USING CBM FOR PROGRESS MONITORING IN READING

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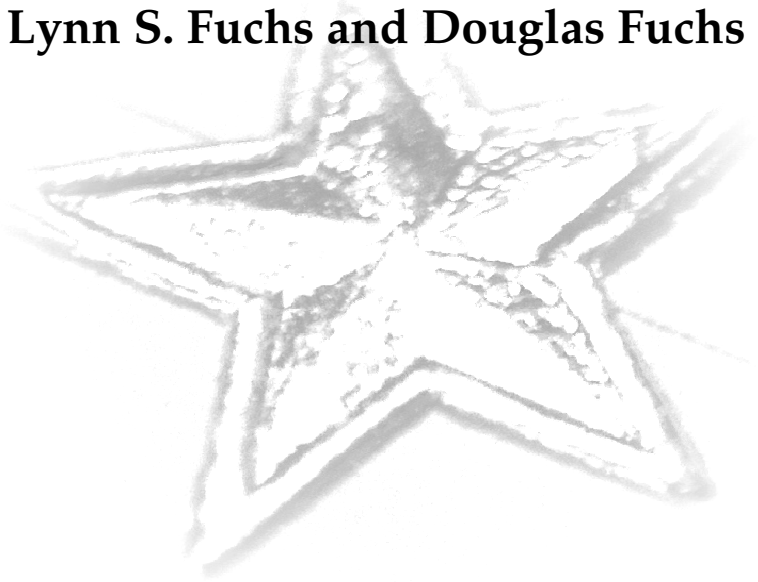

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Introduction to Curriculum-Based Measurement

What Is Progress Monitoring?

Progress monitoring focuses on individualized decision making in general and special education with respect to academic skill development at the elementary grades. Progress monitoring is conducted frequently (at least monthly) and is designed to

a. Estimate rates of improvement,

b. Identify students who are not demonstrating adequate progress and therefore require additional or alternative forms of instruction; and/or

c. Compare the efficacy of different forms of instruction and thereby design more effective, individualized instructional programs for problem learners.

In this manual, we discuss one form of progress monitoring: Curriculum-Based Measurement (CBM).

What Is the Difference Between Traditional Assessments and Progress Monitoring?

Traditional assessments used in schools are generally lengthy tests that are not administered on a regular basis. Many times, traditional assessments are administered to students once per year, and teachers do not receive their students' scores until weeks or months later, sometimes after the school year is complete. Because teachers do not receive immediate feedback, they cannot use these assessments to adapt their teaching methods or instructional programs in response to the needs of their students.

One type of progress monitoring, CBM, is an alternative to commercially prepared traditional assessments that are administered at one point in time. CBM provides teachers with an easy and quick method of obtaining empirical information on the progress of their students. With frequently obtained student data, teachers can analyze student scores to adjust student goals and revise their instructional programs. That way, instruction can be tailored to best fit the needs of each student.

Another problem with traditional assessments is that student scores are based on national scores and averages. In fact, the students in a teacher's classroom may differ tremendously from a national sample of students. CBM allows teachers to compare an individual student's data to data on other students in their classroom. Schools or school districts may also collect normative data on the students within their own school or district to provide teachers with a local normative framework for interpreting scores.

What Is Curriculum-Based Assessment?

Curriculum-based assessment is a broader term than CBM. As defined by Tucker (1987), CBM meets the three curriculum-based assessment requirements:

a. Measurement materials are aligned with the school's curriculum;

b. Measurement is frequent; and

c. Assessment information is used to formulate instructional decisions.

CBM is just one type of curriculum-based assessment.

What Is the Difference Between Curriculum-Based *Assessment* and CBM?

CBM is a distinctive form of curriculum-based assessment because of two additional properties. First, each CBM test is an alternate form of equivalent difficulty. Each test samples the year-long curriculum in exactly the same way using prescriptive methods for constructing the tests. In fact, CBM is usually conducted with "generic" tests, designed to mirror popular curricula. By contrast, other forms of curriculum-based assessment (CBA) require teachers to design their own assessment procedures. The creation of those CBA tests can be time-consuming for teachers because the measurement procedures (a) change each time a student masters an objective and (b) can differ across pupils in the same classroom.

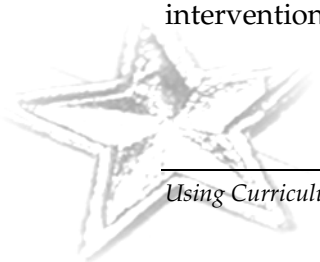
The second distinctive feature of CBM is that it is highly prescriptive and standardized. This guarantees reliable and valid scores. CBM provides teachers with a standardized set of materials that has been researched to produce meaningful and accurate information. By contrast, the adequacy of teacher-developed CBA tests and commercial CBA tests is largely unknown. It is uncertain whether scores on those CBA tests represent performance on meaningful, important skills and whether the student would achieve a similar score if the test were re-administered.

The Basics of CBM

CBM is used to monitor student progress across the entire school year. Students are given standardized reading probes at regular intervals (weekly, bi-weekly, monthly) to produce accurate and meaningful results that teachers can use to quantify short- and long-term student gains toward end-of-year goals. With CBM, teachers establish long-term (i.e., end-of-year) goals indicating the level of proficiency students will demonstrate by the end of the school year.

CBM tests (also called "probes") are relatively brief and easy to administer. The probes are administered the same way every time. Each probe is a different test, but the probes assess the same skills at the same difficulty level. The reading probes have been prepared by researchers or test developers to represent curriculum passages and to be of equivalent difficulty from passage to passage within each grade level.

Probes are scored for reading accuracy and speed, and student scores are graphed for teachers to consider when making decisions about the instructional programs and teaching methods for each student in the class. CBM provides a doable and technically strong approach for quantifying student progress. Using CBM, teachers determine quickly whether an educational intervention is helping a student.



What CBM Probes Are Available?

Currently, CBM probes are available in reading, math, writing, and spelling. This manual focuses on reading CBM. Appendix A contains a list of CBM resources and how to obtain CBM reading probes and computer software.

CBM Research

Research has demonstrated that when teachers use CBM to inform their instructional decision making, students learn more, teacher decision making improves, and students are more aware of their own performance (e.g., Fuchs, Deno, & Mirkin, 1984). CBM research, conducted over the past 30 years, has also shown CBM to be reliable and valid (e.g., Deno, 1985; Germann & Tindal, 1985; Marston, 1988; Shinn, 1989).

The following is an annotated bibliography of selected CBM articles. Appendix B contains another list of CBM research articles.

Deno, S. L., Fuchs, L. S., Marston, D., & Shin, J. (2001). Using curriculum-based measurement to establish growth standards for students with learning disabilities. School Psychology Review, 30, 507–526.

> Examined the effects of curriculum-based measurement on academic growth standards for students with learning disabilities (LDs) in the area of reading. The reading abilities of 638 learning disabled students in Grades 1–6 were evaluated. Results show that rate-of-growth differences existed at first grade concerning LD Ss and general education controls Ss, but by Grades 5 and 6, a sharp drop in the learning slopes for general education control Ss resulted in virtually identical growth rates for the 2 groups. The observed reading progress was similar to results reported in several previous studies. Findings suggest that it is possible to set growth standards for both general and special education students using CBM.

Fuchs, D., Roberts, P. H., Fuchs, L. S., & Bowers, J. (1996). Reintegrating students with learning disabilities into the mainstream: A two-year study. *Learning Disabilities Research and Practice, 11,* 214–229.

> Reports a study that evaluated the short- and long-term effects of 3 variants of a case-by-case process for readying students to move successfully from resource rooms to regular classrooms for math instruction. Preparation for this transition included use of curriculum-based measurement and transenvironmental programming, each alone and in combination. Teachers using the more complex variants of the case-by-case process were more successful at moving students across settings and fostering greater math achievement and positive attitude change, especially while the students were still in special education. At 1-year follow-up, about half of the students either never were reintegrated or were moved to the mainstream temporarily, only to be returned to special education.

Fuchs, L. S., & Deno, S. L. (1991). Paradigmatic distinctions between instructionally relevant measurement models. *Exceptional Children, 57,* 488–501.

> Explains how CBM differs from most other forms of classroom-based assessment.

Fuchs, L. S., & Deno, S. L. (1994). Must instructionally useful performance assessment be based in the curriculum? *Exceptional Children, 61,* 15–24.

Examines the importance of sampling testing material from the students' instructional curricula; concludes that sampling from the curriculum is not essential; and proposes three features critical to insure the instructional utility of measurement.

Fuchs, L. S., & Fuchs, D. (1992). Identifying a measure for monitoring student reading progress. *School Psychology Review, 58,* 45–58.

Summarizes the program of research conducted to explore CBM reading measures other than reading aloud.

Fuchs, L. S., & Fuchs, D. (1996). Combining performance assessment and curriculum-based measurement to strengthen instructional planning. *Learning Disabilities Research and Practice, 11,* 183–192.

Explores the coordinated use of performance assessment (PA) and curriculum-based measurement (CBM) to help teachers plan effective instruction.

Fuchs, L. S., & Fuchs, D. (1998). Treatment validity: A unifying concept for reconceptualizing the identification of learning disabilities. *Learning Disabilities Research and Practice, 13,* 204–219.

Summarizes a substantial portion of the research base on the technical features and instructional utility of CBM; provides a framework for using CBM within a treatment validity approach to LD identification, within which students are identified for special education when their level of achievement and rate of improvement is substantially below that of classroom peers and when, despite intervention efforts, they remain resistant to treatment.

Fuchs, L. S., & Fuchs, D. (1999). Monitoring student progress toward the development of reading competence: A review of three forms of classroom-based assessment. *School Psychology Review, 28,* 659–671.

Describes and critiques 3 classroom-based assessment models for monitoring student progress toward becoming competent readers.

Fuchs, L. S., & Fuchs, D. (2000). Curriculum-based measurement and performance assessment. In E. S. Shapiro & T. R. Kratochwill (Eds.), *Behavioral assessment in schools: Theory, research, and clinical foundations* (2nd ed., pp. 168–201). New York: Guilford.

Summarized research on curriculum-based measurement of math computation, math concepts and applications, and math problem solving.

Fuchs, L. S., & Fuchs, D. (2002). Curriculum-based measurement: Describing competence, enhancing outcomes, evaluating treatment effects, and identifying treatment nonresponders. *Peabody Journal of Education, 77,* 64–84.

Summarizes research on curriculum-based measurement (CBM) within four strands: studies demonstrating the psychometric tenability of CBM; work showing how teachers can use CBM to inform instructional planning; research examining CBM's potential use in evaluating treatment effects; and work summarizing CBM's contribution to identifying children who fail to profit from otherwise effective instruction.

Fuchs, L. S., Fuchs, D., & Hamlett, C. L. (1993). Technological advances linking the assessment of students' academic proficiency to instructional planning. *Journal of Special Education Technology, 12,* 49–62.

Summarizes the program of research conducted on computer applications to CBM.

Fuchs, L. S., Fuchs, D., & Hamlett, C. L. (1994). Strengthening the connection between assessment and instructional planning with expert systems. *Exceptional Children, 61,* 138–146.

Summarizes the program of research conducted on expert systems used in conjunction with CBM to enhance teachers' capacity to use classroom-based assessment to improve planning and increase student learning.

