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Selecting and Designing Measurements to Track the Reading Progress of Students With Disabilities

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Abstract

To support students with disabilities who do not respond to typically effective reading intervention, special education teachers are expected to implement evidence-based practices for intensifying intervention. Data-based individualization is an effective, evidence-based practice recommended in research to intensify intervention, but requires knowledge and skills in data use that many teachers are not trained for. This article provides guidance for teachers to select appropriate tools for measuring progress during the data-based individualization process. In addition, guidelines for how to design appropriate mastery measures based on a student's individual weaknesses and information gathered from progress monitoring are provided. Together, these data provide a foundation for making sound decisions on when and how to adjust reading intervention to meet student needs.

Keywords

reading instruction, data-based individualization, curriculum-based measurement, intensive intervention

Evidence suggests that approximately 2% to 6% of early readers (Torgesen, 2000) and up to 50% of students with disabilities fail to respond to evidence-based reading interventions (Al Otaiba & Fuchs, 2006; Fuchs & Fuchs, 2015). For these students, research supports the use of data-based individualization (DBI) to intensify intervention (Deno, 1985; Filderman et al., 2018; Jung et al., 2018; Stecker et al., 2005). Data-based individualization refers to the use of student data to determine whether an intensive intervention is working with a particular student and, if not, to adjust intervention to support growth in that student's individual weakness area (National Center on Intensive Intervention [NCII], 2013). Specifically, within the DBI process, teachers (a) implement an intensive intervention, (b) monitor progress for a set number of weeks toward a goal level of growth based on normed levels of growth to determine whether the intervention is effective, (c) administer diagnostic assessment if not to determine specific student needs, (d) decide on ways to adjust the intervention according to these needs, and then (e) repeat the process with the newly intensified intervention (NCII, 2013). An abundance of research demonstrates that, when teachers use data in these ways, student outcomes improve across subject areas (Filderman et al., 2018; Jung et al., 2018; Stecker et al., 2005). The data collected during DBI can also be beneficial because it can help inform the development of the individualized education program (IEP), particularly as legislation has mandated, and recently re-emphasized, the use of present levels of performance data aligned with areas of remediation (Sayeski et al., 2019). As a result of this added benefit, DBI, although time-intensive, is a process that special education teachers might consider embedding into their practice.

Knowledge and skills in data use are required for preservice and in-service teachers to develop effective decision-making skills (Mandinach & Gummer, 2016), which many teachers report they are lacking (Means et al., 2011). Correspondingly, although schools are collecting increasing amounts of data, teachers are not using the data available

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Step 1: Identify Broad Areas of Need	
Gather student's universal screening assessments and standard assessments	Resources: Special education coordinator, MTSS coordinator, school psychologist
⇩	
Step 2: Refine and Define Individual Weaknesses for Progress Monitoring	
Administer CBM in reading to determine specific areas of individual weakness	Resources: www.DIBELS.uoregon.edu
⇩	
Step 3: Determine Reliability and Validity of Progress Monitoring Tools	
Is there convincing evidence, somewhat convincing evidence, or unconvincing evidence for reliability and validity?	Resources: On the tools chart, select Subject (Reading) > Grade Level > Performance Level Standards.
⇩	
Step 4: Determine Availability and Feasibility of Tools	
Determine if your school has an assessment available or could purchase the desired assessment.	Resources: Special education coordinator, MTSS coordinator, school administrator, school psychologist.
Design mastery measures that align with specific sub-skills students struggle with using error analysis for each CBM.	Resources: Special education coordinator, school psychologist

Figure 1. Resources for selecting measurement tools to guide the DBI process.
Note. CBM = curriculum-based measurement.

