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Assessment-based instructional coaching provided to reading intervention teachers

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Abstract The use of student assessment data is a key component of a model of instructional coaching, Student-Focused Coaching (Hasbrouck & Denton, 2005), designed to support student achievement by engaging reading teachers in a collaborative problem-solving process to modify instructional strategies with the goal of enhanced student outcomes. In this paper, we describe the role of student assessments in a technology-based implementation of the Student-Focused Coaching model provided to reading intervention teachers within a study of scaling-up research-validated educational innovations. Examination of transcripts of teacher–coach interchanges in the technology-based implementation of Student-Focused Coaching supported the key role of assessment in that model, revealing that coaches frequently (a) answered teachers' questions related to assessment, (b) suggested that teachers implement specific instructional strategies based on assessment results, (c) engaged teachers in examining assessment results and observing students for specific purposes, and (d) provided feedback, especially encouragement, to teachers about students' progress based on assessment results. Further, these classes of interactions were observed between coaches and teachers in both a flexible intervention heavily dependent on teacher decision-making and in a highly prescriptive intervention program.

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Over the past 20 years, a strong emphasis on research of primary-grade reading has resulted in a convergence of evidence regarding elements of effective instruction. Much of this research has been directed toward intervention for students at risk for developing serious reading difficulties. As a result, consensus reports (e.g., Snow, Burns, & Griffin, 1998) and syntheses of research (e.g., National Reading Panel, 2000) have concluded that the majority of reading difficulties can be prevented by providing high-quality reading instruction in the early grades, with supplemental intervention for students who struggle. There is strong evidence from multiple studies that early reading intervention is effective for the large majority of students (see Mathes & Denton, 2002; Torgesen, 2004).

Despite this emerging understanding of effective reading intervention, a large percentage of students continue to experience reading difficulties (Perie, Grigg, & Donahue, 2005). This lack of connection between knowledge of effective practices and widespread implementation of these practices in schools has led to a recent focus on improving teachers' knowledge and skills through professional development, based on an assumption that quality professional development of teachers will result in improved outcomes for students. Although there is evidence that teacher quality and teacher behaviors affect student outcomes in reading (see, e.g., Foorman et al., 2006) and that well-designed professional development can impact teacher practices (see Klingner, 2004), there is a need to systematically investigate the impact of professional development provided to teachers on their students' reading outcomes (Chard, 2004).

Instructional coaching in reading

An increasingly popular strategy for supporting the effectiveness of reading teachers, including those who provide intervention to struggling readers, is the provision of instructional coaching by a reading coach (see Dole, 2004; Poglinco & Bach, 2004). Coaching is usually characterized as a form of professional development that is individualized and sustained over time (International Reading Association, 2004). Despite its popularity in practice, there is a lack of experimental research directly examining the effects of the coaching model on teacher effectiveness or student outcomes. There is evidence that professional development with characteristics typical of a coaching or mentoring approach is associated with better outcomes in terms of sustained impact on teacher practice (i.e., Bean, Swan, & Knaub, 2003; Garet, Porter, Desimone, Birman, & Yoon, 2001) and perceived positively by teachers (Vaughn & Coleman, 2004). However, there is a need for research examining the effects of specific models of instructional coaching provided

to reading teachers on both the teachers' knowledge and practices and on their students' reading outcomes.

Research on the consulting teacher model and collaborative problem-solving

A body of research that can inform the field about the role of the reading coach and the effectiveness of the model is found in the literature related to collaborative consultation, particularly as it has been implemented in special education. As students with disabilities are increasingly instructed in regular classroom settings, special educators may serve as collaborators supporting general educators in implementing effective instruction for these students (see Idol, 1993; Sugai & Tindal, 1993). A common feature of this consulting teacher role is engaging in structured problem-solving with colleagues with the purpose of supporting the success of students with disabilities in regular classrooms (Sugai & Tindal, 1993). In this model, students' academic and behavior problems are characterized as amenable to changes in teacher behaviors, including instructional decisions. There has been much written about collaborative consultation in education, but less high-quality research. There is, however, evidence that consultation can have positive effects on both teacher and student outcomes (see Evans, 1991; MacLeod, Jones, Somers, & Havey, 2001; Sheridan, Welch, & Orme, 1996).

A systematic approach to problem-solving has also characterized special education pre-referral intervention, in which professionals such as school psychologists or teams of educators such as child study teams or teacher assistance teams devise individualized intervention plans for students experiencing academic or behavioral difficulties. There is evidence that such instructional consultation teams are associated with reduced referrals to special education (see Safran & Safran 1996), and specifically with a reduction in the disproportionate referral and placement of minority students (Gravois & Rosenfeld, 2006). This team problem-solving approach is currently gaining attention as a component of response-to-intervention models in which students receive instruction and support of increased intensity when they demonstrate inadequate progress with regular classroom instruction alone (see Bahr & Kovaleski, 2006; Kovaleski & Glew, 2006; Tilly, 2006). The 2004 reauthorization of the Individuals with Disabilities Education Act, the law that governs special education, has stipulated that a student's failure to respond adequately to quality interventions can be used as a factor in the determination of the presence of a learning disability.

Use of assessments in coaching

In their position statement on the role and qualifications of the reading coach, the International Reading Association (IRA, 2004) describes typical coaching activities such as providing professional development, modeling instruction, co-planning and co-teaching lessons, and observing teachers and providing feedback. In addition, the International Reading Association suggests that coaches may engage in activities related to student assessment, such as assisting teachers in conducting student

assessments or interpreting assessment results. However, a primary focus on student data is not consistently a major emphasis of instructional coaching in reading.