Fuchs, L. S., Fuchs, D., & Hamlett, C. L. (in press). Using technology to facilitate and enhance curriculum-based measurement. In K. Higgins, R. Boone, & D. Edyburn (Eds.), *The handbook of special education technology research and practice.* Whitefish Bay, WI: Knowledge by Design, Inc.

Describes a research program conducted over the past 18 years to examine how CBM technology can be used to enhance implementation.

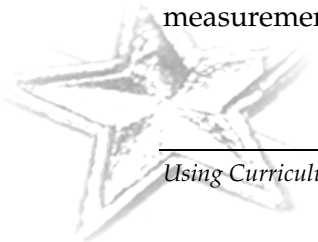
Fuchs, L. S., Fuchs, D., Hamlett, C. L., Phillips, N. B., & Karns, K. (1995). General educators' specialized adaptation for students with learning disabilities. *Exceptional Children, 61,* 440–459.

Reports a study that examined general educators' specialized adaptation for students with learning disabilities, in conjunction with peer-assisted learning strategies and curriculum-based measurement; findings revealed that (a) teachers who were provided with support to implement adaptations engaged differentially in specialized adaptation, and their thinking about how they planned for their students with LD changed and (b) although some teachers implemented substantively important, individually tailored adjustments, others relied on adaptations that were uninventive and limited.

Fuchs, L. S., Fuchs, D., Hamlett, C. L., & Stecker, P. M. (1991). Effects of curriculum-based measurement and consultation on teacher planning and student achievement in mathematics operations. *American Educational Research Journal, 28,* 617–641.

Reports an experimental study contrasting CBM, CBM with expert systems, and standard treatment; results showed the importance of helping teachers translate classroom-based assessment information via instructional consultation.

Fuchs, L. S., Fuchs, D., Hamlett, C. L., Thompson, A., Roberts, P. H., Kubek, P., & Stecker, P. S. (1994). Technical features of a mathematics concepts and applications curriculum-based measurement system. *Diagnostique, 19*(4), 23–49.



Reports a study investigating the reliability and validity of a CBM system focused on the concepts and applications mathematics curriculum; results supported the technical adequacy of the CBM graphed scores as well as the CBM diagnostic skills analysis.

Fuchs, L. S., Fuchs, D., Hamlett, C. L., Walz, L., & Germann, G. (1993). Formative evaluation of academic progress: How much growth can we expect? *School Psychology Review, 22,* 27–48.

Reports normative information on CBM slopes in reading, spelling, and math expected for typically developing students.

Fuchs, L. S., Fuchs, D., Hosp, M., & Hamlett, C. L. (2003). The potential for diagnostic analysis within curriculum-based measurement. *Assessment for Effective Intervention, 28*(3&4), 13–22.

Describes recent efforts to develop a reading diagnostic analysis to be used in conjunction with CBM for informing teachers how to refocus their instruction to address individual needs.

Fuchs, L. S., Fuchs, D., Hosp, M., & Jenkins, J. R. (2001). Oral reading fluency as an indicator of reading competence: A theoretical, empirical, and historical analysis. *Scientific Studies of Reading, 5,* 239–256.

Considers oral reading fluency as an indicator of overall reading competence. The authors examined theoretical arguments for supposing that oral reading fluency may reflect overall reading competence, reviewed several studies substantiating this phenomenon, and provided an historical analysis of the extent to which oral reading fluency has been incorporated into measurement approaches during the past century.

Fuchs, L. S., Fuchs, D., Karns, K., Hamlett, C. L., Dutka, S., & Katzaroff, M. (2000). The importance of providing background information on the structure and scoring of performance assessments. *Applied Measurement in Education, 13,* 83–121.

Reports development of curriculum-based measurement problem-solving assessment system, reliability and validity data supporting use of that system, and effects of a study examining the effects of test-wiseness training on scores for low-, average-, and high-performing students.

Fuchs, L. S., Fuchs, D., Karns, K., Hamlett, C. L., Katzaroff, M., & Dutka, S. (1997). Effects of task-focused goals on low-achieving students with and without learning disabilities. *American Educational Research Journal, 34*(3), 513–544.

Reports a study that examined the effects of a task-focused goals treatment in mathematics, using curriculum-based measurement. CBM students reported enjoying and benefiting from CBM, chose more challenging and a greater variety of learning topics, and increased their effort differentially. Increased effort, however, was associated with greater learning only for low achievers in TFG without learning disabilities.

Fuchs, L. S., Fuchs, D., Karns, K., Hamlett, C. L., & Katzaroff, M. (1999). Mathematics performance assessment in the classroom: Effects on teacher planning and student learning. *American Educational Research Journal, 36*(3), 609–646.

Reports the findings of a study examining teachers' use of a curriculum-based measurement problem-solving system. Teachers were assigned randomly to CBM or control conditions; teachers administered and scored three performance assessments at monthly intervals and planned instruction in response to the assessment feedback. Teachers' knowledge of performance assessment, their curricular focus, and their instructional plans were described. Outcomes on three types of problem-solving assessments for low-, average-, and high-performing students were assessed.

Gersten, R., & Dimino, J. A. (2001). The realities of translating research into classroom practice. *Learning Disabilities Research and Practice, 16*, 120–130.

Hosp, M. K., & Hosp, J. (2003). Curriculum-based measurement for reading, math, and spelling: How to do it and why. *Preventing School Failure, 48*(1), 10–17.

Provides a rationale for collecting and using curriculum-based measurement (CBM) data as well as providing specific guidelines for how to collect CBM data in reading, spelling, and math. Relying on the research conducted on CBM over the past 25 years, the authors define what CBM is and how it is different from curriculum-based assessment (CBA). Authors describe in detail how to monitor student growth within an instructional program using CBM data in reading, spelling, and math. Reasons teachers should collect and use CBM data are also discussed.

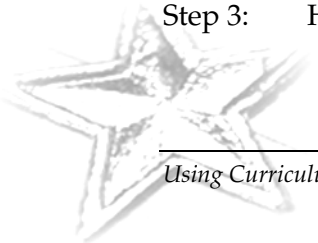
Phillips, N. B., Hamlett, C. L., Fuchs, L. S., & Fuchs, D. (1993). Combining classwide curriculum-based measurement and peer tutoring to help general educators provide adaptive education. *Learning Disabilities Research and Practice, 8,* 148–156.

Provides an overview of the math PALS methods for practitioners, with a brief summary of an efficacy study.

Stecker, P. M., & Fuchs, L. S. (2000). Effecting superior achievement using curriculum-based measurement: The importance of individual progress monitoring. *Learning Disabilities Research and Practice, 15,* 128–134.

Examined the importance of designing students' programs based on individual progress-monitoring data, using curriculum-based measurement. Results indicate that students for whom teachers tailored instructional adjustments based on those students' own CBM data performed significantly better on a global achievement test than did their partners whose instructional adjustments were not based on their own assessment data

Steps for Conducting CBM



- CBM Letter Sound Fluency (page 10)
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- CBM Passage Reading Fluency (page 16)
- CBM Maze Fluency (page 20)

Step 4: How to Graph Scores (page 24)

Step 5: How to Set Ambitious Goals (page 26)

Step 6: How to Apply Decision Rules to Graphed Scores to Know When to Revise Programs and Increase Goals (page 32)

Step 7: How to Use the CBM Database Qualitatively to Describe Students' Strengths and Weaknesses (page 42)

Step 1: How to Place Students in a Reading CBM Task for Progress Monitoring

The first decision for implementing CBM in reading is to decide which task is developmentally appropriate for each reader to be monitored over the academic year. For students who are developing at a typical rate in reading, the correct CBM tasks are as follows:

- At Kindergarten, Letter Sound Fluency.
  - Select Letter Sound Fluency if you are more interested in measuring students' progress toward decoding.
- At Grade 1, Word Identification Fluency.
- At Grades 2 and 3, Passage Reading Fluency.
  - See next section for determining which level of passages to use for progress monitoring.
- At Grades 4–6, Maze Fluency.
  - Use the guidelines in the next section for determining which level of passages to use for progress monitoring.

Note: Once you select a task for CBM progress monitoring (and for Passage Reading Fluency or Maze Fluency, a grade level of passages for progress monitoring), stick with that task (and level of passages) for the entire year.

Step 2: How to Identify the Level of Material for Monitoring Progress for Passage Reading Fluency and Maze Fluency

For Passage Reading Fluency (PRF) and Maze Fluency, teachers use CBM passages written at the student's current grade level. However, if a student is well below grade-level expectations, then he or she may need to read from a lower grade-level passage. If teachers are worried that a student is too delayed in reading to make the grade-level passages appropriate, then find the appropriate CBM level by following these steps.

1. Determine the grade level text at which you expect the student to read competently by year's end.

2. Administer 3 passages at this level. Use generic CBM Passage Reading Fluency (PRF) passages, not passages that teachers use for instruction.

    - If the student reads fewer than 10 correct words in 1 minute, then use the CBM word identification fluency measure instead of CBM PRF or CBM Maze Fluency for progress monitoring.
    - If the student reads between 10 and 50 correct words in 1 minute but less than 85–90% correct, then move to the next lower level of text and try 3 passages.
    - If the student reads more than 50 correct words in 1 minute, then move to the highest level of text where he/she reads between 10 and 50 words correct in 1 minute (but not higher than the student's grade-appropriate text).

3. Maintain the student on this level of text for the purpose of progress monitoring for the *entire school year*.

Step 3: How to Administer and Score Reading CBM

With Reading CBM, students read letters, isolated words, or passages within a 1-minute time span. The student has a "student copy" of the reading probe, and the teacher has an "examiner copy" of the same probe. The student reads out loud for 1 minute while the teacher marks student errors. The teacher calculates the number of letters or words read correctly and graphs this score on a student graph. The CBM score is a general overall indicator of the student's reading competency (Fuchs, Fuchs, Hosp, & Jenkins, 2001).

In reading, the following CBM tasks are available at these grade levels.

- Letter Sound Fluency (Kindergarten)
- Word Identification Fluency (Grade 1)
- Passage Reading Fluency (Grades 1–8)
- Maze Fluency (Grades 1–6)

A description of each of these CBM tasks follows. Information on how to obtain the CBM materials for each task is available in Appendix A.

CBM Letter Sound Fluency

CBM Letter Sound Fluency (LSF) is used to monitor student progress in beginning decoding at kindergarten.

CBM LSF is administered individually. The examiner presents the student with a single page showing 26 letters in random order (Figure 1). The student has 1 minute to say the sounds that correspond with the 26 letters. The examiner marks student responses on a separate score sheet (Figure 2). The score is the number of correct letter sounds spoken in 1 minute. If the student finishes in less than 1 minute, then the score is prorated. Five alternate forms, which can be rotated through multiple times, are available.

