

Providing Effective Literacy Instruction to Students With Down Syndrome

Stephanie Al Otaiba • Michelle K. Hosp

Rhonda slid into the back seat of the car with her friend. "What did you read today?" she asked.

Jane answered, "Berenstain Bears at Night. And you?"

Rhonda smiled and responded, "Polar Bear."

Rhonda and Jane are middle-school students with Down syndrome who joined 2 first-grade students with Down syndrome, Carl and Laura, and 14 additional students with reading difficulties in an after-school University Reading Clinic. The parents of the students with Down syndrome wanted their children to learn to read for enjoyment, for safety, and for employment but were concerned that their children were receiving as little as 1 hour of reading instruction per week at school. Moreover, the parents reported that their children's individualized education programs (IEPs) reflected no clearly articulated reading goals and contained no plan to monitor the children's progress in reading.

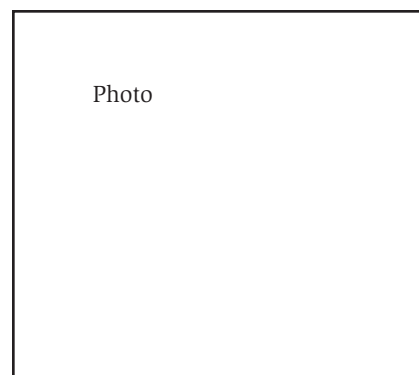
Students like Rhonda have little instructional time to waste. Commonly, children with disabilities begin their school careers with less than half the exposure to print than children without

disabilities (Fitzgerald, Roberts, Pierce, & Schuele, 1995); receive fewer opportunities to engage in literacy activities than peers in early childhood programs (Koppenhaver, 1993; Marvin & Mirenda, 1994); and may be less likely to benefit from generally effective reading interventions (Al Otaiba & Fuchs, 2002).

Their teachers are not to blame. Current standards for the preparation and certification of special education teachers do not provide guidelines about instructional strategies for teaching reading to students with mental retardation (Katims, 1999). As a result, many special education teachers report that they feel unprepared to teach reading to these students (Moats & Lyon, 1996). Further, little is known about what level of reading achievement is attainable for students with mental retardation in general and for students with Down syndrome in particular (Carr, 1988; Oelwein, 1995). The problem, therefore, is that a limited research base is available to teachers on effective reading instruction strategies for students with mental retardation.

The Model

To address this problem and to better prepare preservice teachers who were functioning in the role of reading tutors (hereafter referred to as "tutors"), we



developed and implemented a tutoring model. This model was guided by research that showed tutoring is most effective at improving reading outcomes for students when tutors are well trained, tutoring is well implemented, and student results are formally evaluated (Elbaum, Vaughn, Hughes, & Moody, 2000) as well as research that has shown that tutors benefit most when given good training, ongoing professional supervision, inservice modeling, feedback, and recognition (Mayhew & Welch, 2001).

Our tutors worked in the University Reading Clinic for at least one semester and were trained to implement scientifically based reading instruction recommended by the National Reading Panel (NRP; National Institute of Child Health and Human Development, 2000):

phonological awareness, phonics, fluency, vocabulary, and reading comprehension.

Because most of the research reviewed by the NRP excluded students with IQ scores below 70, it was not clear whether these five components would also be effective for our students with Down syndrome. An investigation into the literature for programs and curriculum that have been effective for students with mild to moderate mental retardation revealed that no prior studies have incorporated all five components suggested by the NRP. Instead, investigations using sight-word approaches consistently outnumber investigations using phonological awareness or phonics approaches (Connors, 1992). Sight-word approaches are not consistent with either the NRP findings nor with the general education reading curriculum, indicating that sight-word approaches alone may not constitute appropriate reading instruction for students with mild to moderate mental retardation. (See box, "What Does the Literature Say?" for a summary.)