Student-Focused Coaching

Student-Focused Coaching (SFC; Hasbrouck & Denton, 2005) is a model of instructional coaching incorporating the problem-solving emphasis of collaborative consultation with a focus on the use of student assessment and observation data for decision-making. The goals of coaching in the SFC model are (a) improved student achievement, (b) solving problems that impede student growth, (c) helping teachers gain knowledge and skills to enable them to meet students' needs, and (d) preventing future problems by increasing teachers' resources and capacities to use effective instructional and classroom management strategies and to make instructional adaptations to meet the needs of all students (Hasbrouck & Denton, 2005).

A salient characteristic of the SFC model is its focus on the use of student assessment data (a) by the coach as a basis for making decisions about teachers and students who are the focus of coaching, (b) by the coach to inform the emphasis and nature of coaching, and (c) by the coach and teacher together in the process of collaborative problem-solving. This aspect of the SFC model is derived from research indicating that teachers who monitor their students' progress and use these data to inform instructional planning and decision-making have higher student outcomes than those who do not (Conte & Hintze, 2000; Fuchs, Fuchs, Hamlett, & Allinder, 1991) and that these teachers have a more realistic conception of the capabilities of their students than teachers who do not regularly use student data to inform their decisions (Fuchs, Deno, & Mirkin, 1984; Fuchs, Fuchs, Hamlett, & Stecker, 1991). Further, the emphasis on assessment in the SFC model was derived from the collaborative problem-solving models in special education consultation (cf., Idol, 1993) that result in adjustments in instructional delivery, materials, content, and context based on the continuous monitoring of student progress in a domain of interest (e.g., reading fluency, pro-social behaviors). Specifically, the SFC model has three primary characteristics that differentiate it from other approaches to instructional coaching.

First, decisions about the focus of coaching activities are based on student assessment outcomes and classroom observation data. Reading coaches who are responsible for helping raise reading achievement for many students across multiple classrooms must constantly make strategic decisions about the use of their time and the nature of coaching activities. These decisions are often dictated by a program of professional development that is provided to all teachers regardless of their individual needs with the goal of high fidelity of implementation of a reading curriculum. Rather than implementing a generic program of professional development and simply observing in classrooms and providing feedback, SFC coaches provide *differentiated coaching* based on a combination of needs (a) articulated by teachers, (b) evident from classroom observations, and (c) evident from student assessment data, with the latter always taking precedence. For example, if progress monitoring data indicate that students in some kindergarten classrooms are not making sufficient progress in phonemic awareness skills, the SFC coach will plan a

cohesive set of activities to build the capacity of those teachers to provide explicit instruction and multiple practice opportunities in phonemic awareness skills. This set of activities might include (a) small workshops or study groups, (b) regular team meetings to examine data and collaborate to devise plans to support student achievement, (c) coaches and teachers co-planning explicit phonemic awareness lessons or evaluating the adopted core reading program to decide where to incorporate more explicit instruction and practice opportunities, (d) coaches or skillful peers providing modeling of instructional strategies related to phonemic awareness instruction, (e) collaborative problem-solving with kindergarten teachers to devise strategies for supporting student growth, or (f) other activities directed at phonemic awareness instruction. Over time, as a school moves closer to the goal of school-wide collaboration with the shared goal of reading success for all students, the requests for coaching support by teachers engaged in SFC become increasingly based on their own examination of student data, and coaching becomes more and more directly student-focused.

A second salient characteristic of SFC is that, rather than focusing classroom observations on teacher behaviors, coaches focus on the interactions between student and teacher behaviors. Rather than providing teachers feedback with statements such as, ''You could provide more clear modeling and demonstration of the skills you are teaching,'' SFC coaches provide a ''second set of eyes'' to notice how students are responding to instruction. Thus, coaches are able to make statements such as, ''I noticed that when you provided a clear model to show the students how to read words with the silent *e*, your most challenging students, Marissa and Michael, were successful on most of the practice items,'' or, ''When you presented the silent *e* rule in the large group setting, Marissa didn't read the words correctly, but when you reinforced the skill by modeling clearly in the small group, Marissa had a high rate of success.'' This kind of student-focused feedback helps to reduce the feeling of evaluation of classroom observations, and helps teachers understand and take responsibility for the effects of their instructional decisions on student outcomes, even for students with reading difficulties.

The third unique aspect of SFC is the use of a systematic problem-solving approach for collaborative planning. Based on strategies used in collaborative consultation, the approach involves a four-step process of (a) carefully defining the problem (based on data collected from classroom observations; student assessments; interviews of teachers, parents, and others; and a review of relevant student records) and setting measurable student goals, (b) collaboratively developing strategies to address the problem and move students toward the goals, (c) implementing the strategies and monitoring student progress, with modification of the strategies if there is insufficient progress, and (d) evaluation of the effectiveness of the plan.

To illustrate, we describe an SFC problem-solving scenario involving a first-grade struggling reader (who we will call Crystal). Crystal refuses to participate and is often off-task in a supplemental reading intervention group. Progress monitoring assessment data show that Crystal is not making sufficient growth in reading, so the SFC reading coach meets with Crystal's teacher to discuss the problem. Their first job is to identify what is causing Crystal's growth to be impeded. Teachers often believe that students' lack of academic success is caused by a lack of effort or

ability on the part of the students themselves. Through the collection of observation and assessment data, a coach may see that the problem, in fact, may be more related to instructional, classroom management, or curriculum-related issues. By skillfully sharing data collected while observing and documenting student–teacher interactions during lessons, the coach may help the teacher see the problem in a new light. In our scenario, observational data indicate that (a) Crystal is frequently off-task during instruction that is delivered generally to the group and requires her to listen for more than a brief period of time without active involvement and that (b) Crystal often fails to master new skills taught in the intervention lessons, probably related to a need for more opportunities to practice with corrective feedback. The coach shares the data and engages the teacher in a discussion that helps her see that the problem is not just that Crystal will not do or cannot do her reading work. The teacher begins to understand that making changes in how she provides instruction could help Crystal be more successful. Together, the teacher and coach write a clear statement of the problem identified by the data: ''Crystal is making insufficient growth in oral reading fluency. This appears to be related to difficulty remaining on task when she is not actively involved in instructional activities and to a need for more opportunities for practice with corrective feedback to master newly learned skills.''