Figure 1. Student Copy of CBM Letter Sound Fluency Test

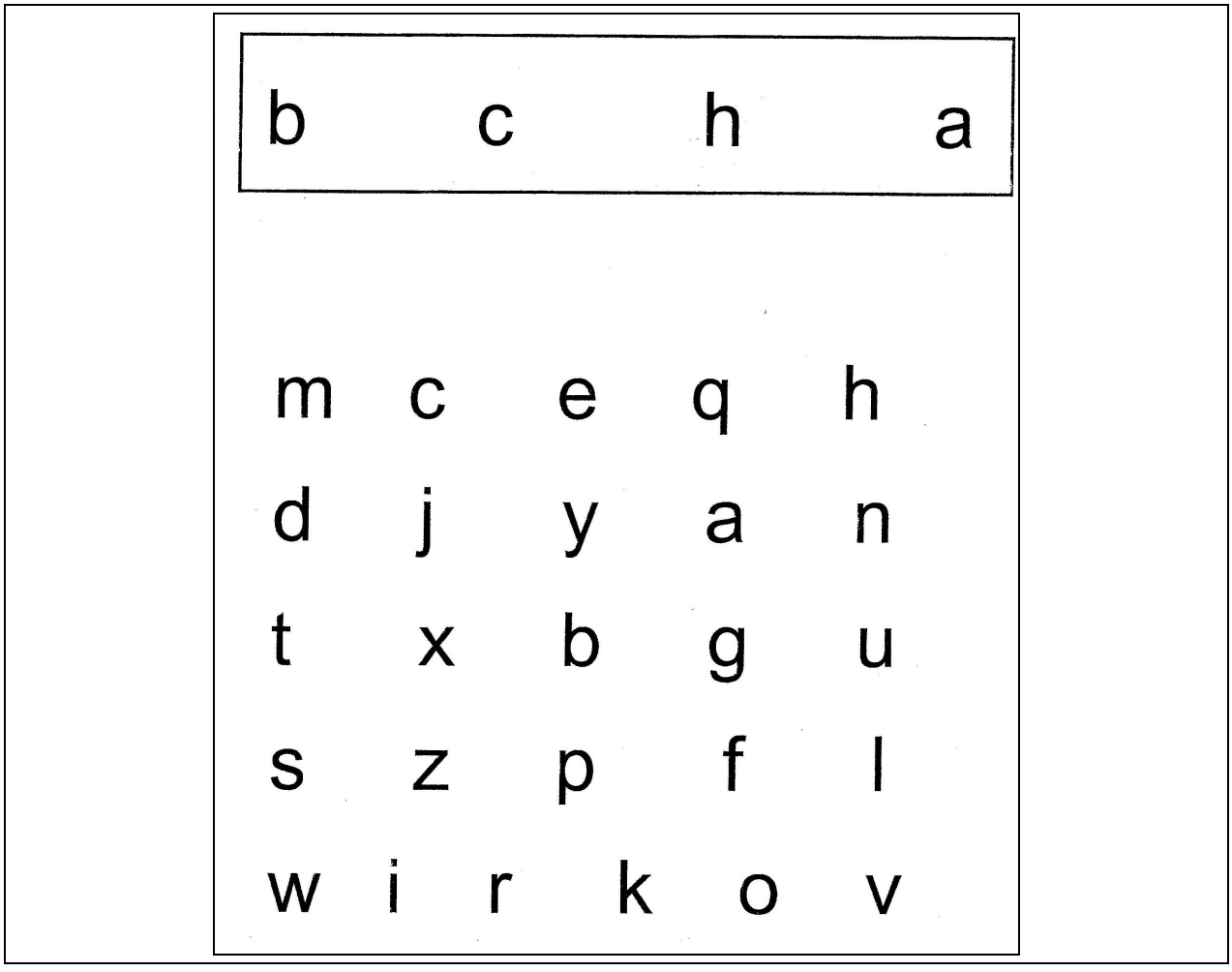
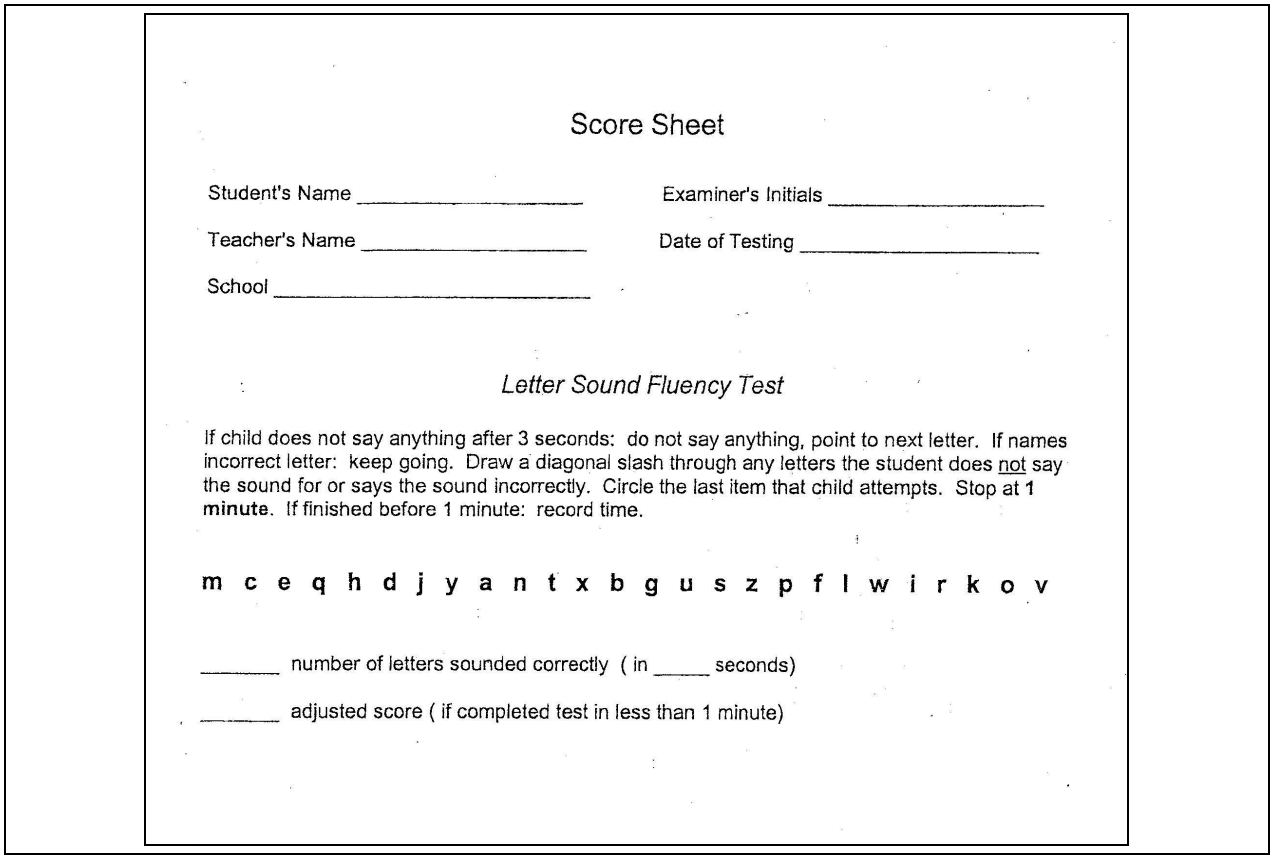


Figure 2. Teacher Copy of CBM Letter Sound Fluency Test



Score Sheet

Student's Name _____ Examiner's Initials _____

Teacher's Name _____ Date of Testing _____

School _____

Letter Sound Fluency Test

If child does not say anything after 3 seconds: do not say anything, point to next letter. If names incorrect letter: keep going. Draw a diagonal slash through any letters the student does not say the sound for or says the sound incorrectly. Circle the last item that child attempts. Stop at **1 minute**. If finished before 1 minute: record time.

m c e q h d j y a n t x b g u s z p f l w i r k o v

_____ number of letters sounded correctly (in _____ seconds)

_____ adjusted score (if completed test in less than 1 minute)

Administration of CBM LSF is as follows:

Examiner: I'm going to show you some letters. You can tell me what sound the letters make. You may know the sound for some letters. For other letters, you may now know the sounds. If you don't know the sound a letter makes, don't worry. Okay? What's most important is that you try your best. I'll show you how this activity works. My turn first. (Refer to the practice portion of the CBM LSF sheet.) **This says /b/. Your turn now. What sound does it say?**

Student: /b/

Examiner: Very good. You told me what sound the letter makes. (Correction procedures are provided in the CBM LSF manual.) **You're doing a really good job. Now it will be just your turn. Go as quickly and carefully as you can. Remember to tell me the sounds the letters make. Remember just try your best. If you don't know the sounds it's okay.** Trigger the stopwatch.

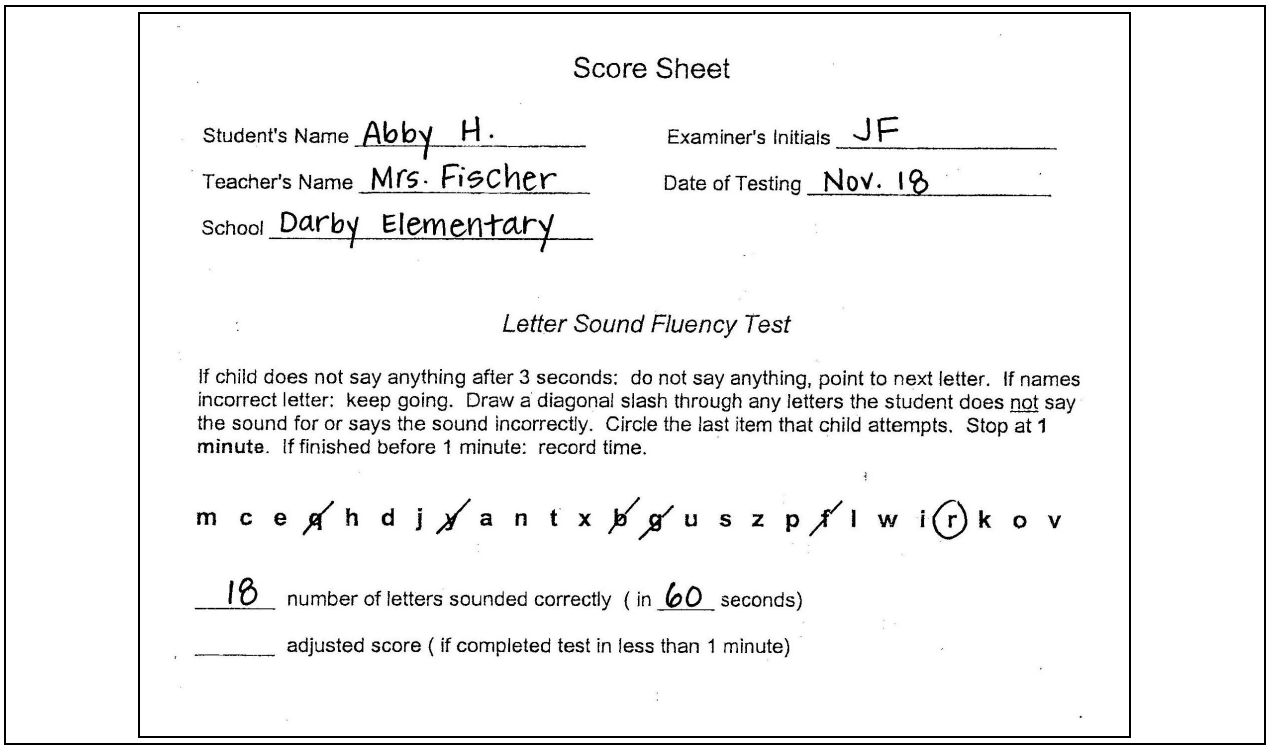
When scoring CBM LSF, short vowels (rather than long vowel sounds) are correct. If the student answers correctly, then the examiner immediately points to the next letter on the student copy. If the student answers incorrectly, then the examiner marks the letter as incorrect by making a

slash through that letter on the teacher's score sheet. If a student does not respond after 3 seconds, then the examiner points to the next letter. As the student reads, the examiner does not correct mistakes.