for decision making (Gallagher et al., 2008). To support teachers' use of data, several practitioner pieces have been written that provide an overview of the DBI process (Lemons et al., 2014), specific steps that must be taken to interpret data, such as when to make an instructional decision (Filderman & Toste, 2018), and guidance on how to intensify instruction (Fuchs et al., 2017). This article builds upon these guidelines by focusing specifically on selecting appropriate curriculum-based measurement (CBM) in the area of reading for monitoring progress toward global goals, as well as describes how to design appropriate mastery measurement to assess student performance on targeted reading sub-skills or instructional content. Specifically, this article describes the following four steps that will aide teachers in selecting an appropriate progress monitoring measure in reading: (a) identify a student's areas of need, (b) determine available measures, (c) determine reliability and validity of the measures, and (d) determine availability, feasibility, and alignment of the tool. Following this, the design of mastery measures is discussed; specifically, how to use error analysis to design an aligned mastery measure. Together, these data provide a foundation for making informed decisions on when to make instructional changes and how to adjust instruction based on specific needs. A vignette is presented throughout the article with a corresponding illustrative figure (see Figure 1) to demonstrate the steps a teacher would utilize to select an appropriate progress monitoring tool and conduct error analysis to design a mastery measure in reading.

Mr. Yates (see Note 1) was a special educator at Stonehill Elementary. He was experienced in delivering research-based reading instruction to students in his special education resource classroom and was concerned about the progress demonstrated by Angelica, a fourth grader in his class. Despite having implemented intensive intervention for the past 10 weeks (i.e., increased time in intervention), Angelica continued to demonstrate a lack of progress toward grade-level reading norms. Mr. Yates knew that he needed to intensify intervention even further, and had read that DBI was one suggested way to make informed decisions about the instruction he provided to Angelica.

Progress Monitoring

Step 1: Identify Broad Areas of Need

To identify individual weaknesses, teachers can refer to data from (a) universal screeners and (b) standardized assessments used diagnostically. Both of these assessments are beneficial sources of information because they compare a student's performance on specific sub-tests or skills with grade-level reading norms, which can be used to identify

broad areas of weakness. These data provide teachers with preliminary evidence of the broad components of reading in which a student performs below grade level to identify a potential list of progress monitoring tools that will then be used to determine specific skill weaknesses.

Universal screening. The reauthorization of the Individuals With Disabilities Education Act (2004) encouraged schools to use a response to intervention (RTI) model to identify struggling learners and provide them with increasing levels of support. Integral to this process is the use of universal screening measures administered 2 to 3 times per year to all students to identify students who are not meeting benchmark levels of growth and are therefore at risk of failure (Compton et al., 2006). As screening measures provide a measure of student performance against grade-level expectations (Balu et al., 2015), they provide a useful starting point for identifying broad areas of needs.

Screeners measure student performance on broad skills against a composite benchmark performance level that would indicate that they are on track in reading (Balu et al., 2015). For kindergartners, these skills typically comprise of letter naming fluency, letter–sound identification, blending onset–rimes, phoneme segmentation, and sound repetition. For first graders, skills measured include word identification fluency (WIF), letter naming fluency, letter–sound identification, phoneme segmentation, sound repetition, vocabulary, and WIF (Jenkins & Johnson, 2008). After first grade, measures that are typically used are nonsense word fluency (NWF) and oral reading fluency (ORF; Good et al., 2004). As students develop adequate decoding skills with vowel–consonant and consonant–vowel–consonant words, progress is more appropriately measured with ORF alone. In addition to screening measures, standardized diagnostic assessments may be used to identify broad areas of need.

Standardized assessments used diagnostically. When students do not respond to evidence-based intervention, they may be provided additional assessment and/or referred for special education services. During this process, standardized diagnostic assessments are administered that determine whether a student is performing below grade-level norms, as well as broad areas where a student might particularly struggle. Standardized diagnostic assessments measure student performance on a wide range of skills to allow teachers to identify student performance in each of the components of reading (i.e., phonological awareness, phonics, fluency, vocabulary, or reading comprehension; National Early Literacy Panel, 2008). Table 1 provides teachers with several commonly used standardized reading assessments and lists the components of reading assessed for each measure. Like universal screening, these provide a useful resource for teachers to refer back to, to determine broad individual areas of weakness within which to seek further refinement.