Step 1: Identifying Students' Learner Characteristics and Initial Reading Skills

The four participating students with Down syndrome were from middle and upper-middle class families and ranged in age from 7 to 12 years. To guide plans for reading instruction, we used several standardized norm-referenced assessments.

First, we addressed learner characteristics that research has linked with responsiveness to treatment (Al Otaiba & Fuchs, 2002), such as vocabulary, rapid naming, and phonological processing. A measure of one-word receptive vocabulary, as measured on the Peabody Picture Vocabulary Test-Revised (PPVT-R; Dunn & Dunn, 1981), indicated that three of the four students were severely delayed in this area and one student was mildly delayed. With regard to phonological processing skills, as measured on the Comprehensive Test of Phonological Processing (CTOPP; Torgesen, Wagner, & Rashotte, 1999), we found that all four students were

What Does the Literature Say About Effective Reading Instruction for Students With Mild to Moderate Retardation?

- Several reviews have documented positive effects of sight-word approaches (Browder & Lalli, 1992; Browder & Xin, 1998; Singh & Singh, 1986; Stanovich, 1985).
- One review (Connors, 1992) summarized findings from eight investigations of phonetic decoding interventions for students with mental retardation. All reported positive effects.
- Three investigations showed positive effects of phonological awareness training (O'Connor, Jenkins, Leicester, & Slocum, 1993; O'Connor, Jenkins, & Slocum, 1995; O'Connor, Notari-Syverson, & Vadasy, 1996), and one study also reported positive effects for a program that combined phonics and basal instruction with reading literature and writing (Hedrick, Katims, & Carr, 1999).

Table 1. Standard Scores on Pretreatment Measures of Learner Characteristics

Student	CTOPP**			
	PPVT-R*	Memory for Digits	Rapid Color Naming	Segmenting Words
Rhonda	46	1	1	4
Jane	40	2	1	5
Carl	40	1	2	6
Laura	64	2	1	6

* Peabody Picture Vocabulary Test-Revised (PPVT-R; Dunn & Dunn, 1981; *M* = 100, *SD* = 15)
 ** Comprehensive Test of Phonological Processing (CTOPP; Torgesen, Wagner & Rashotte, 1999; *M* = 10; *SD* = 2)

severely delayed on tasks requiring memory and speed, and moderately delayed on segmenting words into individual phonemes. Table 1 summarizes students' standard scores on these learner-characteristic measures.

Second, we measured the students' ability to read words in isolation (Word Identification subtest) and to decode nonsense words (Word Attack subtest) using the Woodcock Reading Mastery Test-Revised, or (WRMT-R; Woodcock, 1987), and found that two of the four students were moderately delayed on word reading and decoding nonsense words, while the other two students were only mildly delayed on word read-

ing and decoding nonsense words. (Table 2 shows students' pretreatment standard scores on reading measures.) In addition, parents completed a literacy survey that asked them to describe (a) how much reading instruction students received in school, (b) how much reading took place at home, and (c) how many books the family owned. Parents reported that none of the students received more than 2 hours of reading instruction per week at school; however, all families read to the students for a minimum of 30 minutes each day and reported having more than 200 books in their home. This information revealed that though parents reported little read-

Table 2. Pretest and Posttest Scores on the Woodcock Reading Mastery Test-Revised (WRMT-R)

Word Identification							Work Attack					
Standard Score			Percentile		Grade Equivalent		Standard Score		Percentile		Grade Equivalent	
Student (Grade)	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Rhonda (5)	59	59	0.3	0.3	1.0	1.0	58	58	0.3	0.3	K.0	K.0
Jane (6)	59	69	0.3	2	1.7	2.3	50	86	0.1	17	K.0	3.3
Carl (1)	76	77	6		1.2	1.3	75	86	4	17	K.0	1.3
Laura (1)	78	83	7	12	1.5	1.9	80	88	9	22	1.2	1.9

Note: Woodcock Reading Mastery Test-Revised (WRMT-R; Woodcock, 1987; $M = 100$, $SD = 15$).

ing instruction occurring at school, they did incorporate reading on a daily basis into their routines at home.