At 1 minute, the examiner circles the last letters for which the student provides a correct sound. If the student finishes in less than 1 minute, then the examiner notes the number of seconds it took to finish the letters. The score is adjusted if completed in less than 1 minute. Information on adjusting scores is available in the administration and scoring guide.

Look at the following CBM LSF score sheet (Figure 3). Abby mispronounced 5 letter sounds in 1 minute. The last letter sound she said correctly (/r/) is circled. Her score for the LSF would be 18. A score of 18 would be charted on Abby's CBM graph.

Figure 3. Abby's Sample CBM LSF Score Sheet



Score Sheet

Student's Name Abby H. Examiner's Initials JF

Teacher's Name Mrs. Fischer Date of Testing Nov. 18

School Darby Elementary

Letter Sound Fluency Test

If child does not say anything after 3 seconds: do not say anything, point to next letter. If names incorrect letter: keep going. Draw a diagonal slash through any letters the student does not say the sound for or says the sound incorrectly. Circle the last item that child attempts. Stop at **1 minute**. If finished before 1 minute: record time.

m c e ~~a~~ h d j ~~y~~ a n t x ~~b~~ ~~g~~ u s z p ~~f~~ l w i (r) k o v

18 number of letters sounded correctly (in 60 seconds)

_____ adjusted score (if completed test in less than 1 minute)

CBM Letter Sound Fluency is available from the University of Maryland and Vanderbilt University. See Appendix A for contact information.

CBM Word Identification Fluency

CBM Word Identification Fluency (WIF) is used to monitor students' overall progress in reading at first grade.

CBM WIF is administered individually. The examiner presents the student with a single page with 50 words (Figure 4). The 50 words have been chosen from the Dolch 100 most frequent words list or from "The educator's word frequency guide" (Zeno, Ivens, Millard, & Duvvuri,

1995) 500 most frequent words list with 10 words randomly selected from each hundred. The student has 1 minute to read the words. The examiner marks student errors on a separate score sheet (Figure 5). The score is the number of correct words spoken in 1 minute. If the student finishes in less than 1 minute, then the score is prorated. Twenty alternate forms are available.

Figure 4. Student Copy of CBM Word Identification Fluency Test

List 13

and	always	gave
as	going	car
at	until	probably
one	saw	fire
said	end	taken
into	room	problems
could	far	tree
than	form	common
new	become	hot
back	government	using
such	himself	doing
things	sun	main
same	known	thus
find	war	ask
went	learn	comes
between	I'm	street
want	eat	

Figure 5. Teacher Copy of CBM Word Identification Fluency Test

List 13

Student's Name:_____ Examiner's Initials:_____

Student's Teacher:_____ Date:_____

Score 1 for correct response, 0 for incorrect response.

and____	always____	gave____
as____	going____	car____
at____	until_____	probably____
one____	saw____	fire____
said____	end____	taken____
into____	room_____	problems____
could____	far____	tree____
than____	form_____	common____
new____	become_____	hot____
back____	government____	using____
such____	himself____	doing____
things____	sun____	main____
same____	known____	thus____
find____	war____	ask____
went_____	learn____	comes____
between____	I'm____	street____
want____	eat____	

Total score = _____

Administration of the WIF is as follows:

Examiner: When I say, 'go,' I want you to read these words as quickly and correctly as you can. Start here (point to the first word) **and go down the page** (run your finger down the first column)**. If you don't know a word, skip it and try the next word. Keep reading until I say, 'stop.' Do you have any questions?** Trigger the stopwatch for 1 minute.

The teacher scores a word as a "1" if it is correct and a "0" if it is incorrect. The examiner uses a blank sheet to cover the second and third columns. As the student completes a column, the blank sheet is moved to expose the next column. If the student hesitates, then after 2 seconds he/she is prompted to move to the next word. If the student is sounding out a word, then he/she is prompted to move to the next word after 5 seconds. As the student reads, the examiner does not correct mistakes and marks errors on the score sheet.

At 1 minute, the examiner circles the last word the student reads. If the student finishes in less than 1 minute, then the examiner notes the number of seconds it took to complete the word list, and the student score is adjusted.

Look at the following CBM WIF score sheet (Figure 6). Shameka mispronounced 7 words in 1 minute. The last word she read correctly (car) is circled. Her score for the WIF is 29. A score of 29 is charted on Shameka's CBM graph.

Figure 6. Shameka's CBM WIF Score Sheet

List 13

Student's Name: Shameka S. Examiner's Initials: ST

Student's Teacher: Mr. Towler Date: Jan. 15

Score 1 for correct response, 0 for incorrect response.

and 1	always 1	gave 1
as 1	going 0	car 1
at 1	until 1	probably
one 1	saw 1	fire
said 0	end 1	taken
into 1	room 1	problems
could 1	far 1	tree
than 1	form 0	common
new 1	become 0	hot
back 1	government 0	using
such 1	himself 1	doing
things 1	sun 1	main
same 1	known 0	thus
find 0	war 1	ask
went 1	learn 1	comes
between 1	I'm 1	street
want 1	eat 1	

Total score = 29

CBM Word Identification Fluency is available from Vanderbilt University. See Appendix A for contact information.

CBM Passage Reading Fluency

CBM Passage Reading Fluency (PRF) is used to monitor students' overall progress in reading at Grades 1–8. Some teachers prefer Maze Fluency beginning at Grade 4.

CBM PRF is administered individually. In general education classrooms, students take one PRF test each week. Special education students take two PRF tests each week. Each PRF test uses a different passage at the same grade level of equivalent difficulty. For higher-performing general education students, teachers might administer PRF tests (also referred to as "probes") on a monthly basis and have each student read three probes on each occasion.

For each CBM PRF reading probe, the student reads from a "student copy" that contains a grade-appropriate reading passage (Figure 7). The examiner scores the student on an "examiner copy." The examiner copy contains the same reading passage but has a cumulative count of the number of words for each line along the right side of the page (Figure 8). The numbers on the teacher copy allow for quick calculation of the total number of words a student reads in 1 minute.

Figure 7. Student Copy of CBM Passage Reading Fluency Test

Raymond lived in Georgia. He was born there and had many friends. One day Dad had come home from work to say that they would have to move far away. Dad worked in a factory. The factory had closed and Dad needed a new job. Dad had found a new job and now they had to move.

Raymond was sad because he did not want to leave his school. He did not want to leave his friends.

"I am sorry, son," said Dad.

"It is OK," said Raymond with a smile. He did not want Dad to feel bad.

They packed up the car and moved to a new state. Their new house was old and scary. "I wonder whether there are any ghosts living in our house," said Raymond. The house was big and dark. The front of the house was covered by trees. Even the trees looked scary. The blowing breeze made them look alive.

Inside, the house was dark, so Dad fixed the lights and turned them on. Then they unpacked the car and Raymond went up to his new room. The walls were cracked. Dad would paint them. Raymond was afraid to open the closet. He would do it later.

Raymond went down to the kitchen. Mom was making dinner. She had fried chicken and potatoes cooking because these were Raymond's favorites.

After dinner Raymond felt sleepy, so he went to his room to go to sleep. "Good night!" he called down to Mom and Dad.

"Sweet dreams," they said back.

Raymond got into bed and turned out the light. He began to fall asleep. Then he heard a loud noise. It came from the closet. Raymond

Figure 8. Teacher Copy of CBM Passage Reading Fluency Test

Raymond lived in Georgia. He was born there and had many	11
friends. One day Dad had come home from work to say that they	24
would have to move far away. Dad worked in a factory. The factory	37
had closed and Dad needed a new job. Dad had found a new job and	52
now they had to move.	57
Raymond was sad because he did not want to leave his school.	69
He did not want to leave his friends.	77
"I am sorry, son," said Dad.	83
"It is OK," said Raymond with a smile. He did not want Dad to	97
feel bad.	99
They packed up the car and moved to a new state. Their new	112
house was old and scary. "I wonder whether there are any ghosts	124
living in our house," said Raymond. The house was big and dark. The	137
front of the house was covered by trees. Even the trees looked scary.	150
The blowing breeze made them look alive.	157
Inside, the house was dark, so Dad fixed the lights and turned	169
them on. Then they unpacked the car and Raymond went up to his new	183
room. The walls were cracked. Dad would paint them. Raymond was	194
afraid to open the closet. He would do it later.	204
Raymond went down to the kitchen. Mom was making dinner.	214
She had fried chicken and potatoes cooking because these were	224
Raymond's favorites.	226
After dinner Raymond felt sleepy, so he went to his room to go	239
to sleep. "Good night!" he called down to Mom and Dad.	250
"Sweet dreams," they said back.	255
Raymond got into bed and turned out the light. He began to fall	268
asleep. Then he heard a loud noise. It came from the closet. Raymond	281

Administration of CBM PRF is as follows:

Examiner: I want you to read this story to me. You'll have 1 minute to read. When I say, 'begin,' start reading aloud at the top of the page. Do your best reading. If you have trouble with a word, I'll tell it to you. Do you have any questions? Begin. Trigger the timer for 1 minute.

The examiner marks each student error with a slash (/). At the end of 1 minute, the last word read is marked with a bracket (]). If a student skips an entire line of a reading passage, then a straight line is drawn through the skipped line. When scoring CBM probes, the teacher

identifies the count for the last word read in 1 minute and the total number of errors. The teacher then subtracts errors from the total number of words to calculate the student score.

There are a few scoring guidelines to follow when administering reading CBM probes. Repetitions (words said over again), self-corrections (words misread, but corrected within 3 seconds), insertions (words added to passage), and dialectical difference (variations in pronunciation that conform to local language norms) are all scored as correct. Mispronunciations, word substitutions, omitted words, hesitations (words not pronounced within 3 seconds), and reversals (two or more words transposed) are all scored as errors.

Numerals are counted as words and must be read correctly within the context of the passage. With hyphenated words, each morpheme separated by a hyphen(s) is counted as a word if it can stand alone on its own (e.g., *Open-faced* is scored as two words but *re-enter* is scored as one word). Abbreviations are counted as words and must be read correctly within the context of the sentence.