Mr. Yates knew that the first step in the DBI process was to select a tool. Mr. Yates already had some information about Angelica's present levels of performance based on informal and formal assessments he administered during class and her most recent IEP. To ensure he was making an informed decision, he gathered the assessments and benchmarks that had already been conducted to thoroughly consider all of Angelica's needs. Mr. Yates knew that all fourth-grade students were administered an ORF screener as part of the universal screeners conducted 3 times a year. Mr. Yates found Angelica's most recent ORF assessment to compare her performance on the assessment with what he was observing in his classroom. He was unsurprised to note that Angelica performed below the 25th percentile on the ORF assessment. Mr. Yates knew that her performance in fluency could be due to a variety of weaknesses and that he would need to continue to narrow down her specific needs.

Given the fact that Angelica was recently referred to and placed in special education, Mr. Yates also knew that he could refer to data from standardized assessments that were conducted as part of the evaluation for Angelica's IEP. Mr. Yates went to the special education coordinator to request copies of the Woodcock Reading Mastery Tests *administered to Angelica several months prior. This assessment provided Mr. Yates with a substantial amount of data on Angelica's strengths and weaknesses in (a) phonological awareness, (b) phonics, (c) fluency, (d) vocabulary, and (e) comprehension. Looking at standard scores, he noted that Angelica performed below average in the areas of word identification, word attack, ORF, and passage comprehension. Mr. Yates now knew that Angelica's limited fluency demonstrated on the ORF screener was likely due to Angelica's weakness in phonics or decoding, and suspected that her comprehension was impaired by her limited ability to access text due to her word-reading difficulties. Mr. Yates knew that he needed to further refine his understanding of Angelica's needs by administering progress monitoring tools within each of these broad areas.*

Step 2: Refine and Define Individual Weaknesses

Once a broad area of need is identified, the next step is to use available progress monitoring assessments to determine individual areas of weakness. Known as curriculum-based measurement (CBM; Deno, 1985), these norm-referenced general outcome measures are used to track a student's progress on global reading skills over time (e.g., NWF, comprehension). For example, a weakness in the area of decoding could be due to a variety of factors, including phonological awareness, grapheme–phoneme knowledge, and word recognition. Progress monitoring tools can help to tease out individual weaknesses. Using CBM data, teachers can then determine whether a student has responded to the

Table 1. Standardized Diagnostic Assessments.

Assessment	Sub-tests	Skills Assessed
Woodcock–Johnson IV Tests of Achievement	Letter–word ID	Decoding
	Reading fluency	Fluency
	Passage comprehension	Comprehension, decoding, fluency
	Word attack	Word structure, decoding
	Reading vocabulary	Vocabulary, comprehension
Gates–MacGinitie Reading Test	Word decoding	Decoding
	Word knowledge	Word structure, comprehension
	Vocabulary	Vocabulary, comprehension
	Comprehension	Comprehension
Developmental Reading Assessment	Reading Engagement	Reading behaviors
	Oral Reading	Fluency
	Comprehension	Comprehension
	Word analysis	Phonological awareness, letter and word identification, phonics, decoding, morphological awareness
Test of Word Reading Efficiency–2	Sight word efficiency	Word identification
	Phonemic decoding efficiency	Word reading fluency
Test of Silent Reading Efficiency and Comprehension	Passage comprehension	Fluency, comprehension
Woodcock Reading Mastery Tests	Rapid automatic naming	Phonics
	Word identification	Sight word recognition
	Word attack	Decoding
	Word comprehension	Vocabulary, comprehension
	Oral reading fluency	Fluency
	Passage comprehension	Comprehension, vocabulary

intensified intervention adequately and, if not, administer further assessment to continually refine the instruction students are receiving (Filderman & Toste, 2018).

Curriculum-based measurement in reading. Students who have weaknesses in phonemic awareness can be administered phoneme segmentation fluency (PSF), CBM, and initial sound fluency (ISF) CBM. The PSF measures student ability to manipulate the sounds in words, while the ISF CBM measures student ability to separate the initial sound in words. Students who struggle with foundational phonics skills (e.g., letter sounds and beginning decoding) can be administered letter–sound fluency (LSF), WIF, and NWF CBM. Letter–sound fluency will provide the teacher with data on whether a student has mastered the most common sound produced by each single letter of the alphabet. If a student demonstrates fluent letter–sound identification and is beginning to apply grapheme–phoneme knowledge to sound out words, teachers can utilize WIF and NWF to determine a student's ability to both blend phonemes together to decode regular closed-syllable vowel–consonant and consonant–vowel–consonant words (e.g., ap, wuv) or to identify words by sight with increasing fluency (e.g., the, of).

