategies. Even older students who require instruction in the basic elements of decoding and word-level reading should not be precluded from receiving instruction in vocabulary, concept development, and reading comprehension (Klingner & Vaughn, 2004; Wilder & Williams, 2001).

Chall's seminal study of low-income students compared with middle-income students (Chall & Jacobs, 1983) clearly defines the continual regression in reading for students with low vocabulary. These researchers reported a decrease beginning in fourth grade in low-income students' knowledge of word meanings (i.e., words that are abstract, academic, and less common) that became more pronounced as children progressed through the grades. The text demands in fourth grade and beyond require students to know and acquire many words and concepts. Thus, interventions that include vocabulary and concept development are of particular importance as students enter the upper elementary grades. Results of intervention studies in vocabulary development with older students with reading difficulties yield positive outcomes using a variety of approaches, including mnemonics, cognitive strategy instruction, direct instruction, activity-based methods, and computer-assisted instruction (Jitendra, Edwards, Sacks, & Jacobson, 2004). Approaches that use explicit instruction combined with activities that engage students in manipulating words and word meanings (e.g., mnemonics, word associations) appear to be the most effective for increasing vocabulary and maintaining the use of the newly learned words (Mastropieri, Scruggs, & Graetz, 2003; Bryant, Goodwin, Bryant, & Higgins, 2003).

Because understanding the words that are read and being able to find the meaning of unknown words is an integral part of reading comprehension, most successful approaches for reading comprehension combine vocabulary and comprehension techniques (Baumann, Edwards, Boland, Olejnik, & Kame'enui, 2003; Beck, McKeown, & Kucan, 2002). Although approaches to teaching reading comprehension can be quite varied, three features are common to most successful interventions for older students in this area. First, as previously stated,

these approaches teach key vocabulary words that will be encountered in the text. Second, specific strategies that assist students in engaging the text and monitoring their understanding (e.g., links to prior knowledge, self-questioning, decoding, summarizing) are taught explicitly. Third, teachers provide opportunities for students to discuss what they have read (Gersten, Fuchs, Williams, & Baker, 2001; Kucan & Beck, 1997; Mastropieri & Scruggs, 1997; Mastropieri et al., 2003).

Recently, Edmonds et al. (in press) conducted a meta-analysis of all reading intervention studies for older students (grades 6–12) with reading difficulties that had reading comprehension as an outcome variable. Interventions addressing decoding, fluency, vocabulary, and comprehension were included if the interventions measured the effects on reading comprehension. Of the 29 studies that were located and described in the synthesis, 13 met criteria for a meta-analysis. The mean weighted average effect size for all 13 studies on comprehension outcomes was ES=.89 in favor of treatment students over comparison students, suggesting again that older students with reading difficulties benefited from interventions. Even word-level interventions were associated with moderate effect size gains in reading comprehension (ES=.49).

Extending the Edmonds et al. (in press) meta-analysis, Scammacca et al. (2007) examined how effective reading interventions were for older students with reading difficulties on all reading outcomes (not just comprehension). Thirty-one studies met criteria and yielded an overall ES of 0.95. The overall effect size for those studies that used standardized, norm-referenced measures was considerably lower (0.42). Considering the subgroup of struggling readers, those with learning disabilities, the effects of intervention were similar for the group as a whole (ES=0.51). Not all intervention types were associated with the same effects. Using standardized measures, word study interventions had the highest effects (ES=0.68), followed by comprehension interventions (ES=0.55), and with minimal effect from fluency interventions (ES=0.04). Effects from vocabulary interventions were only available using nonstandardized tests. One of the primary conclusions from these meta-analyses is that older readers with reading difficulties can benefit from interventions and that it is not too late to provide instruction to these students.

Summarily, reading interventions for older students should address the basic elements of reading as needed (decoding, word analysis), with emphasis placed on the vocabulary development and comprehension strategies that are essential to learning in the intermediate grades. However, the majority of the research on reading interventions for older readers has been investigations of the separate components of reading (e.g., fluency, comprehension, etc.). Significantly less is known about appropriate ways to coordinate these areas of reading through multicomponent interventions. Furthermore, less is known about the relative effects of more standardized approaches to reading interventions for older students versus more individualized approaches.