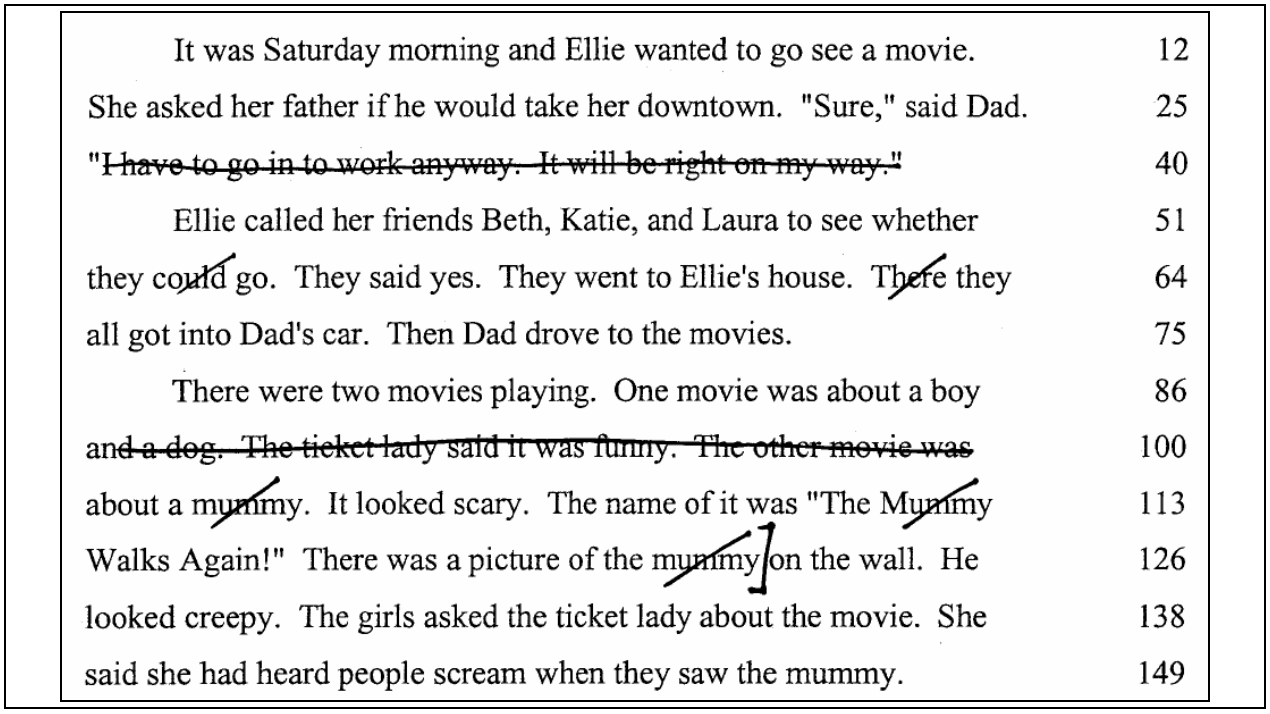
As teachers listen to students read, they can note the types of decoding errors that students make, the kinds of decoding strategies students use to decipher unknown words, how miscues reflect students' reliance on graphic, semantic, or syntactic language features, and how self-corrections, pacing, and scanning reveal strategies used in the reading process (Fuchs, Fuchs, Hosp, & Jenkins, 2001). Teachers can use these more qualitative descriptions of a student's reading performance to identify methods to strengthen the instructional program for each student. More information about noting student decoding errors is covered under "Step 7: How to Use the Database Qualitatively to Describe Student Strengths and Weaknesses."

If a student skips several connected words or an entire line of the reading probe, the omission is calculated as 1 error. If this happens, then every word but 1 of the words is subtracted from the total number of words attempted in 1 minute.

Look at the following example (Figure 9). The student omitted text 2 times during the 1-minute CBM PRF. The examiner drew a line through the omitted text. The first omission was on words 26–40. The examiner counts 15 words as omitted and drops 14 of the words before calculating the total words attempted. The student also omitted words 87–100. The examiner drops 13 of the 14 words before calculating the total words attempted.

To calculate the total number of words read in 1 minute, the examiner subtracts the 2 words (14 words from first omission plus 13 words from second omission) from the total number of words read in 1 minute (122). The adjusted number of words attempted is then 95. The student made 7 errors (5 errors marked by slashes and 2 errors from omissions). These 7 errors are subtracted from the adjusted number of words attempted of 95. 95 – 7 = 88. 88 is the number of words read correctly in 1 minute.

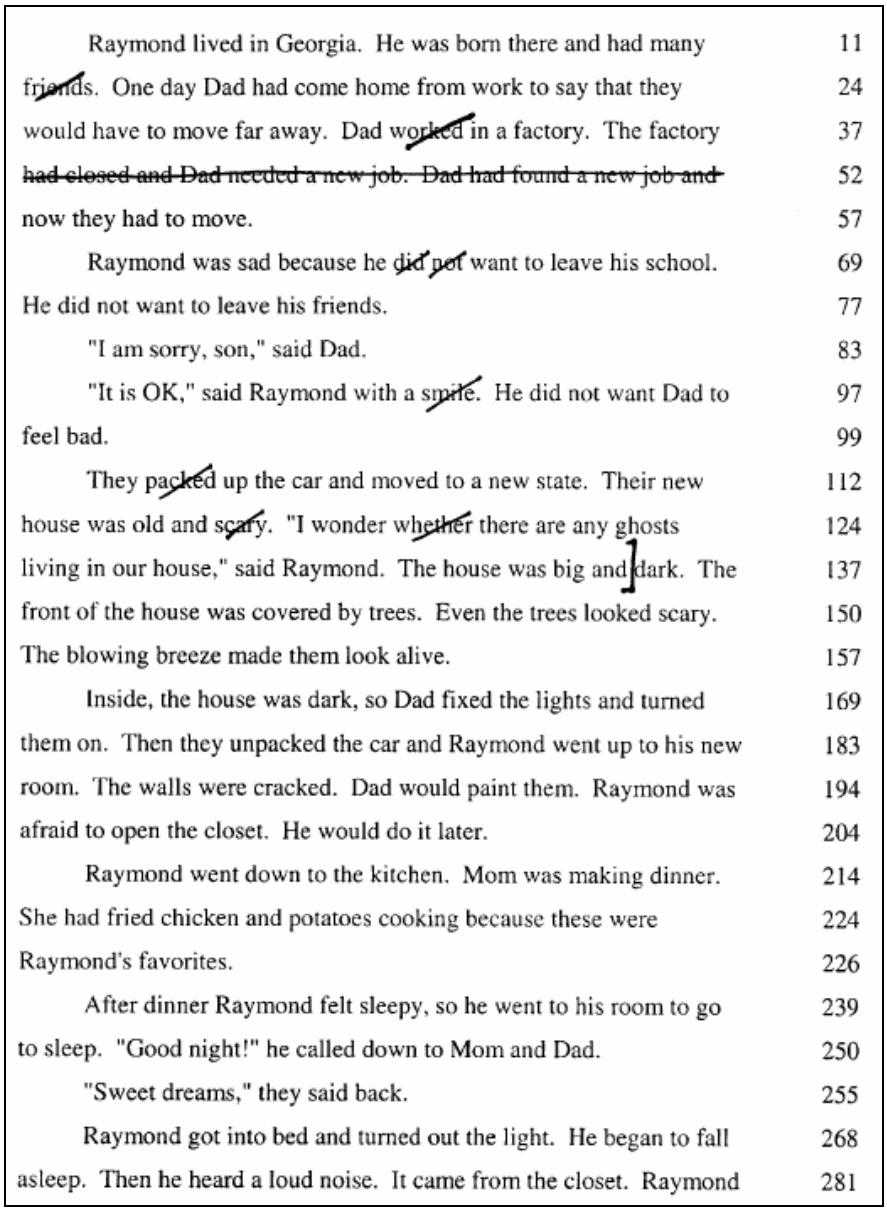
Figure 9. Sample CBM Passage Reading Fluency Passage



It was Saturday morning and Ellie wanted to go see a movie. 12
She asked her father if he would take her downtown. "Sure," said Dad. 25
"~~I have to go in to work anyway. It will be right on my way.~~" 40
Ellie called her friends Beth, Katie, and Laura to see whether 51
they could go. They said yes. They went to Ellie's house. There they 64
all got into Dad's car. Then Dad drove to the movies. 75
There were two movies playing. One movie was about a boy 86
~~and a dog. The ticket lady said it was funny. The other movie was~~ 100
about a mummy. It looked scary. The name of it was "The Mummy 113
Walks Again!" There was a picture of the mummy on the wall. He 126
looked creepy. The girls asked the ticket lady about the movie. She 138
said she had heard people scream when they saw the mummy. 149

Look at this sample CBM PRF probe (Figure 10). Reggie made 8 errors while reading the passage for 1 minute. The straight line drawn through the fourth line shows that he also skipped an entire line. The last word he read was "and" and a bracket was drawn after this word. In all Reggie attempted 136 words. He skipped 15 words in the fourth line. 14 of those skipped words are subtracted from the total words attempted (136 – 14 = 122) and 1 of those skipped words is counted as an error. Reggie made 8 additional errors for a total of 9 errors. The 9 errors are subtracted from the 122 words attempted. 122 – 9 = 113. 113 is Reggie's reading score for this probe.

Figure 10. Reggie's CBM PRF Score Sheet



Raymond lived in Georgia. He was born there and had many	11
friends. One day Dad had come home from work to say that they	24
would have to move far away. Dad worked in a factory. The factory	37
had closed and Dad needed a new job. Dad had found a new job and	52
now they had to move.	57
Raymond was sad because he did not want to leave his school.	69
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"I am sorry, son," said Dad.	83
"It is OK," said Raymond with a smile. He did not want Dad to	97
feel bad.	99
They packed up the car and moved to a new state. Their new	112
house was old and scary. "I wonder whether there are any ghosts	124
living in our house," said Raymond. The house was big and dark. The	137
front of the house was covered by trees. Even the trees looked scary.	150
The blowing breeze made them look alive.	157
Inside, the house was dark, so Dad fixed the lights and turned	169
them on. Then they unpacked the car and Raymond went up to his new	183
room. The walls were cracked. Dad would paint them. Raymond was	194
afraid to open the closet. He would do it later.	204
Raymond went down to the kitchen. Mom was making dinner.	214
She had fried chicken and potatoes cooking because these were	224
Raymond's favorites.	226
After dinner Raymond felt sleepy, so he went to his room to go	239
to sleep. "Good night!" he called down to Mom and Dad.	250
"Sweet dreams," they said back.	255
Raymond got into bed and turned out the light. He began to fall	268
asleep. Then he heard a loud noise. It came from the closet. Raymond	281

CBM PRF tests can be obtained from a variety of sources. See Appendix A for contact information.

CBM Maze Fluency

CBM Maze Fluency is available for students in Grades 1–6, but typically teachers use CBM Maze Fluency beginning in Grade 4. Maze Fluency is used to monitor students' overall progress in reading.

CBM Maze Fluency can be administered to a group of students at one time. The examiner presents each student with a maze passage (Figure 11). With CBM Maze, the first sentence in a

passage is left intact. Thereafter, every seventh word is replaced with a blank and three possible replacements. Only one replacement is semantically correct. Students have 2.5 minutes to read the passage to themselves and circle the word correct for each blank. The examiner monitors the students during the 2.5 minutes and scores each test later. When the student makes 3 consecutive errors, scoring is discontinued (no subsequent correct replacement is counted). Skipped blanks (with no circles) are counted as errors. The score is the number of correct replacements circled in 2.5 minutes. Thirty alternate forms are available for each grade level.

Figure 11. Sample CBM Maze Fluency Student Copy

THE CAVE TRIP

Mrs. Jones said that Cindy's class [**was/ step/ hill**] going on a field trip. The [**stare/ class/ green**] of third graders had never been [**be/ on/ so**] a field trip before. Cindy was [**bed/ went/ very**] excited. Mrs. Jones said that the [**class/ chair/ peach**] was going on a field trip [**at/ to/ is**] see the caves up in the mountains. [**Show/ And/ The**] class had been studying about caves [**for/ sad/ kill**] the last few weeks. Cindy [**wet/ and/ ill**] her classmates had seen pictures of [**shout/ caves/ sing**]. Now, they were going to see [**a/ are/ or**] real cave.