As students are able to decode with greater automaticity, educators can utilize ORF CBM to determine if a student reads a brief passage accurately, at an appropriate rate, with expression. In addition, as students increase their ORF proficiency, Maze CBM can be useful for teachers interested in determining if a student demonstrates difficulties with comprehending text. Refer to Table 2 for help selecting the most appropriate CBM to identify individual weaknesses through error analysis.

Finding curriculum-based measurements. The NCII developed a tools chart (see Figure 1) to assist educators in selecting progress monitoring tools. The charts include progress monitoring tools that can be used to assess a student's performance, quantify their rate of improvement or responsiveness to intervention, adjust the intervention program to make it more effective and suited to a student's needs, and evaluate the effectiveness of the intervention. Schools often have specific CBM that are available to teachers for their use. Teachers may refer to the NCII tools chart to determine if additional tools would be helpful based on individual weaknesses.

Before utilizing the NCII progress monitoring tools chart, an educator must consider the following questions:

1. What skills require progress monitoring? It is critical that the progress monitoring tool selected aligns with the student's individual weaknesses targeted for instruction (Stecker et al., 2008).
2. Is there a specific academic outcome or measure of interest?
3. What is the instructional level of the target student?

Table 2. Selecting a Curriculum-Based Measurement.

Instruction Level	Curriculum-Based Measurements (Skills Assessed)
Unable to name letters or identify letter–sound relationships	Letter–sound fluency (letter identification, phonics) Nonsense word fluency (phonics, decoding)
Able to name the most common sound produced by each letter of the alphabet, but struggle with blending and demonstrate dysfluent reading	Nonsense word fluency (phonics, decoding)
Able to easily blend most decodable text	Oral reading fluency (fluency) MAZE (comprehension)

Once these questions are answered, an educator can visit the website, select tools chart, then academic progress monitoring, to find information about academic progress monitoring tools. Afterward, an educator can filter results by selecting the subject area and instructional level. After filtering results, the educator will be left with a list of progress monitoring tools.

With his newfound knowledge of Angelica's areas of need in phonics, fluency, and comprehension, Mr. Yates was interested in identifying specific areas to target and monitor. His school used the DIBELS progress monitoring system, so Mr. Yates decided to administer the LSF, NWF, and ORF probes to better understand whether Angelica had difficulty with recognizing basic or advanced sounds in words (i.e., short vowels or digraphs), blending sounds into words, and to determine her overall instructional level. Based on administration of these assessments, he discovered that she could identify the most common sound produced by letters of the alphabet and could blend regular consonant–vowel–consonant words accurately (e.g., c–a–t). He decided the most appropriate progress monitoring tool would be ORF, because Angelica's biggest area of need was with more advanced words and spelling patterns. Because this tool was already available at this school, Mr. Yates decided to move forward with the DIBELS measure of ORF to determine whether it was the best fit for monitoring ongoing progress.

Step 3: Determine Reliability and Validity

After identifying the tools available, either at the school or for purchase, for progress monitoring that aligns with a student's specific weaknesses and instructional level, teachers must consider whether the tools have been proven to be reliable, valid, and unbiased in measuring a student's progress (Deno, 1985). Knowing the grade level, individual weaknesses, and characteristics of the target student will allow educators to select a progress monitoring tool that has demonstrated convincing evidence with students of similar profiles.