2. Interventions: Standardized and individualized

2.1. Standard protocols

Researchers investigating effective reading interventions for students with reading difficulties typically use standard protocols of instruction (e.g., Lovett et al., 1994, 2000; Torgesen et al., 2001; Vellutino et al., 1996; Wise, Ring, & Olson, 1999). Standard protocol interventions provide empirically validated interventions to all students performing at low levels. Although the materials and instruction are matched to the students' current level, the emphasis and procedures for implementing the instruction are similar for all students receiving the intervention.

One of the significant issues related to providing standardized interventions to older students with reading difficulties is that the range of reading problems is greater than with younger students with reading difficulties. If older students were being taught "one-on-one" this would not be a problem. But for the vast majority of older readers with reading difficulties, intervention is likely to occur in group-sizes ranging from 3–18 students. For this reason, the use of standardized interventions requires consideration of several issues: (a) providing diagnostic information on each student to ensure that the critical elements needed for instruction are targeted—e.g., students who need extensive word study have the opportunities for this instruction, (b) considering text that is interesting and motivating to the student, and (c) providing social/behavioral supports to ensure engagement.

We were unable to identify studies at the middle school level that used multi-tiered interventions, so a brief review of interventions provided at the elementary level follows (see Fletcher et al., 2006, for a review). In all of these studies, a standard intervention was provided to students at risk for reading difficulties for approximately one semester. After this initial semester of intervention, students making insufficient progress were identified and received additional intervention (also standard protocol). In most studies, the continued intervention for low responders extended the previous intervention. Vadasy, Sanders, Peyton, and Jenkins (2002) reported that additional intervention did not significantly improve outcomes for students. However, Berninger et al. (2002) found that first-grade students who made insufficient progress after one semester of intervention had improved word reading, but not significantly improved comprehension, after an additional one-semester intervention provided in second grade. Vellutino et al. (1996) identified students making "low" growth or "very low" growth compared with students making "good" growth or "very good" growth after the first standard protocol intervention. Although student outcomes continued to improve with each intervention, the identified growth groups remained distinct on outcome measures after the second intervention. In a subsequent study (Vellutino, Scanlon, Small, & Fanuele, 2006), kindergarten students at risk for reading problems were provided an intervention using a standard protocol. When compared to students at risk and who received no kindergarten intervention, the intervention group had better performance on a range of reading measures. The students were screened at the beginning of grade 1. Those who remained at risk received one of two supplemental interventions. There were no differences between the two supplemental instructions. By the end of grade 3, 84% of the students who had received supplemental intervention in only kindergarten or both kindergarten and first grade were performing in the average range on a variety of literacy measures, representing an inadequate response rate in the population of 3.2%.

Three intervention opportunities were provided in 10-week timeframes to second-grade students at risk for reading problems (Vaughn et al., 2003). After each 10-week period, students reaching criteria on reading fluency were exited from the intervention. The additional time in the standard intervention allowed more students to progress and meet exit criteria at both the 20-week and 30-week periods. Another group of students demonstrated insufficient response throughout the 30 weeks and were never exited from intervention. In another study involving two layers of instruction with standardized protocols, McMaster et al. (2005) randomly assigned 33 first-grade classrooms to treatment (22 classrooms) with Peer Assisted Learning Strategies (PALS) or to standard practice (11 classrooms). Based on a 7-week period of progress monitoring, PALS reduced the number of struggling readers from 28% to 15%. These inadequate responders were then randomly assigned to three supplemental interventions: (1) control, which involved continuing the PALS intervention; (2) a modified form of PALS that permitted more differentiation of instruction; or (3) 1:1 tutoring in three weekly sessions combining word-recognition training with practice in reading stories. Tutoring was the most effective supplemental intervention, reducing inadequate responders to less than 5%.

Two studies of a series of grade 1 cohorts included three levels of intervention: classroom, supplemental, and intensive (Denton et al., 2006; Mathes et al. 2005). After a 30-week intervention, all three groups scored in the average range on measures of word recognition,

fluency, comprehension, and spelling. Although the two groups that received supplemental intervention did not differ substantially, they were significantly higher on a variety of reading outcomes than the comparison group of at-risk readers who received only classroom instruction. Denton et al. (2006) placed inadequate responders from Mathes et al. (2005) into a 16-week intervention based on a standard protocol. The intervention involved 8 weeks of an intense phonological decoding program daily for 2 h. Then, over the next 8 weeks, the students received intervention targeting fluency daily for 1 h. The average gains of about 0.5 standard deviations in word reading, fluency, and comprehension were significant, but highly variable individual responses to intervention were apparent. Denton et al. suggested that many of the students would have benefited from a more individualized protocol.