Crystal's teacher and the reading coach set two goals for Crystal, one related to improved participation in reading intervention lessons and the other to improved performance on reading fluency monitoring measures. These goals are clearly stated in observable terms: (a) Crystal will demonstrate on-task behavior for at least 85% of daily reading intervention lessons for a 2-week period, and (b) Crystal's scores on weekly progress monitoring assessments of oral reading fluency in connected text will demonstrate gains of at least two words read correctly per minute per week for a 1-month period (i.e., progress from a score of 12 words correct per minute, or wcpm, in Week 1 to a score of 14 wcpm in Week 2, to 16 wcpm in Week 3, etc.). Fuchs, Fuchs, Hamlett, Walz, and Germann (1993) demonstrated that first-grade students receiving instruction focused on fluency can be expected to gain an average of 2–3 wcpm per week in oral reading fluency scores.

Next, the teacher and coach brainstorm possible adaptations in instructional delivery and materials to support Crystal's progress toward these goals. During this conversation, the teacher and coach also make a plan to monitor the effectiveness of the adaptations (e.g., periodic observations by the coach; examining Crystal's reading fluency data, which is charted weekly; a brief checklist completed by the teacher each day following Crystal's group's lesson).

Once the plan is in place, the teacher implements it in her classroom. The coach may provide support to the teacher by co-planning lessons with many opportunities for active student engagement and guided practice with teacher feedback, modeling delivery of these lessons with energetic, quick pacing, meeting with the teacher to review the progress monitoring graphs, or in other ways.

After a time (usually about 2 weeks), the coach and the teacher meet again to evaluate the effectiveness of the plan in supporting Crystal's improved progress. The teacher and the coach decide collaboratively whether to continue the plan as written, make some modifications, or discontinue the plan. All these steps in the process are reiterative; for example, if Crystal does not respond positively to the

plan it may be necessary to return to the first step in the process, and re-examine the problem. Even the most elegant solution is doomed to failure if it does not address the correct problem.

This problem-solving approach is highly dependent on regular monitoring of student behaviors and academic progress across time so that strategies implemented to address the problem can be modified if there is insufficient progress (see Denton, Hasbrouck, & Sekaquaptewa, 2003, for a descriptive case study illustrating this process). The collaborative nature of the problem-solving process is designed to increase teachers' capacities to use data—primarily collected from student assessments and classroom observations—to develop instructional adaptations that could prevent and solve problems in the future independent of the coach.

It is unclear, however, specifically how practicing reading coaches use student assessment data in the SFC model. In order to examine further the role of student assessment in instructional coaching, we will (a) describe a study of SFC, (b) describe the use of student assessment data in two reading intervention programs provided by intervention teachers in this study, and (c) describe interactions related to the results of these student assessments between coaches and teachers of the two reading intervention programs in a technology-based application of SFC.

Study of scaling-up and instructional coaching

Research is currently underway examining the effects on teacher and student outcomes of SFC provided to reading intervention teachers within a study of scaling-up interventions that demonstrated efficacy in previous research conducted by Mathes et al. (2005). This ''Scale-up'' study is being conducted in multiple schools in widely varying contexts with less researcher control than is typical of many intervention studies (Denton, Swanson, Mathes, Jia, & Shih, 2007). The study has three overarching goals: (a) to study the factors related to scaling-up research-supported interventions in natural school settings with widely differing contexts, (b) to learn whether the two interventions are sufficiently robust to have significant effects on student achievement despite variations in teacher background, consistency and quality of implementation, and other factors related to school context, and (c) to study the effects of providing instructional coaching support to the intervention teachers using three different mechanisms. This paper will focus on the latter purpose.

Context and participants

The study is taking place in approximately 38–48 schools for each of 4 years in a wide geographic area of a southern state. The schools are in urban, suburban, and rural districts, and they vary widely in student characteristics, including socio-economic status. In each school, one to three reading intervention teachers provide one of two first-grade interventions every day to groups of three to five students, with each teacher serving from one to three research intervention groups each day. Teachers are regular school employees who were selected by their schools to deliver

the intervention. All are certified teachers, but their regular assignments vary greatly. In some schools, certified and experienced reading specialists provide the intervention, while in other schools intervention is provided to one to two groups per day by special education teachers, classroom teachers, librarians, or other school personnel who have teacher certification but little or no experience teaching reading.

Currently, one of the 4 years of the study has been completed. During the first year of the study, 34 teachers and 336 students participated. One hundred and fifty-nine students received a research reading intervention in addition to their regular classroom reading instruction, while 177 students received the typical instruction delivered to at risk first-grade readers in their schools. Of these comparison students, 108 were provided with an alternative intervention of some kind in addition to classroom reading instruction, and 69 received no alternative intervention according to typical practices in their schools.

Procedures

When schools or districts agree to participate in the study, they are asked to select from two small group reading intervention programs—Responsive Reading Instruction (Denton & Hocker, 2006) and Proactive Beginning Reading (Mathes, Torgesen, Menchetti, Wahl, & Grek, 1999). In a previous study conducted in six schools in a single school district (Mathes et al., 2005), both interventions were associated with statistically higher gains in word reading (timed and untimed), spelling, phonological awareness, and oral reading fluency, than comparison at-risk students in the same schools who received instruction typically provided to struggling readers in their schools. Although the two interventions vary considerably in (a) theoretical orientations, (b) levels of prescriptiveness (i.e., scripted lessons), (c) amount of time spent practicing reading-related skills (i.e., letter–sound correspondences, word reading) in isolation and applying skills and strategies within engaged reading and writing practice, and (d) type of text used (i.e., decodable vs. leveled text), outcomes for the two groups differed significantly for only one measure—students in the Proactive condition had significantly higher scores than students in the Responsive condition on the Woodcock–Johnson III Word Attack subtest (a test of context-free decoding requiring students to read nonsense words). The interventions are described in greater detail below.