A week later, the students [**then/ her/ and**] Mrs. Jones climbed onto a bus [**four/ that/ dime**] would take them to [**and/ the/ sat**] cave. It was early in the morning [**sit/ tap/ and**] the air was chilly. Mrs. Jones [**got/ sat/ had**] warned all of the students to [**bring/ pillow/ horse**] a sweater because the air might [**be/ to/ it**] chilly in the cave. Cindy was [**work/ jump/ very**] glad that she had brought her sweater.

[**Rain/ Halt/ The**] bus driver started the engine and [**the/ was/ got**] bus began to roll. The bus [**rolled/ mother/ girls**] along the freeway. Finally the bus [**lather/ coffee/ pulled**] onto a little country road that [**ate/ led/ pear**] to the cave.

When the students arrived at the [**goat/ math/ cave**], all they could [**see/ kite/ lot**] was a mountain with a big [**toys/ trees/ black**] hole in the side. A

Administration of CBM Maze Fluency is as follows:

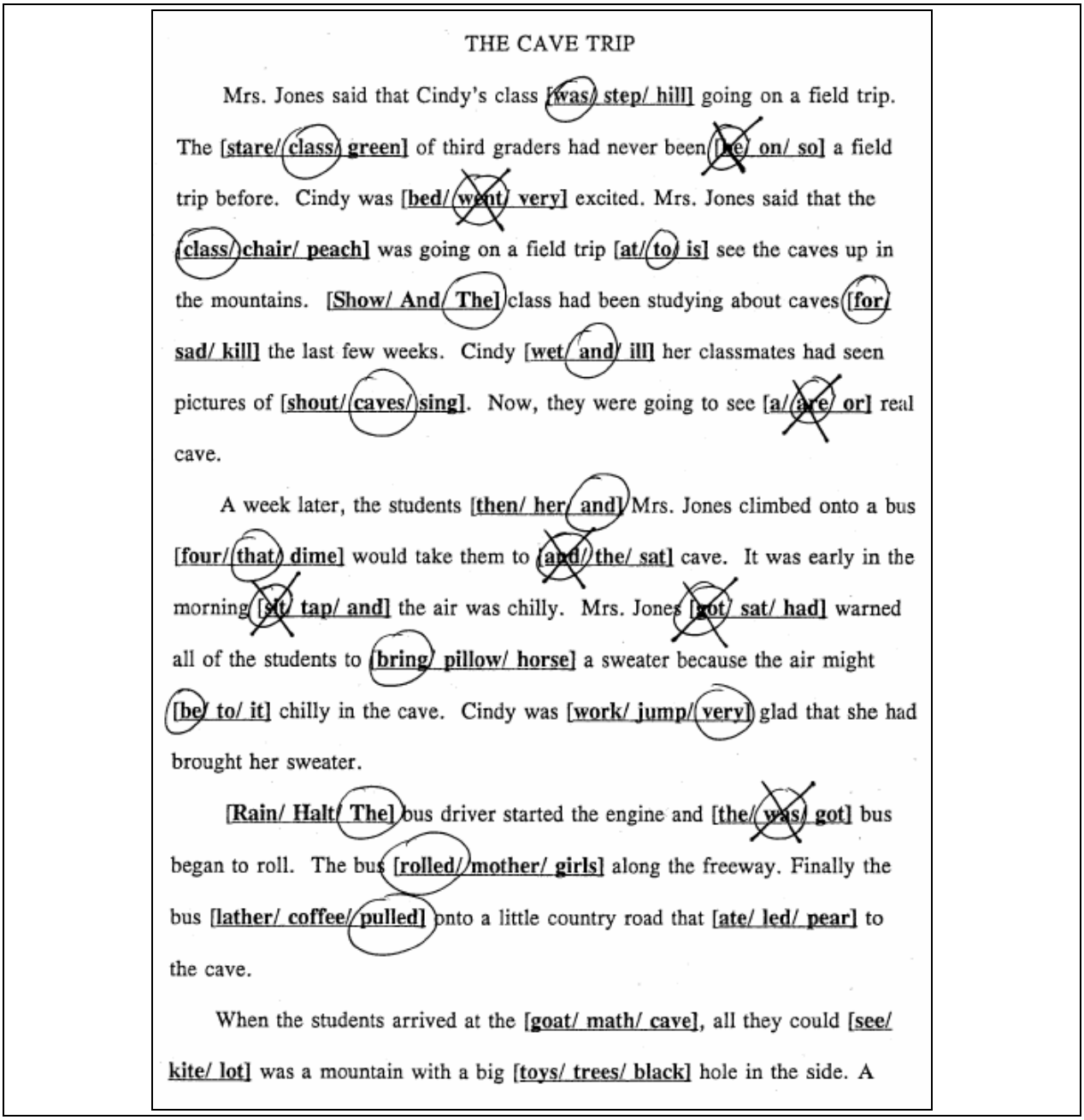
Examiner: Look at this story. (Place practice maze on overhead.) **It has some places where you need to choose the correct word. Whenever you come to three words in parentheses and underlined** (point)**, choose the word that belongs in the story. Listen. The story begins, "Jane had to take piano lessons. Her Mom and Dad made her do. Jane (<u>from/did/soda</u>) not like playing the piano." Which one of the three underlined words (<u>from/did/soda</u>) belongs in the sentence?** (Give time for response.) **That's right. The word that belongs in the sentence is <u>did</u>. So, you circle the word <u>did</u>.** (Demonstrate.) Continue through entire practice activity.

Now you are going to do the same thing by yourself. Whenever you come to three words in parentheses and underlined, circle the word that belongs in the sentence. Choose a word even if you're not sure of the answer. When I tell you to start, pick up your pencil, turn you test over, and begin working. At the end of 2 and a half minutes, I'll tell you to stop working. Remember, do your best. Any questions? Start. Trigger the timer for 2.5 minutes.

When scoring CBM Maze Fluency, students receive 1 point for each correctly circled answer. Blanks with no circles are counted as errors. Scoring is discontinued if 3 consecutive errors are made. The number of correct answers within 2.5 minutes is the student score.

Look at the following CBM Maze score sheet (Figure 12). Juan circled 16 correct answers in 2.5 minutes. He circled 7 incorrect answers. However, Juan did make 3 consecutive mistakes, and 5 of his correct answers were after his 3 consecutive mistakes. Juan's score for the Maze Fluency Test would be 10. A score of 10 would be charted on Juan's CBM graph.

Figure 12. Juan's CBM Maze Fluency Student Answer Sheet



THE CAVE TRIP

Mrs. Jones said that Cindy's class [was/ step/ hill] going on a field trip. The [stare/ class/ green] of third graders had never been [he/ on/ so] a field trip before. Cindy was [bed/ went/ very] excited. Mrs. Jones said that the [class/ chair/ peach] was going on a field trip [at/ to/ is] see the caves up in the mountains. [Show/ And/ The] class had been studying about caves [for/ sad/ kill] the last few weeks. Cindy [wet/ and/ ill] her classmates had seen pictures of [shout/ caves/ sing]. Now, they were going to see [a/ are/ or] real cave.

A week later, the students [then/ her/ and] Mrs. Jones climbed onto a bus [four/ that/ dime] would take them to [and/ the/ sat] cave. It was early in the morning [sit/ tap/ and] the air was chilly. Mrs. Jones [got/ sat/ had] warned all of the students to [bring/ pillow/ horse] a sweater because the air might [be/ to/ it] chilly in the cave. Cindy was [work/ jump/ very] glad that she had brought her sweater.

[Rain/ Halt/ The] bus driver started the engine and [the/ was/ got] bus began to roll. The bus [rolled/ mother/ girls] along the freeway. Finally the bus [lather/ coffee/ pulled] onto a little country road that [ate/ led/ pear] to the cave.

When the students arrived at the [goat/ math/ cave], all they could [see/ kite/ lot] was a mountain with a big [toys/ trees/ black] hole in the side. A

CBM Maze is available from AIMSweb, Edcheckup, and Vanderbilt University. Some of these products include computerized administration and scoring of CBM Maze Fluency. See Appendix A for contact information.

Step 4: How to Graph Scores

Once the CBM data for each student have been collected, it is time to begin graphing student scores. Graphing the scores of every CBM on an individual student graph is a vital aspect of the CBM program. These graphs give teachers a straightforward way of reviewing a student's progress, monitoring the appropriateness of the student's goals, judging the adequacy of the student's progress, and comparing and contrasting successful and unsuccessful instructional aspects of the student's program.

CBM graphs help teachers make decisions about the short- and long-term progress of each student. Frequently, teachers underestimate the rate at which students can improve (especially in special education classrooms), and the CBM graphs help teachers set ambitious, but realistic, goals. Without graphs and decision rules for analyzing the graphs, teachers often stick with low goals. By using a CBM graph, teachers can use a set of standards to create more ambitious student goals and help better student achievement. Also, CBM graphs provide teachers with actual data to help them revise and improve a student's instructional program.

Teachers have two options for creating CBM graphs of the individual students in the classroom. The first option is that teachers can create their own student graphs using graph paper and pencil. The second option is that teachers and schools can purchase CBM graphing software that graphs student data and helps interpret the data for teachers.

Creating Your Own Student Graphs

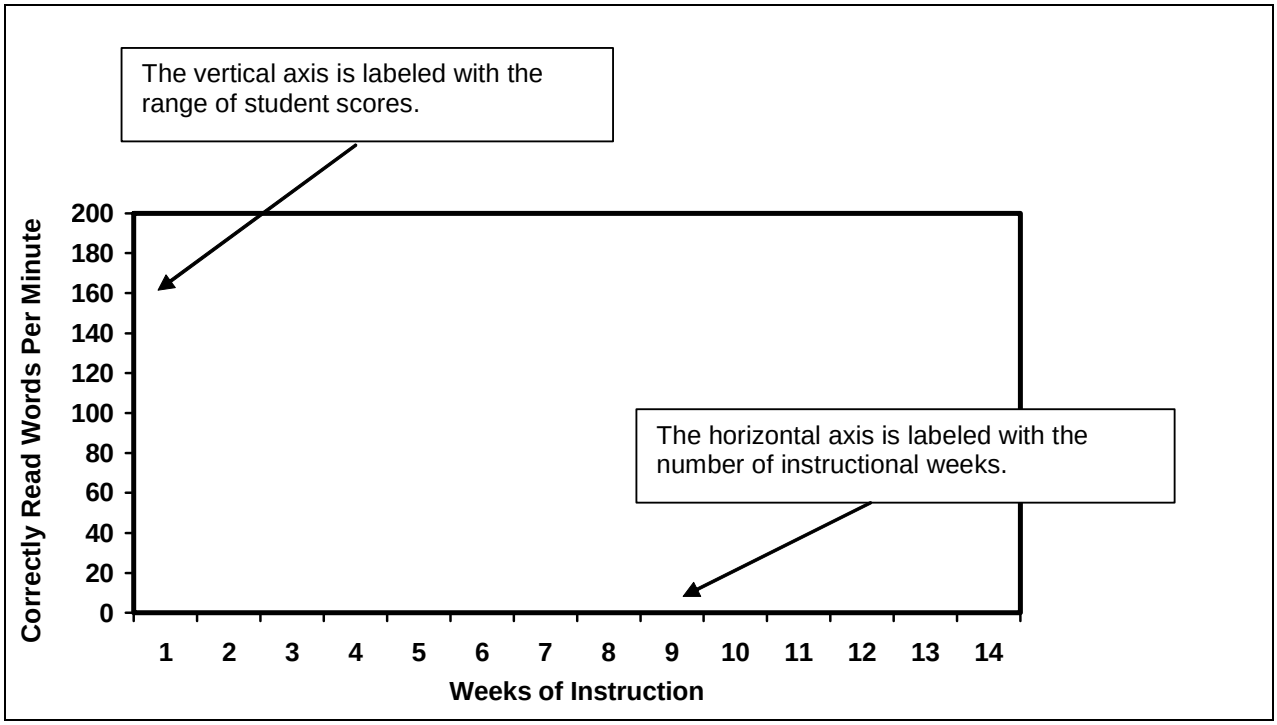
It is easy to graph student CBM scores on teacher-made graphs. Teachers create a student graph for each individual CBM student so they can interpret the CBM scores of every student and see progress or lack thereof.