Step 2: Developing a Model of Reading Instruction and Progress Monitoring

We developed objectives on the basis of the recommendations of the NRP, the literature we reviewed, and students' learner characteristics and initial reading skills. We created an individualized initial lesson plan, based on these objectives, for each student. The plans included the following five instructional components:

1. Phonological awareness (5-10 minutes).
2. Phonics (5-10 minutes).
3. Sight-word fluency games (5 minutes).
4. Vocabulary and comprehension (20 minutes).
5. Progress monitoring (5 minutes).

For phonological awareness and phonics, we used instructional materials originally designed for kindergarten and first-grade peer-mediated phonological awareness and reading activities—peer-assisted learning strategies (PALS; Fuchs et al., 2002). PALS materials have a systematic scope and sequence and are designed to provide opportunities for students to practice phonological awareness, phonics, and sight-word reading. The PALS lessons chosen required the students to produce sounds

of letters in isolation, blend letter sounds together to form words, and practice reading high-frequency words in isolation. The students practiced each skill while the tutors modeled the skill and offered corrective feedback.

For fluency, we created a sight-word speed-reading game that incorporated repeated readings of sight words on flashcards. In these games, students were rewarded for either reading faster or for reading more words. For vocabulary, as well as for listening and reading comprehension, tutors read to the students and asked them questions about the main idea in the story or about general story concepts. Because we wanted students to be actively engaged with text, we also let them choose their own books from the clinic's library. These books included a range of texts from various genres, and we guided students to choose books at their reading level.

To formally evaluate student outcomes, we gathered two types of evidence about student benefits from treatment. One was to re-administer the two

subtests on the WRMT-R to address students' gains relative to those of their peers. The other was to monitor student progress weekly using one or more types of curriculum-based measurement (CBM). We chose CBM because it is an efficient and objective measurement system of student outcomes, and it allows for enhanced instructional planning (Deno, 1985). Some of the key features that make CBM appropriate for this use are that it

- Controls the difficulty of the curriculum (i.e., the assessments measure the same skills at the same level).
- Is suitable for multiple forms necessary for monitoring progress.
- Has standardized administration and scoring criteria.
- Is time efficient to administer and score.
- Is inexpensive to make and produce.
- Is sensitive to student improvement over time (Jenkins, Deno, & Mirkin, 1979).

The monitoring materials were based on the student's abilities at the time of the initial assessment. For example, if a child was on a kindergarten level and was learning letter sounds, we created multiple sheets with the same set of letter sounds in random order (i.e., parallel probes); if that child was also learning to read sight words, we created a second set of multiple sheets with sight words to allow for progress monitoring. Consequently, Rhonda and Carl were

Parents reported that none of the students received more than 2 hours of reading instruction per week at school.

monitored using letter sounds and sight words, Laura was monitored using sight words and words read correctly from a passage, and Jane was monitored only using words read correctly from a passage.

To facilitate ease of implementation of instructional and monitoring materials, we used three-ring binders to organize materials, as follows:

- Student objectives, strengths, and weaknesses.
- The initial lesson plan and subsequent lesson plan templates to be completed by the tutor.
- Supporting materials arranged into tabbed sections for each of the five lesson components.
- Progress monitoring sheets.
- Motivational materials (e.g., point sheets, stickers, and small prizes).

The PALS and CBM materials were readily available in the reading clinic; therefore, we did not need to use the Web sites listed in the box, “Web Sites for Materials” (these sites provide further information about PALS and CBM).

Step 3: Training Tutors to Implement the Model

Tutors were either enrolled in a graduate-level reading methods course or a reading assessment course, and all had taken at least one course in reading methods. They received between 3 and 4 hours of orientation and training at the clinic. The initial training was conducted during a 2-hour general session that included background information about the clinic, scientifically-based reading research as outlined by the NRP, and a training session in progress monitoring assessment and scoring using CBM. In addition, they heard a testimonial from a mother of a student with Down syndrome about what a difference the clinic had made in her son’s life. Tutors attended a second training session that covered detailed information about tutoring, including how to complete a lesson plan template, and how to use the materials and information in their tutoring binder.