Although these studies have reported improved outcomes for students following standard protocol interventions, a hallmark of instruction for students with reading disabilities is the individualization of interventions (Cook & Schirmer, 2003). Individualized interventions may be of higher need for older students with reading difficulties who may have previously participated in standardized interventions that were not successful at remediating their reading difficulties. Thus, individualized interventions may be beneficial with some older students with reading difficulties.

2.2. Individualized interventions

In contrast to standardized interventions, the effectiveness of individualized interventions that respond to the differentiated needs of students has been understudied. For example, in their synthesis of Tier III interventions with early elementary grade students, Wanzek and Vaughn (2007) identified *no* quasi-experimental or experimental studies that provided individualized interventions. All of the studies that met criteria utilized more or less standardized interventions. Similarly, in their synthesis of interventions with older students with reading difficulties, Scammacca et al., 2007 reported that all of the studies used some variation on a standardized intervention approach.

Particularly with older students, individualized interventions may be necessary because the range of reading difficulties is likely to vary based on the learning needs of students, the reasons for their reading difficulties, and the gap between their performance and grade-level expectations. However, there may be advantages to standardized interventions, including that they are more structured for teachers. For these reasons, we are currently investigating the relative effects of a standardized treatment intervention compared with an individualized intervention for older students with significant reading difficulties. As part of our current study with older students with reading difficulties, we have defined individualized intervention as implementing instruction that may change frequently throughout the intervention period to match changes in individual student needs. While individualized approaches have been used in practice (e.g., Ikeda, Tilly, Stumme, Volmer, & Allison, 1996; Marston, Muyskens, Lau, & Canter, 2003) and are referred to conceptually in the field of special education, few data are available that support their implementation and evaluate their effectiveness. More specifically, outcome data from experimental designs employing comparison or control groups have not been reported, leaving questions as to the direct effects of these individualized implementations (Fuchs et al., 2003). There is a specific need not only for randomized controlled trials of RTI models implementing individualized interventions (Burns, Appleton, & Stehouwer, 2007), but also for a direct comparison of individualized and standard protocol interventions.

In our application of an individualized intervention, teachers focus on the same research based components of reading instruction (i.e. word study, fluency, comprehension, vocabulary) as teachers focus on in a standardized intervention protocol, the individualized intervention has an increased emphasis on flexibility in lesson planning and overall instructional decision making. For example, while teachers are required to meet weekly time requirements for specific components of reading (i.e. comprehension/text reading, word study, vocabulary/morphology, and attitude/motivation) they have a greater amount of flexibility in when to schedule instruction in each area and who in their small groups need a greater emphasis on the different reading components. Teachers also have flexibility in text selection and spend more time conferencing with students on an individual basis to set goals and increase motivation. They give bi-weekly curriculum based measures to determine if students are responding to instruction and to guide future instructional decision making accordingly.

See Table 1 for a comparison between standardized and individualized interventions.

2.3. Screening and progress monitoring for older students with reading difficulties

All RTI models require tools for identifying students who are at-risk for academic difficulties and measuring progress and instructional response so that decisions can be made concerning instructional intensity and differentiation. These tools are well-developed for elementary school, but less work has been completed at a secondary level. Although many of the principles of screening and progress monitoring with older readers are the same as with elementary students, a major difference is that screening procedures in elementary school have been heavily influenced by the need for early interventions that would begin in kindergarten and grade 1, when many children are just beginning to learn to read. As such, screening methods for beginning readers have focused on assessments of precursors to reading, with consistent evidence supporting the validity of predictions based on letter-sound knowledge, phonological awareness, and oral language (Scarborough, 1998). Such screening tools tend to have high false positive rates, which are reduced as children are exposed to reading instruction and when assessments of actual reading are employed. Thus, by second grade, short tasks involving accurate and fluent reading of word lists and passages account for most of the independent variance in more extensive assessments of different components of reading (Foorman, Fletcher, & Francis, 2004).