Teachers should create a master CBM graph in which the vertical axis accommodates the range of the scores of all students in the class, from 0 to the highest score (Figure 13). On the horizontal axis, the number of weeks of instruction is listed (Figure 14). Once the teacher creates the master graph, it can be copied and used as a template for every student.

Figure 13. Highest Scores for Labeling Vertical Axes on CBM Graphs

CBM Task	Vertical Axis: 0–__
LSF	100
PSF	100
WIF	100
PRF	200
Maze Fluency	60

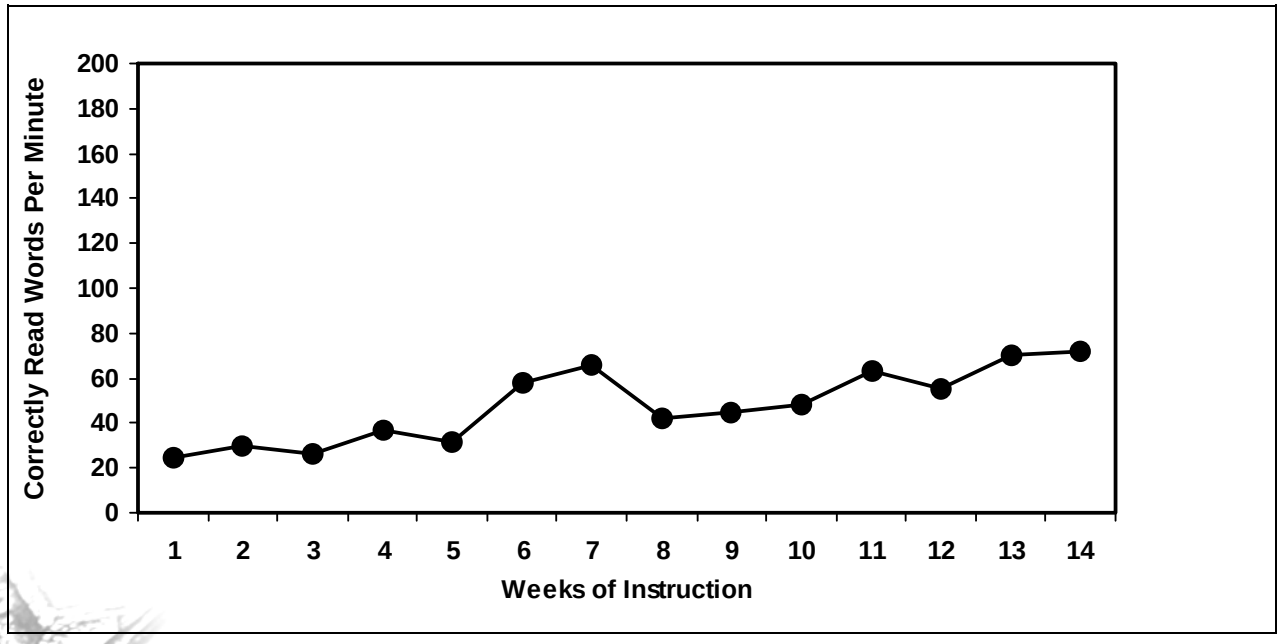
Figure 14. Labeling the CBM Graph



Beginning to Chart Data

Every time a CBM probe is administered, the teacher scores the probe and then records the score on a CBM graph (Figure 15). A line can be drawn connecting each data point.

Figure 15. Sample CBM Graph



Step 5: How to Set Ambitious Goals

Once a few CBM scores have been graphed, it is time for the teacher to decide on an end-of-year performance goal for the student. There are three options. Two options are utilized after at least three CBM scores have been graphed. One option is utilized after at least 8 CBM scores have been graphed.

Option #1: End-of-Year Benchmarking

For typically developing students at the grade level where the student is being monitored, identify the end-of-year CBM benchmark. (See recommendations in Figure 16.) This is the end-of-year performance goal. The benchmark, or end-of-year performance goal, is represented on the graph by an X at the date marking the end of the year. A goal-line is then drawn between the median of at least the first 3 CBM graphed scores and the end-of-year performance goal.

Figure 16. CBM Benchmarks

Grade	Benchmark
Kindergarten	40 letter sounds per minute (CBM LSF)
1st	60 words correct per minute (CBM WIF) 50 words correct per minute (CBM PRF)
2nd	75 words correct per minute (CBM PRF)
3rd	100 words correct per minute (CBM PRF)
4th	20 correct replacements per 2.5 minutes (CBM Maze)
5th	25 correct replacements per 2.5 minutes (CBM Maze)
6th	30 correct replacements per 2.5 minutes (CBM Maze)

For example, the benchmark for a first-grade student is reading 60 words correctly in 1 minute on CBM WIF. The end-of-year performance goal of 60 would be graphed on the student's graph. The goal-line would be drawn between the median of the first few CBM WIF scores and the end-of-year performance goal.

The benchmark for a sixth-grade student is correctly replacing 30 words in 2.5 minutes on CBM Maze Fluency. The end-of-year performance goal of 30 would be graphed on the student's graph. The goal-line would be drawn between the median of the first few CBM Maze Fluency scores and the end-of-year performance goal.

Option #2: Intra-Individual Framework

Identify the weekly rate of improvement for the target student under baseline conditions, using at least 8 CBM data points. Multiply this baseline rate by 1.5. Take this product and multiply it by the number of weeks until the end of the year. Add this product to the student's baseline score. This sum is the end-of-year goal.

For example, a student's first 8 CBM scores were 10, 12, 9, 14, 12, 15, 12 and 14. To calculate the weekly rate of improvement, find the difference between the highest score and the lowest score. In this instance, 15 is the highest score and 9 is the lowest score: 15 – 9 = 6. Since 8 scores have been collected, divide the difference between the highest and lowest scores by the number of weeks: 6 ÷ 8 = 0.75.

0.75 is multiplied by 1.5: 0.75 × 1.5 = 1.125. Multiply the product of 1.125 by the number of weeks until the end of the year. If there are 14 weeks left until the end of the year: 1.125 × 14 = 15.75. The median score of the first 8 data points was 12.00. The sum of 15.75 and the median score is the end-of-year performance goal: 15.75 + 12.00 = 27.75. The student's end-of-year performance goal would be 28.0.

Option #3: National Norms

For typically developing students at the grade level where the student is being monitored, identify the average rate of weekly increase from a national norm chart (Figure 17).

Figure 17. CBM Norms for Student Growth (Slope)

Grade	Letter Sound Fluency Norms	Word Identification Fluency Norms	Passage Reading Fluency Norms	Maze Fluency Norms
K	1.2	—	—	—
1	—	1.50	2.00	0.40
2	—	—	1.50	0.40
3	—	—	1.00	0.40
4	—	—	0.90	0.40
5	—	—	0.50	0.40
6	—	—	0.30	0.40

Note. From Fuchs, Fuchs, Hamlett, Walz, & Germann, 1993

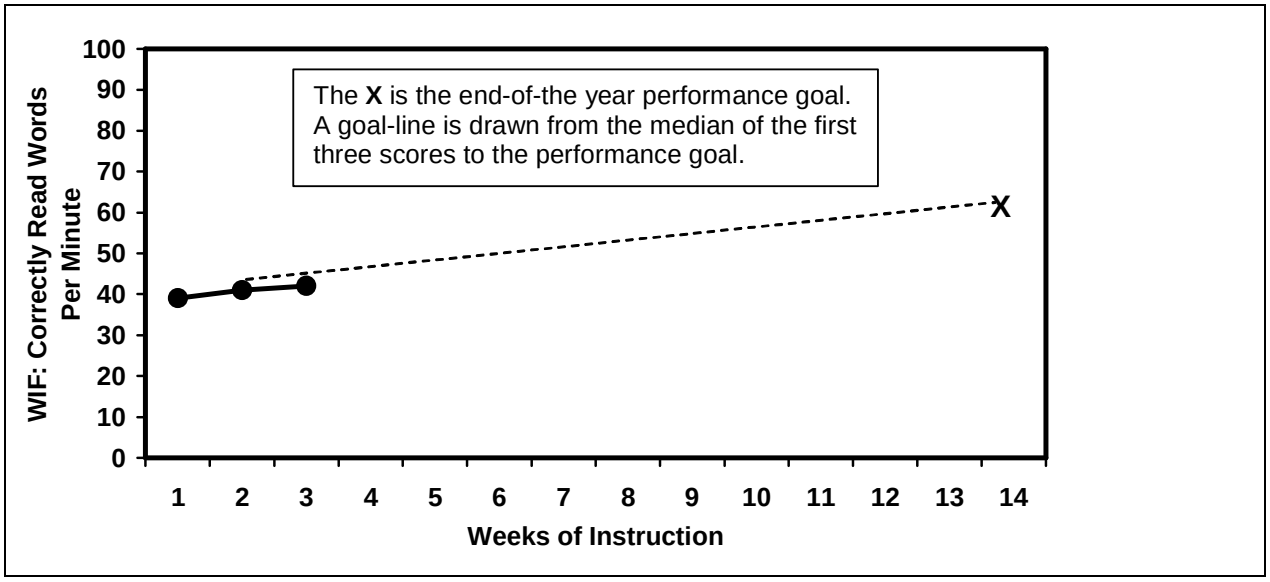
For example, let's say that a fourth-grade student's median score from his first three CBM PRF scores is 29. The PRF norm for fourth-grade students is 0.90 (Figure 17). The 0.90 is the weekly rate of growth for fourth graders. To set an ambitious goal for the student, multiply the weekly rate of growth by the number of weeks left until the end of the year. If there are 16 weeks left, then multiply 16 by 0.90: 16 × 0.90 = 14.4. Add 14.4 to the baseline median of 29 (29 + 14.4 = 43.4). This sum (43.0) is the end-of-year performance goal.

Drawing the Goal and the Goal-Line on the Graph

The teacher creates an end-of-year performance goal for the student using one of the three options. The performance goal is marked on the student graph at the year-end date with an "X." A "goal-line" is then drawn between the median of the initial graphed scores and the end-of-

year performance goal (Figure 18). The goal-line shows the teacher and the students how quickly CBM scores should be increasing to reach the year-end goal.

Figure 18. Drawing a Goal-line



Monitoring the Appropriateness of the Goal

After deciding on an end-of-year performance goal and drawing the goal-line, teachers continually monitor the student graph to determine whether student progress is adequate. This tells the teacher whether the instructional program is effective. When at least 7 or 8 CBM scores have been graphed, teachers draw a trend-line to represent the student's actual progress. By drawing the trend-line, teachers can compare the goal-line (desired rate of progress) to the trend-line (actual rate of progress).