We provided ongoing supervision to the tutors as they wrote lesson plans, monitored students’ progress using CBM, and reflected on how students

Web Sites for the Instructional and Progress Monitoring Materials

For Peer-Assisted Learning Strategies:
<http://www.peerassistedlearningstrategies.com>

For Curriculum-Based Measurement:
<http://www.proed.com>

responded to tutoring sessions. We provided support by

- Modeling instruction.
- Providing feedback on teaching behaviors and lesson plans (e.g., pacing, describing objectives clearly, managing transitions, using contingent reinforcement and praise, selecting books at an appropriate instructional level).
- Reading their lesson plan reflections and weekly parent reports.
- Ensuring that progress monitoring was conducted correctly.

To recognize the tutors for their hard work, we gave them T-shirts or book bags with the phrase “Making a Difference” at the end of the semester. Thus, our training model included the key components associated with successful tutoring: training, ongoing professional supervision, in-service modeling, feedback, and recognition (Elbaum et al., 2000; Juel, 1996; Mayhew & Welch, 2001).

Step 4: Evaluating Tutee and Tutor Benefits

Tutee Benefits. All four tutees began the study from 1 to 3 years behind their same-age typically developing peers in language, phonological awareness, and reading. To examine if these four students with Down syndrome made gains in reading skills at the end of the tutoring program (10 weeks), we readministered the two WRMT-R subtests: word identification (to measure growth in word reading) and word attack (to measure growth in decoding). Additionally, we conducted weekly monitoring using CBM on various skills (letter sounds, sight words, reading in passages), depending on the individual

student’s needs. The results indicated that every student showed growth in reading skills, although not every student showed growth in the same reading skills.

To evaluate the effectiveness of intervention, Torgesen (2003) has suggested that gains in standard score points per hour of instruction be used as a metric. He reported that students with learning disabilities participating in scientifically-based reading interventions gained between 0.18 to 0.39 standard score points for word identification and between 0.31 to 0.50 standard score points for word attack. As can be seen in Table 2, the largest gains on the WRMT-R were made by Jane; for each session of tutoring, Jane gained 0.53 standard score points on word identification and 1.89 standard score points on word attack.

The other students’ standard score gains per session of tutoring were less dramatic. Carl did not show much growth in word identification (0.04 standard score growth per session), but he did show growth on word attack (0.52 standard scores per session), which is an important step toward

Every student showed growth in reading skills, although not every student showed growth in the same reading skills.

becoming a proficient reader. As for the other two students, Laura gained 0.28 standard score points on word identification and 0.44 standard score points on word attack per tutoring session. Only Rhonda did not show any gains on the WRMT-R.

We were pleased with the growth that some of these students made and were surprised at the large variation in response to treatment. Even after taking care to ensure that our tutors implemented treatment and instruction consistently (i.e., they followed the protocols 95% to 100% of the time), large

Figure 1. Jane's Progress on Curriculum-Based Measures (CBMs)