In the current Scale-up study, once personnel in the school (or school district) have selected the intervention (Responsive or Proactive) to implement, school administrators select one to three teachers who will deliver the selected intervention and determine the schedule and location for intervention delivery. Researchers provide teacher handbooks and other basic materials needed to implement the intervention. Researchers also assist the schools in administering screening assessments to identify students at the beginning of first grade who are at-risk for reading difficulties. Once students are identified and parent consent for participation is obtained, at-risk students are randomly assigned to receive either the research intervention selected by the school (Responsive or Proactive) or to receive whatever intervention or instruction is typically provided by the school to struggling first-grade readers. Teachers are asked to provide the research intervention for 40 min

per day, 5 days per week, for at least 24 weeks. However, since this is a study of scaling-up interventions in diverse school contexts, the researchers have limited control over the actual implementation of the interventions.

In addition to random student assignment to treatment and comparison conditions, intervention teachers participating in the study are randomly assigned to receive instructional coaching in one of three conditions: (a) on-site coaching, (b) coaching on demand (in which teachers may have contact with their coaches via telephone, e-mail, or on-site visits, but coaching is provided only when teachers request it), or (c) technology-based coaching. These conditions are described in greater detail below. The same coaches, all experienced master teachers in their respective intervention models (Proactive and Responsive), provide coaching in all three conditions using the SFC model (Hasbrouck & Denton, 2005).

Interventions

Teachers in both the Responsive and Proactive programs provide explicit instruction in phonemic awareness, phonics, fluency, and comprehension. However, the two interventions differ in many key ways. Proactive Beginning Reading is a scripted program based on Direct Instruction principles, with a carefully constructed scope and sequence. Students in the Proactive group are taught a synthetic phonics approach and apply these skills in fully decodable text. Responsive Reading Instruction includes a sequence for introducing phonics elements, but teachers plan lessons based on student assessment data. Responsive Reading can be used with any text at the students' instructional reading levels; in our research, teachers have used leveled rather than decodable text. Students in both intervention conditions receive explicit phonics instruction with opportunities to practice skills in isolation and apply them in text reading, but students in the Responsive group spend a larger percentage of each lesson applying skills in reading and writing connected text with the support of their teachers than do students in the Proactive group.

Measures and results

We are collecting teacher observation data, student outcome data, and qualitative and survey data designed to enable us to address the research questions and to describe the processes involved with scaling-up interventions. Currently, as only one of the 4 years of the study has been completed, only preliminary data are available. Year 1 results, which will be reported in detail in a separate publication (Denton et al., 2007), suggest that students who received one of the two research interventions (Responsive or Proactive) had statistically higher outcomes than comparison students in their own schools (some of whom received alternate intervention programs) in phonological awareness, timed and untimed word reading, phonemic decoding, passage comprehension, and spelling. Because only 34 teachers were randomly assigned to three coaching conditions during Year 1 of the study, there is insufficient power to examine the effects of coaching on teacher or student outcomes using Year 1 data only. Since the study is being conducted over a 4-year period, we will be able to address these questions as more data are collected.

Uses of assessment in Responsive Reading Instruction and Proactive Beginning Reading

The remainder of this paper will focus on teachers' and coaches' uses of student assessment data in the Scale-up study. In order to understand the use of assessment in SFC as it is being implemented in this research, we first describe the use of assessment data in the Responsive and Proactive interventions. Researchers have demonstrated that teachers who assess student performance and use that information to plan instruction have better student outcomes than those who do not (Ysseldyke, 2001), but the nature of the role of assessment in individual instructional programs may differ depending on characteristics of the programs. Diagnostic and progress monitoring assessments play a role in highly prescriptive programs such as the Proactive intervention, but it may be different from the role of assessment in intervention programs that are less specified and in which teachers make more decisions about the focus of instruction. Differences and similarities between the use of assessments in more or less prescriptive programs are evident in the instructional practices and coaching interactions in the two interventions implemented in the Mathes et al. (2005) study and the current Scale-up study.

Assessment in Proactive Beginning Reading

As described above, the Proactive intervention (Mathes et al., 1999) is based on the principles of Direct Instruction, with a scope and sequence designed to scaffold student success in several ways, including teaching necessary pre-skills before introducing new skills and embedding multiple opportunities for practice, including cumulative practice over time. Teachers of scripted programs such as this may appear to have limited need for diagnostic assessment, but in fact, ongoing monitoring of student mastery of skills is critical in Direct Instruction programs (Engelmann, 1999). Diagnostic assessment in the Proactive program includes the regular administration of mastery tests to measure students' ongoing progress in the skills being taught, as well as daily and continuous observation of the students' responses to instruction. Effective instruction should result in high levels of student engagement and a large percentage of correct responses with few errors. In our research, we have observed the critical importance of student mastery of skills and of teachers' adaptations of the presentation and pacing of instruction depending on their ongoing observations of student responses and results of mastery tests. In our original intervention study (Mathes et al., 2005), students of teachers who did not monitor student mastery of content and respond to student needs for re-teaching or extended practice had lower reading outcomes than students of teachers who were highly conscious of the critical role of this kind of assessment (Denton & Mathes, 2003).