The tools chart on the NCII website provides information about how technically sound various CBM are. Technically sound measures are (a) reliable, or produce stable and consistent results; (b) *valid*, or measures what it is intended to measure; and (c) unbiased, or have been tested with multiple sub-populations. The tools chart provided by NCII provides ratings on how technically sound each tool is by indicating whether there is convincing evidence (i.e., is found to be technically sound in existing evidence), partially convincing evidence (i.e., evidence is limited or has mixed findings of technical adequacy), or unconvincing evidence (i.e., no evidence or evidence suggests low technical adequacy) of the reliability and validity. Determining whether to use an assessment with partially convincing evidence requires that an educator weigh the pros and cons of available resources. Whenever possible, it is best to use an assessment with convincing evidence; however, if it is not available or feasible to purchase, an assessment with partially convincing evidence may be considered. The tools chart also indicates, with a yes or no, whether the tool has been analyzed for bias, and an educator can select the particular tool of interest if the tool indicates "yes" to gain further insight into whether the progress monitoring tool has been deemed reliable and valid with sub-populations that match the target student. When educators can identify the appropriate assessment tools, they will be able to make sound decisions based on data to determine which students require a problem-solving approach to intensive intervention, identify what specific skills to target for intervention and progress monitoring, and determine whether a student has made adequate progress.

Mr. Yates looked at the progress monitoring tools for elementary students using the NCII tools chart. He scanned the chart and found the DIBELS assessments. He knew he needed to make sure they had been proven to be reliable and valid for monitoring the growth of students similar to Angelica; therefore, he examined the list for tools that had been proven to be reliable and valid for students with learning disabilities at a second-grade instructional level. Next, he looked at whether there was convincing evidence, somewhat convincing evidence, or unconvincing evidence for the reliability and validity of each progress monitoring tool. Finally, Mr. Yates examined the tools chart to see if a bias analysis had been conducted for each tool. For tools that indicated "yes"—that a bias analysis had been conducted—he investigated further to make sure that the tool was not biased against students with disabilities (see Table 3).

Table 3. Mastery Measure for Digraph "sh."

Word	Correctly/Incorrect (If Incorrect, Write as Read)
Ship	Correct
Wish	Correct
Shell	Correct
Dish	Correct
Splash	/s/ /p/ /a/ /s/
Shape	/sh/ /a/ /p/
Share	/sh/ /a/ /r/
Spaceship	Omit
Shellfish	Omit
Shamrock	Omit

Mr. Yates now had the data he needed to decide on a progress monitoring tool. Mr. Yates noted that the DIBELS assessments had partially convincing reliability and convincing validity. Mr. Yates wondered whether he should consider asking the school to purchase a program that had convincing reliability evidence. He looked at the other tools available for reading fluency at a second-grade level. He found that iSTEEP (www.iSTEEP.com) *had convincing reliability and validity, so he decided that he would look into the assessment further to compare the two tools. He learned that iSTEEP was a computerized system that included progress monitoring assessments in the area of ORF with standardized reading passages and tools for tracking progress.*

Step 4: Determine Availability and Feasibility of Tools

After determining all possible tools with convincing evidence of being technically sound, the next step is for educators to determine whether the assessment is available for them to use and feasible to administer to their students. To determine whether an assessment is available, educators can ask their administrator or special education coordinator if the assessment is already available or can be purchased for their use. The NCII tools chart includes a description of the cost of purchasing the assessment materials to support this request. The tools chart also provides information to help educators decide which progress monitoring assessments will be most feasible for use with their target student. For instance, educators can gather information on whether the tool is administered electronically, individually, or in a group format. In addition, the tools chart describes the amount of time required to administer each assessment. A progress monitoring tool that meets all of an educator's desires might not be available, so it is critical for educators to select the tool that is best suited to meet their specific needs.

Mr. Yates knew that he already had access to the mCLASS: Reading 3D tool for use with Angelica to monitor ORF. He also knew that the iSTEEP progress monitoring system had more convincing evidence of reliability and validity. Mr. Yates looked into administration of the assessment and learned that it was administered to students individually for 1 min each, with tracking available online much like DIBELS. He decided to look into the costs associated with purchasing the iSTEEP program to see whether it would be worth purchasing and to produce a more refined comparison of both systems to present at his next team meeting. If the team approved, Mr. Yates would propose purchasing the iSTEEP program to administration. For now, Mr. Yates decided to continue tracking progress using DIBELS ORF probes.