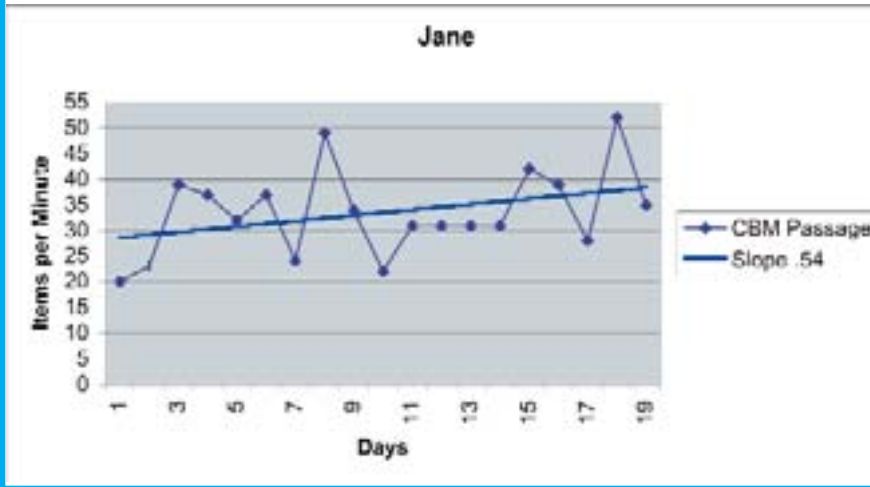


Figure 2. Rhonda's Progress on Curriculum-Based Measures (CBMs)

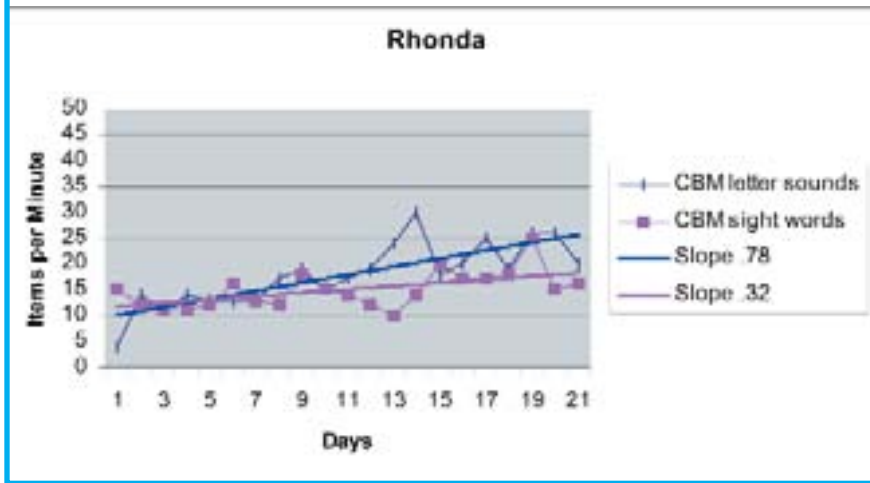
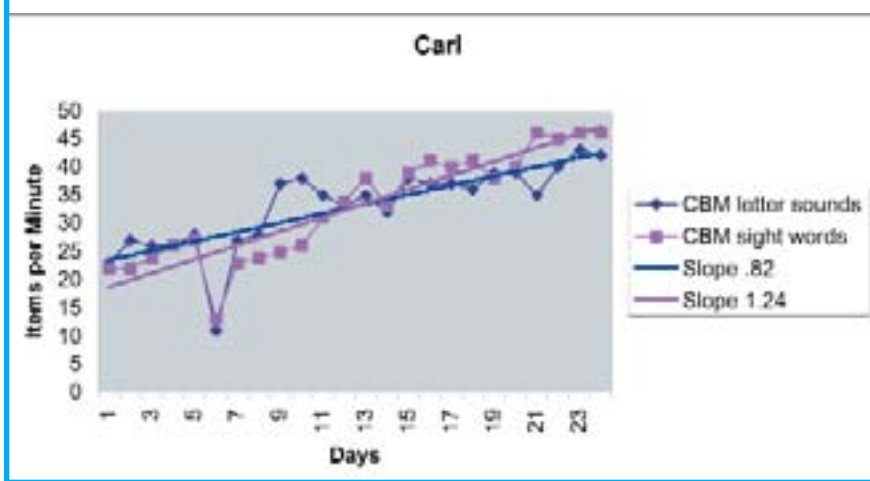


Figure 3. Carl's Progress on Curriculum-Based Measures (CBMs)



individual differences in students growth were apparent on word identification and word attack. Additionally, no clear relationship appeared between student growth and learner characteristics. Consider, for example, verbal ability: Rhonda, Jane, and Carl had similar scores on the PPVT-R. Yet, Jane responded well to treatment and Rhonda did not.