Assessment in Responsive Reading Instruction

Responsive Reading Instruction (Denton & Hocker, 2006), the second intervention in both our original (Mathes et al., 2005) and current Scale-up studies, places heavy

emphasis on planning lessons based on the outcomes of student assessments. Teachers implementing Responsive Reading as a daily small-group intervention provide 40-min lessons divided into four segments: 10 min of explicit phonemic awareness and phonics instruction and practice, 10 min that include both fluency instruction and daily assessment of one student in the group, 10 min of practice reading connected text with the teacher's scaffolding and support in the application of phonics skills and comprehension strategies, and 10 min of writing one to two complete and accurately written sentences with teacher support in response to a question from the teacher about the book that was just read. Within this framework, Responsive Reading Instruction provides teachers with a suggested sequence for the introduction of new skills and strategies and a menu of activities for introducing, practicing, and applying skills and strategies (although the program can be used with any well-planned scope and sequence to coordinate with students' core reading programs). Based on the outcomes of student assessments, teachers select from this menu of activities to plan daily lessons.

As noted above, during every daily lesson, the Responsive Reading teacher administers a brief assessment to one member of the group. This rotates through the group, so that every student is individually assessed at least one time each week. While the teacher is administering this assessment, the other students in the group engage in repeated reading to build fluency, usually in a partner reading format. The teacher selects from several assessments depending on the kind of information needed to plan instruction. Included in the program are assessments of (a) letter name knowledge (for early lessons only), (b) knowledge of the sounds of individual letters and letter combinations, (c) recognition of high-frequency words, (d) reading accuracy in connected text, and (e) oral reading fluency. Besides these measures, Responsive teachers record pertinent observations regarding student strengths and needs throughout each daily lesson in anecdotal records.

Progress monitoring assessments

In both the Mathes et al. (2005) study and the current Scale-up study, researchers monitored growth of students in all research conditions in reading connected text fluently and accurately, and in the Scale-up study we also monitored growth in fluency of segmenting words into phonemes (phonemic awareness) and reading nonsense words (phonemic decoding). Growth in oral reading fluency across time can be evaluated by assessing intervention students repeatedly on a regular basis (i.e., every 1–3 weeks) using passages that have been developed and field tested to assure that they are equally difficult. In our first-grade intervention studies, we repeatedly assessed oral reading fluency using a set of passages at approximately a 1.7-grade level. In this way, we were able to track student progress toward the year-end benchmark using a uniform series of measures. In both studies, the research team conducted these fluency assessments and provided the results to the intervention teachers and classroom teachers in the form of graphs showing growth across time.

Teacher feedback about diagnostic and progress monitoring assessment

To examine intervention teachers' perceptions of the instructional approaches and coaching provided in Year 1 of the Scale-up study, we conducted focus groups of the participating intervention teachers. One topic addressed was the use of assessment data to plan instruction. A preliminary analysis of the focus group transcripts from the first year of implementation indicated that many teachers viewed as valuable the data they had collected using assessments that were closely aligned with the intervention programs. This was particularly true for Responsive Reading teachers. For example, one Responsive intervention teacher noted, ''I think it [daily assessment] is necessary. You have to assess them. It helped [me] to pick the books. It helped to pick what letters to teach ... how to plan, where to start, what they're having problems on, what their strengths and weaknesses are, so you can narrow in on what they need.''

However, some teachers considered the data from the ongoing progress monitoring assessments less valuable because they did not see a direct link between the results of those assessments and the intervention programs. The need for quality training in interpretation of the results was illustrated by one teacher who said, ''I looked at [the progress monitoring graph] but ... it made no sense to me .... The last time [my coach] came she explained ... that this is our benchmark, where we really want the kids to be by the end of the year. When she did that, ... I realized that my kids are very, very low in [oral reading] fluency .... I was glad she explained it to me because ... then I realized that I needed to do a lot more with fluency. I had no idea my kids were that low ... so that part has driven my instruction.'' At the beginning of the study, the teacher had received a cover letter describing the interpretation and use of the fluency graphs, but she noted, ''I think there was a formal letter, but it didn't really mean anything to me. I needed somebody to sit down and say this is what's going on.''

The use of student assessment data in instructional coaching

As described above, as part of the current study of scaling-up, we are investigating instructional coaching provided to reading intervention teachers using the SFC model (Hasbrouck & Denton, 2005). The three essential elements of this approach—decisions about the focus of coaching activities based on student assessment outcomes, directing classroom observations at the interactions between teachers and students, and implementation of a systematic data-based problem-solving approach—necessitate a sustained focus on data. As described above, our research design includes the random assignment of teachers to receive coaching either through (a) traditional on-site coaching visits, (b) a technology application called the ''Virtual Coach,'' or (c) a combination of telephone, email, and on-site visits, all of which must be initiated only by the teacher (coaching ''on demand''). The same coaches provide coaching in all three conditions.

On-site coaching

Teachers receiving coaching in the on-site group are visited by their coaches at least once each month. During a typical visit, coaches arrive early so that they can examine student assessments administered by the intervention teachers. Then coaches may observe a lesson, noting teacher–student interactions, and debrief with the teacher afterwards. This debriefing session includes examining student assessment data and relating student outcomes to teacher–student interactions observed during the lesson. When student assessment data indicate insufficient progress in reading development, the coach and the teacher engage in the systematic problem-solving process described above. On some visits, the coach may co-plan lessons with the teacher or model instruction during parts of the lesson.