Mastery Measures

Once intervention has been implemented, teachers can track progress on specific sub-skills students struggle with to target instruction. To determine what sub-skills to track, error analysis can be conducted from a variety of sources, including progress monitoring, diagnostic assessment, and work samples (NCII, 2013). Suggestions on error analysis for each skill area (e.g., phonemic awareness, phonics, fluency, comprehension) are provided, followed by a general discussion of aligning mastery measures with the areas of need identified.

Error Analysis

Phonemic awareness. Previous research has shown that children can demonstrate greater difficulty with particular manipulations on phonemic awareness tasks depending on where in the word the manipulation must be made (i.e., initial, medial, final position), and the number or type of phonemes that must be manipulated (e.g., Chafouleas et al., 2001). Initial sound fluency CBM error analysis can indicate if a student demonstrates difficulty identifying the initial sounds in words (e.g., the initial sound in the word cap is /k/). Phoneme segmentation fluency error analysis can indicate if a student is having difficulty hearing the initial, medial, or final sounds in words (i.e., in the word light, the initial sound is /l/, the medial sound is /ī/, and the final sound is /t/). In addition, this type of error analysis can indicate if a student demonstrates greater difficulty segmenting words with a greater number of phonemes (i.e., words with four phonemes, such as spin, compared with words with three phonemes, such as play) or has difficulty differentiating between phonetically similar sounds (i.e., short vowel e and short vowel i).

Phonics. Knowledge of letters and sounds are important foundational reading skills. Error analysis of letter name

fluency (LNF) indicates the letter names a student has not yet mastered, while a LSF CBM indicates the letter–sound relationships not mastered. Patterns of errors can be analyzed to help educators understand why a student is struggling with some letters more than others. Most letter names have the sound that letter represents somewhere in the name; however, the position of this sound varies. In some letter names, the sound comes first and is followed by a vowel sound (e.g., b, c, d, g, j, k, p, w, t, v, z). In other letter names, the sound comes second, with a vowel sound before (e.g., f, l, m, n, r, s, x). Some letter names (e.g., h, w, y), when pronounced, do not contain the sound that letter represents at all, and can be more challenging for students to recall. For example, students might say that the letter w makes the /d/ sound because the letter name for w (double-u) starts with the /d/ sound. Finally, some students confuse letters that are visually similar (e.g., b and d). Knowing these differences in letter–sound relationships can help educators support mastery of all letter–sound relationships (National Early Literacy Panel, 2008).

Error analysis of a NWF CBM indicates a student's consistent ability to identify letter–sound relationships as well as the ability to blend sounds together to decode whole words (Flynn et al., 2011). Frequent errors naming the sound that corresponds with each letter indicates a need for additional instruction on grapheme–phoneme correspondences. Analysis of a student's errors can indicate which letter–sound relationships require further instruction for mastery. Difficulty with blending sounds together to read whole words indicates a need for continued instruction on phoneme blending and decoding to help a student's reading become less labored. For example, some students might demonstrate difficulty with blending sounds together, despite correctly naming all letter sounds. Other students might demonstrate greater difficulty decoding words with three phonemes than words with only two.

Fluency. Patterns of errors in ORF passages can be conducted to identify areas of weakness and guide instruction (NCII, 2014). Errors can fall into three categories: (a) graphophonetic errors, (b) syntactic errors, and (c) semantic errors (National Reading Panel, 2000). Graphophonetic errors preserve phonetics of the written word. For example, students may guess a word based on initial sound or may omit the suffix from the end of a word after correctly reading the base word. When reading a sentence about a dog, the reader might substitute bone for the word bark, as both words start with the /b/ sound, or might read jump instead of jumped. Syntactic errors preserve grammar of the written word. For example, a student might substitute a word with similar grammar based on syntax knowledge. In the sentence, "The children raked the leaves into huge piles," a reader might replace "raked" with "liked." Semantic errors preserve the meaning of the text. For example, students may substitute a word with a similar meaning, but different sound patterns. In the sentence "The joyful teacher smiled at each of her students as they worked hard to complete the test," a reader might substitute "happy" for "joyful."