Figures 1 through 4 show the second type of growth assessed using CBM. Interestingly, these scores differed from the results on the two subtests on the WRMT-R. For example, Jane, who had the largest gains on the standardized test, had the smallest slope of the four students on CBM passages. However, her reading fluency may have been limited by her rate of speech because she stuttered. She is also the only student that was assessed using one type of CBM instead of two. It is possible that she may have shown more progress on sight-word reading, as opposed to CBM passages.

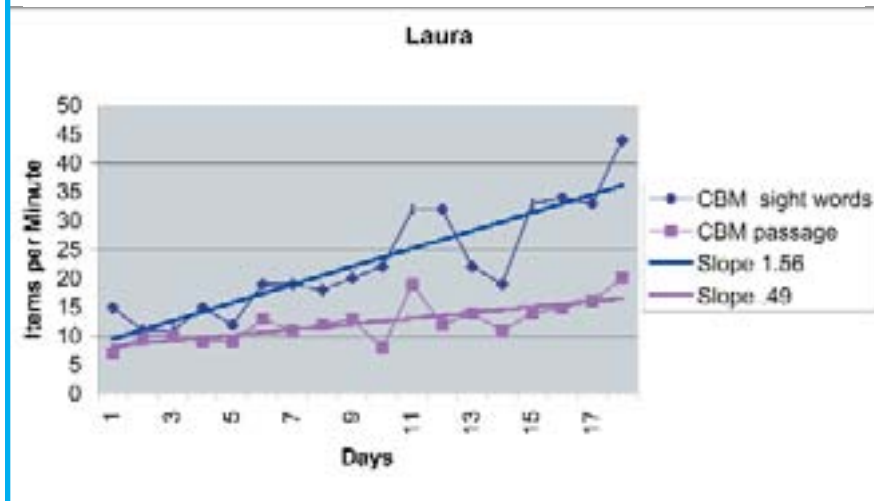
By contrast, Rhonda showed no gains on the two WRMT-R subtests, yet showed an increase in fluency on both letter sounds and sight-word reading. This may indicate that Rhonda is developing some alphabetic and phonological skills that have not yet generalized to reading words as measured on the WRMT-R.

Carl, who was also assessed using letter sounds and sight words, showed an increase in both of these skills. This is interesting because he did not show an increase in word reading as assessed on the WRMT-R.

The last student, Laura, was assessed using sight words and passages. Her scores reflect an increase in sight-word reading but less growth on passages. Similar to Jane's slow passage growth, it is possible that students with Down syndrome need extensive practice to become automatic and fluent in text.

One of the benefits of using CBM to monitor reading progress for these students is that it is more sensitive to growth than standardized norm-referenced tests (Marston, Fuchs, & Deno, 1986). This is important especially for these students that may not demonstrate growth on a norm-referenced test,

Figure 4. Laura's Progress on Curriculum-Based Measures (CBMs)



yet their progress may be easily assessed using CBM. Although the purpose of this project was not to determine if CBM was sensitive enough to monitor reading growth for students with Down syndrome, our results indicate that it is sensitive enough and therefore an appropriate assessment tool to use with this population.

Tutor Benefits. Tutor benefits were gauged using three pieces of information:

- Reflections they completed at the end of each tutoring sessions
- Parent reports that were sent home weekly.
- A final report that was sent home at the end of the 10 weeks.

On the basis of the student's reflections and weekly parent reports, similar patterns emerged across the four tutors. In the beginning, they wrote that they felt like "imposters." During this phase, they often struggled with behavior management and asked for assistance. One tutor wrote, "Carl still has trouble with the words *want* and *they*. Any suggestions?"

Gradually, as they saw their students making progress, they developed confidence and began to see themselves as "tutors and teachers." They became proficient in monitoring student progress using CBM and were excited by students' progress. Their reflections demonstrated more adaptations and individualized instruction as they prob-

lem-solved and established rapport. For example, "He is getting very good at the rhythm of PALS, but is still refusing to point to letters by himself. However, he does sound out words without me prompting him!"