In some instances, the coach and the teacher engage in a coaching routine unique to SFC, adapted from Showers and Joyce (1996). First the teacher and the coach meet to co-plan two lessons based on student assessment data. Then the coach teaches the first of these lessons, while the teacher observes, noting on a form instances when the coach implemented a pre-specified aspect of effective instruction (e.g., explicit modeling of skills, providing many opportunities for practice, providing specific corrective feedback and praise) and the reactions of the students. Next, the teacher teaches the second co-planned lesson, while the coach observes and uses the same procedure to record instances when the teacher implemented the same aspect of effective instruction and the students' reactions. Finally, the coach and the teacher reflect on both lessons, and the coach models self-reflection about what went well in the lesson she taught and what should be done differently next time. The only feedback given to the teacher is the account of the instances during her lesson that the teacher *successfully* implemented the effective instructional strategy that was the focus of the observation. Through this coaching routine, (a) the coach models planning and delivering lessons based on student data, (b) the teacher's attention is focused on a particular aspect of effective instruction, and (c) the coach models the process of self-reflection in which expert teachers routinely engage.

The Virtual Coach

The Virtual Coach, the technology-based adaptation of SFC, is available in Responsive and Proactive intervention versions. Each consists of a combination of a compact disk (CD) and an internet interface. The CD contains (a) video clips demonstrating most of the lesson formats or activities of the respective intervention, (b) copies of the Power Point files presented during professional development attended by the intervention teachers, with speaker notes, and (c) an interactive tool demonstrating the pronunciations of common phonic elements. Within the interactive web-based component, coaches and teachers engage in one-on-one conversations, and groups of teachers implementing the same intervention interact with the coach in a ''team space.'' Although conversations are not in ''real time,'' coaches respond to teachers within 1 day. The tool allows coaches to upload copies of charts and graphs displaying student assessment data and suggest that teachers

view video clips or professional development slides on the CD, with links to these items embedded within the coach's messages to the teacher. This allows the teacher to read the coach's questions or comments related to assessment data and immediately click on a link to view the data. Assessment data that are collected as part of the interventions (i.e., Responsive letter–sound assessments, Proactive mastery tests) are put into a format that allows teachers to easily track student progress. For example, teachers can easily examine the tabulated results to determine exactly which letter combinations their students had identified correctly in more than one administration of the assessment and which were not yet mastered. Progress monitoring data (i.e., oral reading fluency, phoneme segmentation fluency, and nonword reading fluency) collected by the research team are presented in the form of line graphs.

Since coaches using the Virtual Coach cannot directly model lessons for the teachers, they use the video clips on the CD to provide modeling. Similarly, since the coaches cannot directly observe lessons taught by the teachers, coaches use a questioning technique to encourage the teachers to describe their own teaching and their students' behaviors. In order to facilitate coaches' relationships with their teachers in the Virtual Coaching condition, the same group of coaches delivers in-person professional development to all teachers in the study, and the Virtual Coach includes a picture of each teacher's coach. Thus, there is a sense that the Virtual Coach is a mode of communication with a ''real person'' rather than an impersonal technology.

Conversations about assessments on the Virtual Coach

To better understand the nature of coaching interactions related to student assessments, we examined the transcripts of the Virtual Coaching interchanges between two Responsive coaches and a group of Responsive teachers, and between two Proactive coaches and their intervention teachers over the course of one school year. We were especially interested in differences between coaching interchanges for the highly prescriptive Proactive program and the Responsive intervention, in which teachers select activities and instructional emphases based on assessments and observations of students.

Transcripts for all coaches consisted of one-on-one private interactions between coaches and individual teachers. Using the Virtual Coach tool, coaches uploaded the two kinds of assessment data described above (assessments aligned with each program and generic progress monitoring assessments), so that intervention teachers could examine the results.

Categories of virtual coaching conversations

Examination of the transcripts of coach–teacher interchanges revealed four general categories of coaching statements or questions: (a) answering procedural questions related to assessment administration or interpretation, (b) suggesting that teachers implement specific instructional strategies based on assessment results, (c) engaging teachers in examining assessments and observing students, and (d) providing

feedback to teachers based on assessment results. These categories were observed in interchanges in both the Proactive and Responsive interventions, although the nature of the suggestions provided to teachers of the two interventions differed.

Answering questions related to assessment

At times, coaches described for teachers how assessment results should be interpreted and used to make instructional decisions. On several occasions, teachers asked questions related to the progress monitoring data that were collected by the research team and provided to teachers in the form of graphs of progress in phoneme segmentation fluency, nonword reading fluency, and oral text reading fluency. For example, a coach addressed a teacher's concern about fluctuation in a student's oral reading fluency scores from one administration to the next, assuring the teacher that some ''bounce'' in the scores was normal and that the important thing was a steady growth trend across time. Teachers sometimes expressed concern when student scores declined, particularly on the nonword reading fluency measure, and coaches informed them that this is often observed as students transition from providing isolated sounds for each letter in the nonsense words to ''sounding out'' the entire nonsense word letter-by-letter and then blending the sounds. The Responsive intervention transcripts also contained examples of teacher questions related to the administration and use of assessments administered as part of the Responsive program, but we did not find this kind of enquiry from Proactive teachers regarding the Proactive Mastery Tests. This was expected, given the larger number of assessment routines in the Responsive program.

Suggesting instructional strategies

Coaches in both interventions often discussed the instructional implications of assessment results. At times, they appeared to be modeling their thinking processes related to using data in instructional planning, and there were examples of detailed analyses of assessment results in terms of patterns of students' reading-related behaviors. This excerpt from a Responsive coach's entry illustrates a suggestion based on a close alignment between assessment and instruction, ''It is interesting that this student has some confusion with *c* and *ck*. This would be a good opportunity to show this student that *c* and *ck* make the same sound. I would reteach *ck* and *c*. You could also do some Word Building [a Responsive Reading activity] with *ck* words (*sick*, *lick*, *kick*), Listen and Spell activities with *ck*, and make a word pattern chart with *ck* words that you write on the chart and students read.''