By middle school, students vary considerably in reading ability, but assessments of different reading skills tend to be highly correlated. In addition, students have had experience with a variety of tests that are often administered in groups. Consequently, screening assessments in middle school may be suitable for group administration. Since actual reading skills can be assessed, it is likely that screening tools can be constructed with desirable properties such as false positive and false negative rates that are generally below 15%. However, any assessments used in schools, even for benchmarking purposes, must take into account teachers' and students' time and not add unnecessarily to

Table 1
Comparison between standardized and individualized interventions

Standardized	Individualized
Reduced instructional decision making	Increased instructional decision making based on student assessment results
High control of materials used for instruction	Lower control of materials used for instruction
Highly specified curriculum	Low to moderate specification of curricula
Use of time specified	Flexibility in use of time to address specific student needs
High levels of fidelity to a single approach	Responsive to needs of students
Motivation results from success	Motivation considered in text selection
Systematic and explicit instruction	Systematic and explicit instruction
Fast-paced instruction	Fast-paced instruction
Ongoing progress monitoring	Ongoing progress monitoring

the assessment load at a school. In most states, middle school students take state assessments of reading comprehension. The results of these assessments may be used to screen for students in need of supplemental intervention, although validating the use of these assessments for identification purposes requires further research.

Progress monitoring assessments may be done in individual or group settings, but comparative research should be completed to evaluate these approaches to assessments. Even so, it is likely that short probe assessments of fluency involving word lists and passages will be as effective in middle school as they are in elementary school. Issues apparent at elementary school, such as the difficulty level of passages, equating of passages within a year so that fluency rates are not unduly influenced by difficulty level, and cut points for instructional decisions involving movement through the tiers, will continue to be pertinent. A major question is the amount of growth that middle school students will show since the long-term development of reading skills is characterized by rapid growth in early elementary years towards a flattening plateau as students grow older (Francis et al., 1996).

3. Intervention and assessment issues addressed in our studies

This review has identified several important areas of investigation for older students with reading difficulties related to the implementation of RTI. First, can older students at risk for reading difficulties be screened and provided with a standard protocol intervention successfully? If so, approximately what proportion of these students is expected to respond well to a standard protocol at the end of 1 year? If there are students who respond inadequately to intervention, do they require a more individualized intervention or continued standardized interventions, and what are their relative effects? Furthermore, there is a need to identify and describe the RTI of various subgroups of older struggling readers, including those who initially make adequate progress in intervention and then do not "thrive" over time and students whose initial progress is slow but who continue to grow and make adequate progress over time. We are currently conducting a large-scale experimental study in seven middle schools in two sites in the southwestern United States, designed to begin to address these and related issues about effective interventions and implementation of RTI with older students with reading difficulties. We describe the components of this research, but because the study is ongoing findings are not yet available.

3.1. Intervention

Within this study, we provide a Tier I intervention in the form of professional development for all content area teachers (e.g., math, science, social studies, language arts) in all participating schools. This professional development consists of study groups supplemented with in-class modeling and coaching. Reading coaches, who are part of the research team, facilitate monthly study groups with content area teachers, focusing Content area teachers participate in ongoing study groups focused on effective practices for teaching students to read and comprehend academic (content area) text, including research-validated instructional practices targeting vocabulary (i.e., providing examples and non-examples of words, semantic feature analysis) and comprehension (i.e., question generation, summarization strategy instruction, strategic use of graphic organizers). A theme of this professional development is that content area teachers are best qualified to teach students how to comprehend text in their own domains. Thus, the emphasis is not on preparing content area teachers to teach reading, but on giving them evidence-based instructional approaches to teach students vocabulary and comprehension in their specific content domain (e.g., Science teachers learn to more effectively teach science vocabulary and how to comprehend key concepts in science text.) As with any Tier I intervention, the goal is to improve the overall classroom level instruction related to reading and learning from text for all students in the school, thus raising overall achievement levels. An additional goal of Tier I intervention in this study is to facilitate the generalization of a small set of vocabulary and comprehension strategies by students who learn these strategies in supplemental small group (Tier II) intervention and are subsequently taught to apply them across their content area classes.

In the study groups teachers (a) debrief about instructional routines learned in previous study group sessions, that they have implemented during the past month, (b) receive training in different instructional routines with built-in guided and independent practice in the form of role-play with their colleagues, and (c) collaborate to integrate the newly learned routines into an upcoming lesson plan. Implementation of Tier 1 is being monitored by having each teacher complete a self-evaluation at regular intervals throughout the school year, indicating for each instruction routine taught in the professional development (a) his or her level of confidence in the ability to implement the instructional routine, and (b) how frequently he or she implemented the routine in the past 2-week period.