Finally, near the end of the program, the tutors realized how much they and their students had learned. A similar trend was observed in the final report that was prepared for parents. This final report also reflected the tutors' growing confidence and the growing rapport between tutor and tutee that has been described by Juel (1996) as a critical component of effective tutoring. The tutors' final reports to parents showed they had developed a good understanding of the strengths and weaknesses of their students, their growth in response to tutoring, and also expressed other benefits. Laura's tutor described her student's improvement: "Now she is able to decode words with the silent 'e' pattern on almost every occasion. Her CBM has improved too. We are currently working on her areas of relative weakness: general vocabulary and word recognition".

Another tutor added: "I have been so blessed to work with such a great child, and I will miss her when we go our separate ways. She has been such an inspiration and makes me so happy".

Discussion and Some Limitations

Our examination of a tutoring program with four students with Down syndrome extends the literature in three important ways. First, our tutoring program shows that scientifically-based reading research outlined by the NRP can be effective for many students with Down syndrome. Rather than relying solely on sight-word instruction, our program combines phonological awareness, phonics, sight-word fluency games, vocabulary and comprehension, plus progress monitoring and appears to be an appropriate model for teaching reading to students with Down syndrome. All but one student made gains in decoding between 7 months to over 3 years in just 10 weeks. Word-reading gains were more modest, with two students increasing very little, one making 4-month's growth, and one making 1 year's gain.

Second, we found that CBM was a sensitive, reliable measure for monitoring reading growth for students with Down syndrome. This indicates that teachers can use CBM as a reliable way to monitor students' progress and change instruction accordingly.

Third, our findings suggest that pre-service teachers can gain valuable hands-on experience by working as tutors in a University Reading Clinic. This experience allowed them to work directly with students and benefit from the structured feedback and guidance offered by their supervisors.

Although our model demonstrates the potential to increase reading skills for students with Down syndrome, limitations to this project exist that should be taken into consideration. We did not collect any data on comprehension. Whereas reading is made up of many skills, the ultimate goal is to understand

CBM was a sensitive, reliable measure for monitoring reading growth for students with Down syndrome.

what the words on a page mean. We did incorporate comprehension strategies into each lesson, and our students showed improvement in letter sounds, sight-word reading, and decoding; however, we do not know what, if any, effect we had on their comprehension, choosing instead to assess and monitor skills at the subword and word level. With the importance of comprehension, in the future these skills should be included in assessing and monitoring reading skills for these students.

It is possible that students with Down syndrome need extensive practice to become automatic and fluent in text.

Also, we worked with a small number of students in a clinical setting. To determine if these instructional strategies would be effective, other researchers should replicate this model with more students and by teachers working in the field.

Final Thoughts

This tutoring model, which includes phonological awareness, phonics, sight-word fluency, vocabulary, and comprehension—plus progress monitoring—has strong promise for teaching students with Down syndrome to improve their reading skills. We also believe that educators can use curriculum-based measures to monitor the reading progress of students with Down syndrome; such measures are not available through norm-referenced tests. This model offers a valuable learning opportunity for preservice teachers as they function in the role of tutors and are provided with training, guidance, and continuous feedback in a University Reading Clinic setting.

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Stephanie Al Otaiba (CEC Chapter #311), Faculty Associate, Florida Center for Reading Research and Assistant Professor, College of Education, Florida State University, Tallahassee. **Michelle K. Hosp** (CEC Chapter #512), College of Education, Department of Special Education, University of Utah, Salt Lake City.

For a copy of the survey, please contact Stephanie Al Otaiba.

Address correspondence to Stephanie Al Otaiba, College of Education, Department of Special Education and Rehabilitation Counseling, Stone Building 205, Florida State University, Tallahassee, FL 32306-4459. (e-mail: salotaiba@fcr.org).

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