Often, coaches discussed the pacing of instruction (both within and across lessons) in terms of student progress on assessments, frequently incorporating discussions of student progress in relation to year-end benchmarks. For example, a Proactive coach wrote, ''If your students only complete Lesson 60 they will only be expected to be reading about 30 wpm [words correctly per minute]. The minimum we want them at is 40 wpm so you can see it is time to sprint. If you push them too hard it will show up in an increase in errors, and that will be the indication you have to pull back a little.'' A Responsive coach frequently encouraged teachers to move

students up to more difficult text reading levels with suggestions such as, ''I would continue to move the students up [in book levels] by using your good teacher judgment when your students are successfully [reading] on an instructional level when they read a new book [at the current level] ... [Student name] is reading at 98% accuracy on Level E. Remember we want the students to be reading at an instructional level with 90%–94% accuracy [in their lessons], so Level E is too easy from what I can see.''

A Responsive teacher reflected this sense of urgency related to student progress in a Virtual Coach entry in December, when there are typically many interruptions in the teachers' schedules for holiday-related activities. The teacher expressed a hesitation to use intervention time to administer assessments to prepare for the new semester, a suggestion from her coach. The teacher wrote, ''I want to teach more [at this time] because the students are in class every day until the 16th. It has given me a chance to begin working on harder concepts and pushing my students forward. They have some momentum now, and I don't have a lot of time for [additional] assessment. I have done only a few assessments for Word Work and sounds for December because we have been working consistently on these things during group [lessons]. I am also working on their writing skills. I hate to stop when we're on a roll.''

As expected, the Responsive coaches suggested that teachers implement specific activities based on assessments, but this was also true to a lesser extent of the Proactive coaches, despite the fact that the Proactive teachers were using a scripted program.

A Proactive coach described an activity that can support growth in nonword reading fluency, ''Some of my teachers have inserted a one minute activity in their lessons to support nonword growth .... Again, this is not a regular activity. It only takes a minute and you can have fun with it and see if you can take the mystery out of reading words that don't make sense.'' To address lack of student progress in oral reading fluency, the same coach suggested that teachers integrate an echo-reading activity into their lessons.

In the Responsive intervention, coaches frequently suggested that teachers select certain activities and focus on particular phonics elements based on assessment data. For example, in a discussion of results of the Responsive letter–sound assessment, a coach asked, ''How is [student name] doing with the sound /o/ (the short o sound)? You might want to pick words with /o/ and make sure you don't use words with /e/ since he is making the same sound for both vowels.'' For a student who needed practice to support oral reading fluency, the coach suggested, ''If you look on page 37 [of your teacher handbook], there is another activity that you can do with the [students, including] timing them. You will use an unfamiliar text on their level. Check it out. Let me know how your students do on this.''

Engaging teachers in examining assessments and observing students

The third common category of interactions was related to coaches encouraging and stimulating teacher examination of assessment data and focused observation of students. Coaches varied in the frequency and skillfulness with which they engaged

in this kind of activity. Some were frequently prescriptive, suggesting activities or strategies the teacher might try or even telling the teachers to implement certain activities, while other coaches were more likely to use questioning techniques to increase the teachers' capacities to draw conclusions based on the assessments. In these instances, coaches asked questions related to (a) whether the teachers were observing the same trends during instruction as were exhibited in the data, (b) how the teachers interpreted the assessment data, and (c) what teachers had done or planned to do based on the data.

One Responsive coach gave specific suggestions, but included references to the value of the teacher's experience and judgment, as she wrote, ''[Working with this student] sounds frustrating. I'm not sure I can share any new and exciting ideas. All I have are suggestions, and, if anything, I'm a sounding board for you. ... I think it would be helpful to scaffold as much as you can and really make him feel good when he does something well ..., and really make sure you give him specific praise. Then, slowly remove scaffolds as he starts showing repetitive success. I'm sure you know all of this, but I know that with students like this it really helps [to talk with someone].''

A Proactive coach was especially skillful in asking questions to stimulate teacher reflection about student assessments and behaviors during lessons. On one occasion she wrote, ''After you look at the CPM (continuous progress monitoring) data let me know if you think it is consistent with what you are seeing in class. Do [student name] and [student name] usually master their word reading activities? What is the most common error you see these two make during a lesson?'' On another day the same coach wrote, ''I am most interested in how [student name] and [student name] look during individual practice. Do they demonstrate mastery on each activity? I am interested in your thoughts about this after you have had a chance to look at the data.'' This coach asked another teacher, ''What is your impression of what you are seeing [on the fluency graphs]? The data from the graphs can help you to focus on what your students need in order for them to reach grade level. I can help you interpret those graphs.''

An example of more detailed questioning was found in a Proactive transcript in which the coach said, ''Let's look at [student name]'s data together. She had to take [Mastery] Test 2 and Test 5, as you said, twice to pass them. On Test 2 she had trouble passing [the item on] reading a sentence. On Test 5 she is having trouble at the word level with the CVC word type. Please look back at previously missed items to see if there is a pattern or any connection that may have led to the trouble she is having now. I'd also like you to describe a common error correction you use with [this student] when she is exhibiting a lot of confusion.''

Sometimes questions were meant to focus teachers' attention on observing particular student behaviors. A Responsive coach asked, ''If I were going to come out to teach your groups and asked your students, 'What do you do when you come to a word you don't know?' would they be able to tell me what to do?'' The teacher responded, ''I asked the question about what to do when you come to a word you don't know. Very interesting results. [Student name] knew the three-part word reading strategy [taught in Responsive] and demonstrated her knowledge in the lesson. [Student name] knew the terminology but was not secure with the process,

and [student name] was not sure of either. I will definitely make it my focus tomorrow. Thank you for the thought-provoking question.''