In addition, teachers can analyze errors to determine patterns in errors related to grapheme–phoneme (letter–sound) correspondences. For example, students may struggle with consonant digraphs and long vowels, but not with the most common sound produced by each single letter or with reading regularly spelled words with short vowels. To determine patterns of errors, (a) have the student read an instructional-level ORF passage aloud; (b) mark student errors by indicating words read incorrectly and identifying the word read in place of the correct word; (c) determine whether the error was graphophonetic, syntactic, or semantic, and determine if the target student's errors indicate any particular trend; and (d) indicate if the target student's errors demonstrate a need for targeted instruction in regard to grapheme–phoneme correspondences. After analyzing a student's particular areas of need, instruction can be targeted.

Comprehension. Student errors in the area of reading comprehension can be analyzed from classroom assessments, anecdotal records, and mastery measures to determine areas of strength and weakness. Item analysis of errors can be conducted to determine if a pattern of errors emerges. Students might demonstrate errors in the following areas: (a) literal versus inferential questions, (b) specific skills (i.e., summarizing, identifying a main idea, comparing/contrasting), (c) questions requiring extensive background knowledge, or (d) the type of question (i.e., multiple choice, fill in the blank, verbal, or open response). By identifying where students are consistently struggling, teachers can align instruction.

Mastery Measurement

Mastery measurement can help teachers track progress on the specific sub-skills identified through error analysis and targeted in intervention (Hintze et al., 2006). Progress monitoring provides information about a student's progress in a global skill domain, such as decoding, whereas mastery measurement provides information about whether students are learning skills targeted in instruction, such as digraphs (Hintze et al., 2006). Because mastery measurement focuses on more narrow skills, it can be used to adjust instruction on an ongoing basis.

Designing a mastery measure. Some curriculum programs include mastery measures to help teachers measure a student's mastery of specific skills after instruction. If not included in the curriculum program currently being utilized, teachers can develop mastery measures closely aligned to the sub-skills targeted for instruction. To develop a mastery

measure, teachers can think about what sub-skills a student struggles with. Then, they can consider the scope and sequence in which those skills will appear instructionally within the selected intervention. Finally, teachers can develop short assessments to determine whether students have mastered those specific sub-skills to progress to the next skill. For example, if a student is struggling with consonant digraphs and vowel teams, digraphs will appear first in a scope and sequence. A mastery measure can then be developed for each of the digraphs as they are introduced, and then for all of the digraphs together to determine mastery before moving on to instruction on more complex skills. By selecting or designing mastery measures, teachers can track progress more frequently to align instruction to meet student needs.

While implementing the intervention with Angelica, Mr. Yates also knew that he wanted to track Angelica's mastery of sub-skills she was struggling with to better align intervention to her needs. Based on error analysis of her previous work samples and several CBM administered, Mr. Yates knew that Angelica struggled specifically with reading words with consonant digraphs and vowel–consonant–e patterns. He therefore designed a mastery measure of word lists with specific digraphs targeted each week (see Table 3). From the word list Mr. Yates created that progressed in difficulty, Mr. Yates knew that Angelica likely recognized the first words by sight, particularly given her difficulty correctly decoding less common words with the digraph "sh." In addition, Mr. Yates noted that Angelica failed to attempt reading compound words that included the digraph sh. Each week, he had Angelica read a list of words with the targeted skill, with mastery demonstrated when Angelica read each word list with 90% accuracy. Mr. Yates also designed word lists that included multiple digraphs to monitor Angelica's ability to maintain these skills over time. Mr. Yates knew that with the best progress monitoring tool to decide when to adjust intervention, and the best mastery measure to align instruction to Angelica's needs, he was on track to make sound decisions to support Angelica's reading.

Conclusion

This article focused specifically on selecting appropriate tools for measuring progress during the DBI process. In addition, the article discussed how to design appropriate mastery measures based on student individual areas of weakness and information gathered from progress monitoring. This article provides teachers with the knowledge necessary to select and design progress monitoring tools. Once teachers use the correct tools, they can determine whether an intervention is working with a particular student and, if not, re-evaluate to align intervention to support growth in that student's specific areas of need.

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Note

1. The vignette included in this article is a fictionalized account drawn from research literature and not based on actual people or events that were observed by the authors.

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