Additionally, we identified middle school students "at risk" for reading problems based on their low scores on the state assessment of reading. There are two distinct research questions addressed by our research team related to intervention. First, we asked whether 7th and 8th grade students with reading difficulties would benefit differentially from a standardized intervention provided in relatively small groups ($n=5$) versus larger groups ($n=15$). To address this question, students with reading difficulties were randomly assigned to receive the same standard protocol intervention in either: (a) a small group format (approximately 5 students per teacher), daily for approximately 250 min per week, (b) a large group format (approximately 16 students per teacher), daily for the same amount of instructional time, or (c) whatever their schools typically provide to struggling readers. Second, we addressed the relative effects of a standardized intervention compared with "business-as-usual" intervention for students with reading difficulties in Grade 6. Our rationale is that relatively little research was available evaluating the effects of a standardized intervention provided year-long to older students at risk for reading problems. Sixth-grade students were randomly assigned to receive either the large group daily intervention or typical school practice. Sixth-grade students whose RTI is inadequate over a school year will be randomly assigned in the subsequent school year to receive either standard protocol or individualized interventions of higher intensity.

3.2. Instructional framework

The instructional framework applied in both the standardized protocol and individualized interventions implemented in this study reflects research on effective interventions for students with reading difficulties, as well as the phonology of the English writing system. This framework includes two critical components: (1) word reading through understanding and applying sound elements mapped to print (letter-sound correspondence in beginning reading and then phonology of sound combinations for older readers) to build and read words rapidly and accurately, and (2) word and concept meaning as well as reading comprehension strategies so that meaning can be derived from words and text (Bauman & Kameenui, 2004).

One guiding premise for the design of the interventions is that many older students who struggle with reading have difficulties due to lack of mastery in decoding and accurate word reading (Paulesu et al., 2001). Simultaneously, instruction will address learning to read "sight words," or words that are less phonetically regular in English (Ehri & Wilce, 1983; Goswami, 1986; Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001). Sight words or high-frequency words will be introduced prior to students reading them and will be selected based on high utility and frequency of use. While this approach applies a "buildup of reading skills" from easy to more difficult, the intervention is more complex

because an ongoing part of the design will be teaching comprehension skills through improving vocabulary and concept knowledge and increasing knowledge of how to understand and interpret expository and narrative texts. Thus, the intervention will be aligned with current research on developing vocabulary and comprehension (Beck et al., 2002; Fitzgerald, 1995; Gersten & Baker, 2000; Snow, 2002; Ulanoff & Pucci, 1999). The framework has compatible interwoven elements that include building and increasing skills related to word reading—including complex word types and regular and irregular word reading—along with daily instruction in vocabulary and comprehension with an emphasis on expository text.

Finally, the instructional design principles are based on the converging research on the benefits of explicit and systematic instruction in reading that provide high opportunities for student response with feedback while the teacher scaffolds instruction. Teachers will provide systematic and explicit instruction in word study and decoding skills, fluency in word recognition and text processing, construction of meaning, vocabulary, spelling, and writing (see Baumann & Kame'enui, 2004; Berninger et al., 2003; Foorman & Torgesen, 2001; Pressley, 1998; Rayner et al., 2001; Torgesen et al., 2003). Intensive instruction is reflected in activities that require high levels of student engagement in learning critical content. Students will be provided with many opportunities to practice and to apply skills and strategies while reading and writing connected text.

3.3. Assessment development

Our current research includes the development and validation of measures for screening middle school students to identify those in need of supplemental reading intervention, as well as middle school reading progress-monitoring assessments. Students in our study will have taken the state accountability test up to three times by middle school entry. This test is a highly reliable criterion referenced measure of reading comprehension that yields scores tied to the Lexile framework, including student scores that index expected levels of comprehension. The Lexile framework (Stenner & Wright, 2002) is a psychometric approach to the scaling of reading ability and texts that allows readers to be matched to texts for instructional purposes and allows the monitoring of reading development along a continuous scale from beginning reading to advanced, college-level reading. This framework could be utilized as a scale for monitoring growth in reading development that is potentially translated across a diverse body of texts and assessments and tied to intervention needs. For more information on the Lexile Framework, visit www.lexile.com.