In response to her coach's enquiry about children's behaviors related to fluency, one Responsive teacher demonstrated her ability to observe and analyze specific student behaviors:

> Although they were able to read Level E on the benchmark [assessment] and were scoring in the 90% to 95% accuracy range, fluency was very bad. Almost everyone in that group resorts to sounding out [words very slowly]. They seem to get the idea of what to do, but they do it slowly, and they have great difficulty and seem to be very stressed when encouraged to speed up through the word .... I have been thinking and exploring the Responsive Reading [teacher handbook] to find help for myself so I can get then to move faster through words, to listen to themselves when they are reading, and to check for accuracy. ... These children work hard but don't sound so good when they read. ... When I tested them for [reading high-frequency] words they were able to do quite a few of the words on the [high-frequency] word list. Their problems are related to sequencing sounds. When they make errors they reverse sounds or leave sounds out. It seems that we've worked on that quite a bit, but apparently it's not enough .... Fluency and independence are the issues. There are some problems that these dependent students have that are related to using their own thoughts as much as possible. They will purposely wait for someone else to do the hard parts rather than venturing to try.

The coach responded, ''You are on target with your focus on fluency and independence for all your students. This is very important. It is easy for these students to try to 'sponge off' of other students instead of trying the hard part themselves. ... Have you been able to do Word Linking, Word Sorts, and Word Pattern charts with these students? These really help students to identify patterns in words and feel successful in attempting words.''

Providing feedback based on data

Coaches frequently provided two kinds of feedback to teachers based on assessment data. The most common was positive feedback and encouragement when students demonstrated growth. Recognition of student gains was sometimes simple, as in, ''Looks like [student name] had a nice pop up in Oral Reading Fluency!'' Some comments were more detailed, such as, ''Wow! Your students have made some nice gains. [student name] read 28 words in a minute, up 11 words from last month! [student name] also read 28 words, up 10 words since last month, Congrats! Looks like your work with fluency is paying off.''

Coaches also used progress monitoring data to identify for the teachers students who were not making sufficient growth and who should be the focus of increased attention and coaching, including problem-solving activities. A Proactive coach wrote, ''I am so happy to hear that [student name] is making better progress. Her [oral reading fluency progress monitoring] scores show she is reading at 13 wpm [words correct per minute]. She started out at zero. Her progress is slow, but if she is

able to master the skills you are teaching her, she will improve. What did you do to help her to attend to each individual sound in the words?'' A Responsive coach specifically suggested that she and the teacher focus their problem-solving on two students based on low rates of progress: ''I have looked at your oral reading fluency graphs. Some of your students have made some tremendous gains! ... There are some students that we need to focus on. [Student name] read only 7 words per minute. ... Also [student name] read 14 words per minute, but this is the same number of words as last month.''

The predominant theme, however, was positive reinforcement of even small student gains, and this attitude was reflected in the responses of teachers as well as coaches. One Responsive teacher expressed her enthusiasm about assessment results and thanked her coach, writing,

> I have assessed a slew of my Responsive students. WOW!! We have made such progress this semester according to the Responsive assessments as well as tools that the district utilizes. [Student name] was instructional on the Level H benchmark book! [Student name] has read the Level G benchmark! [Student name] read the Level E book, which is fabulous considering the inconsistencies in her [previous] assessments. ... The progress is thrilling. My focus will continue to be on oral reading fluency and the use of letter combinations and the silent *e* rule in the three-step [word identification] strategy.''

Conclusion

In his summary of 25 years of research on the use of assessment to make instructional decisions, Ysseldyke (2001) affirmed the key role of assessment in effective instruction. The examination of the role of assessment in the implementation of two first-grade reading interventions confirmed that effective teachers of these interventions made use of data from ongoing diagnostic and progress monitoring assessments. A commitment to data-based decision-making was strongly evident in conversations with instructional coaches using technology-based coaching.

The key role of diagnostic and progress monitoring assessment was apparent in both a highly prescriptive, scripted program, and in a program in which teachers planned lessons based on assessment results. The successful implementation of the Responsive Reading Instruction program depends on teachers' interpretation of the results a set of assessments closely aligned with the program and their use of those data in daily lesson planning. Results of teacher focus groups suggested that Responsive intervention teachers actively engaged in the process of data-based decision-making. Technology-based communications between Responsive Reading coaches and teachers illustrated detailed examination of data from assessment and teachers' observations to identify skills and strategies that should be the focus of instruction. Similarly, teachers of the Proactive intervention used data from Mastery Tests provided by the program, as well as ongoing progress monitoring data, to guide instructional decisions. Proactive coaches called teachers' attention to fluency

goals as they discussed lesson pacing. Likewise, there was evidence that teachers in both intervention conditions set goals for student performance and adjusted the pacing and focus of instruction based on progress monitoring data.

The examination of interactions between instructional coaches and intervention teachers related to student assessment illustrated the dimension of data-based coaching in the SFC model. Examinations of practices common to schools in which most students become successful readers despite challenging circumstances (i.e., Denton, Foorman, & Mathes, 2003) have established the importance of strong instructional leadership and of a collaborative school culture that includes groups of teachers and other educators, often including administrators, meeting regularly to examine progress monitoring results, and systematically and collaboratively addressing problems related to students who demonstrate inadequate progress. This kind of collaboration focused on student outcomes was evident in teacher–coach interactions throughout the virtual coaching transcripts, although there was less evidence of engagement in the formal problem-solving process. As coaches become more adept at implementing the SFC model via technology, this element may become more pronounced.

Our ongoing research of instructional coaching will provide information about the effects of the SFC model on student outcomes, the critical test of the value of any professional development activity. Further research of instructional coaching is warranted, including both randomized field trials to examine its effects on teacher and student outcomes and qualitative research that provides rich descriptions of the nature of the coaching relationship.

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