In our study, we are asking how well the state-mandated reading test functions as a screening tool and whether other individual and group assessments of word reading, fluency, and comprehension add to the capacity of the state test to plan instruction. The screening tool developed in our study will be anchored to the Lexile scores that are derived from our mandated state assessment, since the use of these data as a major focus for organizing instruction is ingrained into state middle schools. We hope to be able to link scores on the state-mandated test at middle school entry with students' needs for instruction of different levels of intensity.

Specific tools for progress monitoring based on the Lexile scores associated with the state test have also been planned, developed, and piloted, including a word reading fluency measure, a reading fluency measure, and a reading comprehension measure. The purpose of the progress-monitoring system is to establish the Lexile level at which a child maintains adequate comprehension at different fluency rates. Within our research, a battery of progress-monitoring assessments will be administered several times over the course of the school year to students in the intervention groups, struggling readers who receive typical instruction, and a group of typical achievers. Additional procedures for further assessment of comprehension will also be introduced as part of the progress-monitoring system. These procedures will all be tied to the grade-level state assessment, and the goal will be to monitor progress toward the Lexile score that marks the passing standard on the state assessment that will be administered in the coming spring. Although linked to the assessment for the state in which the research is taking place, the progress-monitoring assessments could be tied to other assessments linked to the Lexile framework. These progress-monitoring tasks can also be used for benchmarking purposes.

The word-list reading fluency test comprises 150–200 words selected in one of several ways. For each word list, students are asked to accurately read as many words as possible in 60 s. The passage reading fluency test comprises three to five short passages (i.e., approximately 500 words) that increase in difficulty as measured by the Lexile system. For each passage, students are asked to read the passage as quickly and as accurately as possible for 1 min. They are instructed that they may be asked what the passage is about so that they read for understanding—not simply for speed. In addition, we are piloting quarterly probes of reading comprehension in which students read each of five passages that are monitored for fluency, but also responded to 8–15 comprehension questions after each passage.

The passage reading fluency and comprehension components include modifications of previously released passages from different versions of the state accountability test as well as newly written passages. All passages are approximately 500 words in length. Approximately 50% of the passages are narrative and the other half are expository. Passage difficulty ranges from 350 Lexiles to 1340 Lexiles. The development of the word reading fluency measure required that each passage be analyzed to determine the number of unique words. Unique words were then randomly ordered to create each word list consisting of 150–200 words. One word list was developed for each reading fluency passage and reading comprehension passage. In addition, word lists were developed that incorporated word frequency and length comparable with the passage-based word lists. If the research indicates that screening based on Texas Assessment of Knowledge and Skills (TAKS) is not sufficient, we will identify or develop additional assessments that would be needed to identify students whose difficulties with comprehension stem from problems at the word-reading and fluency levels.

The schedule for assessing progress will depend on the amount of growth demonstrated by students in middle school. We will plan for monthly assessments, but may shift towards quarterly assessments if the amount of growth is relatively small. We will also compare individual and group assessments of progress, always keeping in mind the demands on teacher time.

4. Summary

In a perfect world, few students would emerge with reading difficulties in middle school. If schools successfully implement early intervention programs, not only should the number of struggling readers be reduced, but also schools should be able to readily identify these students. However, even the best early intervention programs will be insufficient for some students, and the demands of secondary school for increasingly sophisticated vocabulary and comprehension will cause some students who had not previously demonstrated reading problems to struggle. The literacy needs of these students will be diverse, and it is likely that accurate and fluent decoding will continue to present a challenge for many secondary students. Although some estimate that 70% of struggling readers have problems primarily with comprehension (Biancarosa & Snow, 2004), these conclusions are not supported by studies such as those of Leach et al. (2003) and Catts, Hogan, and Adolf (2005). Moreover, expectations introduced by the need for an increasingly literate society and demands for meeting yearly progress goals introduced by No Child Left Behind legislation require the enhancement of literacy instruction for all secondary students. We have described a multi-tiered approach anchored in an RTI model that includes screening, progress monitoring, and increasingly intense instruction for those who

struggle. We are working to develop screening and progress-monitoring tools and to evaluate the effectiveness of our instructional framework in a randomized controlled experiment. The results will likely help establish the efficacy of RTI models in middle schools, but also illuminate some of the implementation and policy issues related to enhancing literacy outcomes at this level of development.

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