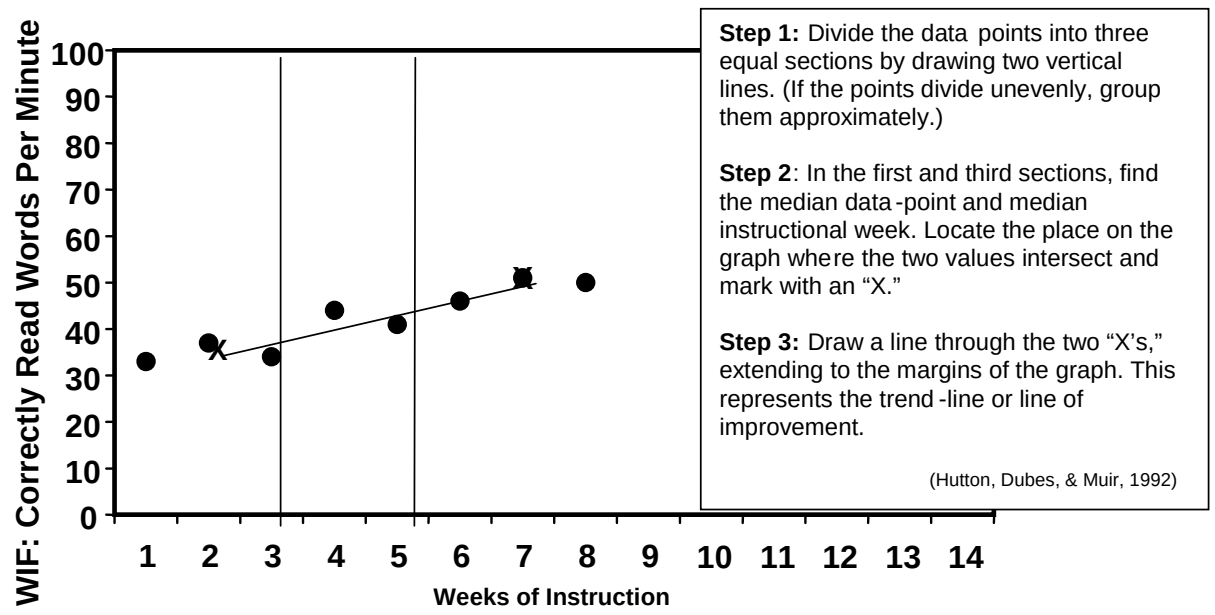
Drawing a Trend-Line Using the Tukey Method

To draw a trend-line, teachers use a procedure called the Tukey method. The Tukey method provides a fairly accurate idea of how the student is progressing.

Teachers use the Tukey method after at least 7 or 8 CBM scores have been graphed. First, the teacher counts the number of charted scores and divides the scores into 3 fairly equal groups. If the scores cannot be split into 3 groups equally, then try to make the groups as equal as possible.

Draw two vertical lines to divide the scores into 3 groups. Look at the first and third groups of data points. Find the median (middle) data point for each group and mark this point with an X. To draw the trend-line, draw a line through the two Xs (Figure 19).

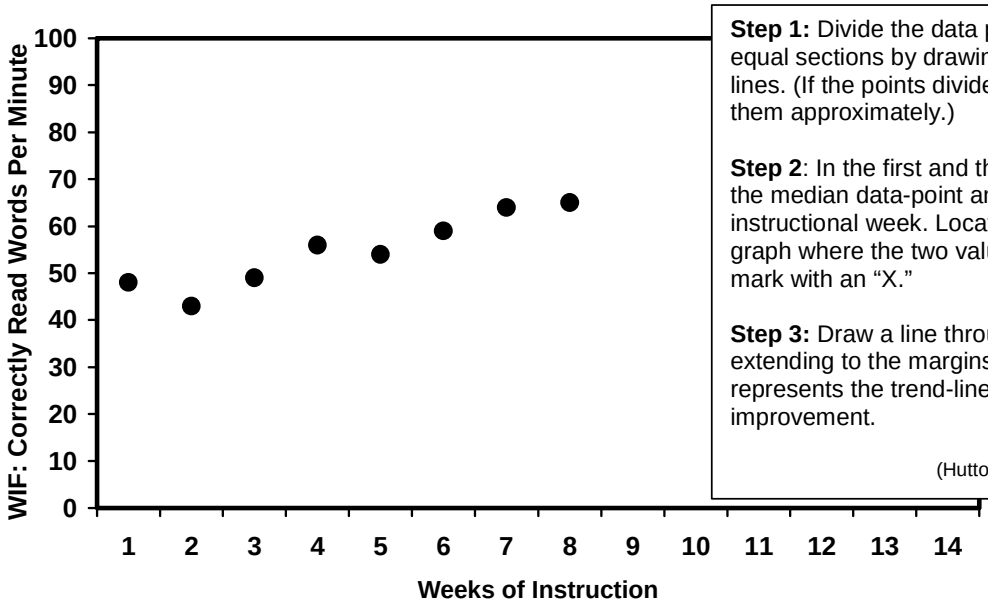
Figure 19. Drawing a Trend-line Using the Tukey Method



After the initial 7 or 8 data points are graphed and the Tukey method is used to create a trend-line, the student graphs should be re-evaluated using the Tukey method every 7 or 8 additional data points. Instructional decisions for students are based on the ongoing evaluation of student graphs.

Let's practice using the Tukey method. Draw a trend-line using the Tukey method (Figure 20).

Figure 20. Drawing a Trend-line Using the Tukey Method: Practice 1



Step 1: Divide the data points into three equal sections by drawing two vertical lines. (If the points divide unevenly, group them approximately.)

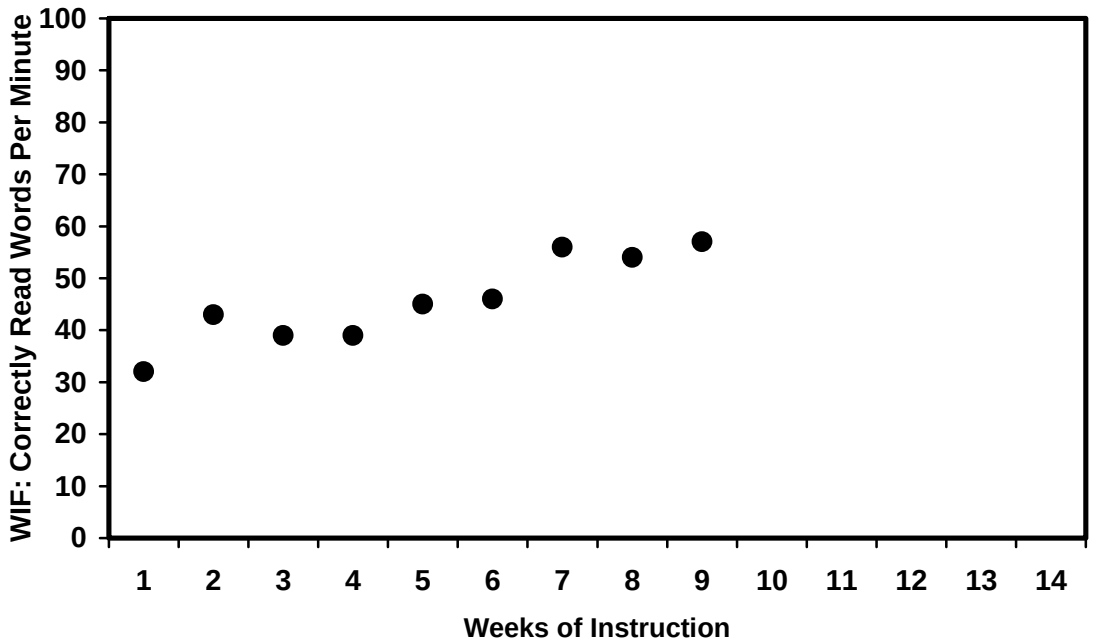
Step 2: In the first and third sections, find the median data-point and median instructional week. Locate the place on the graph where the two values intersect and mark with an "X."

Step 3: Draw a line through the two "X's," extending to the margins of the graph. This represents the trend-line or line of improvement.

(Hutton, Dubes, & Muir, 1992)

Try this one (Figure 21).

Figure 21. Drawing a Trend-line Using the Tukey Method: Practice 2



Your graphs should look like Figures 22 and 23.

Figure 22. Drawing a Trend-line Using the Tukey Method: Practice 1

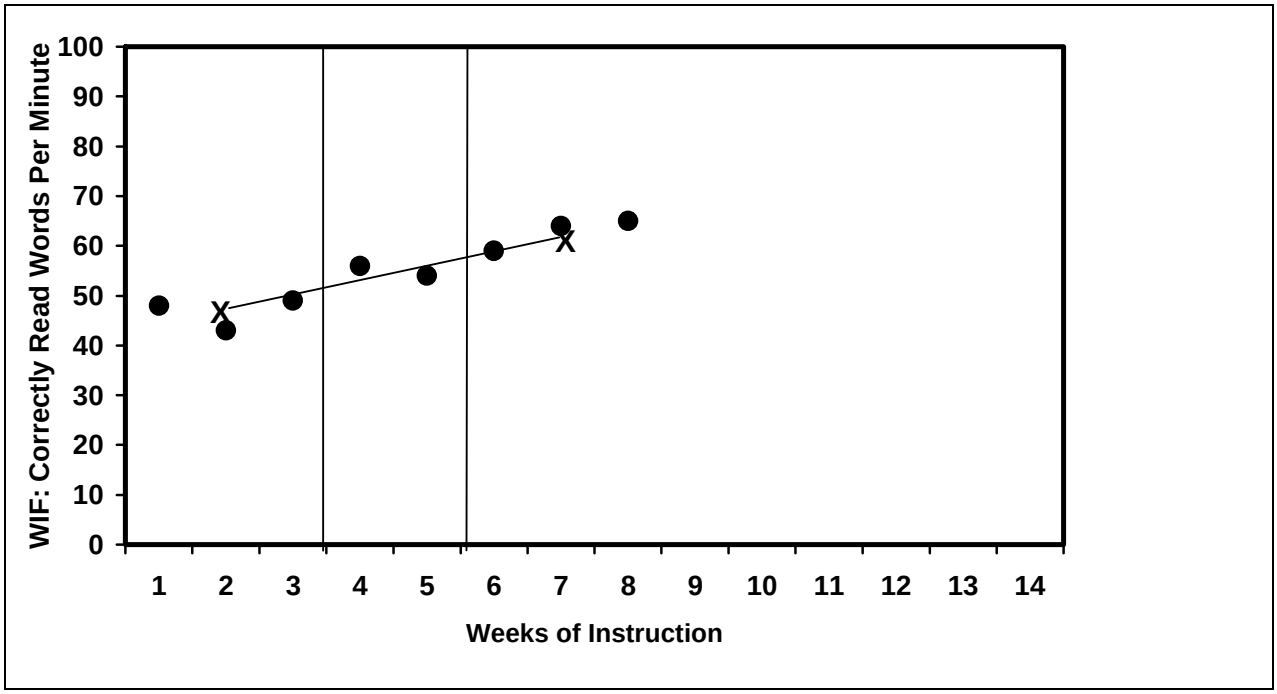
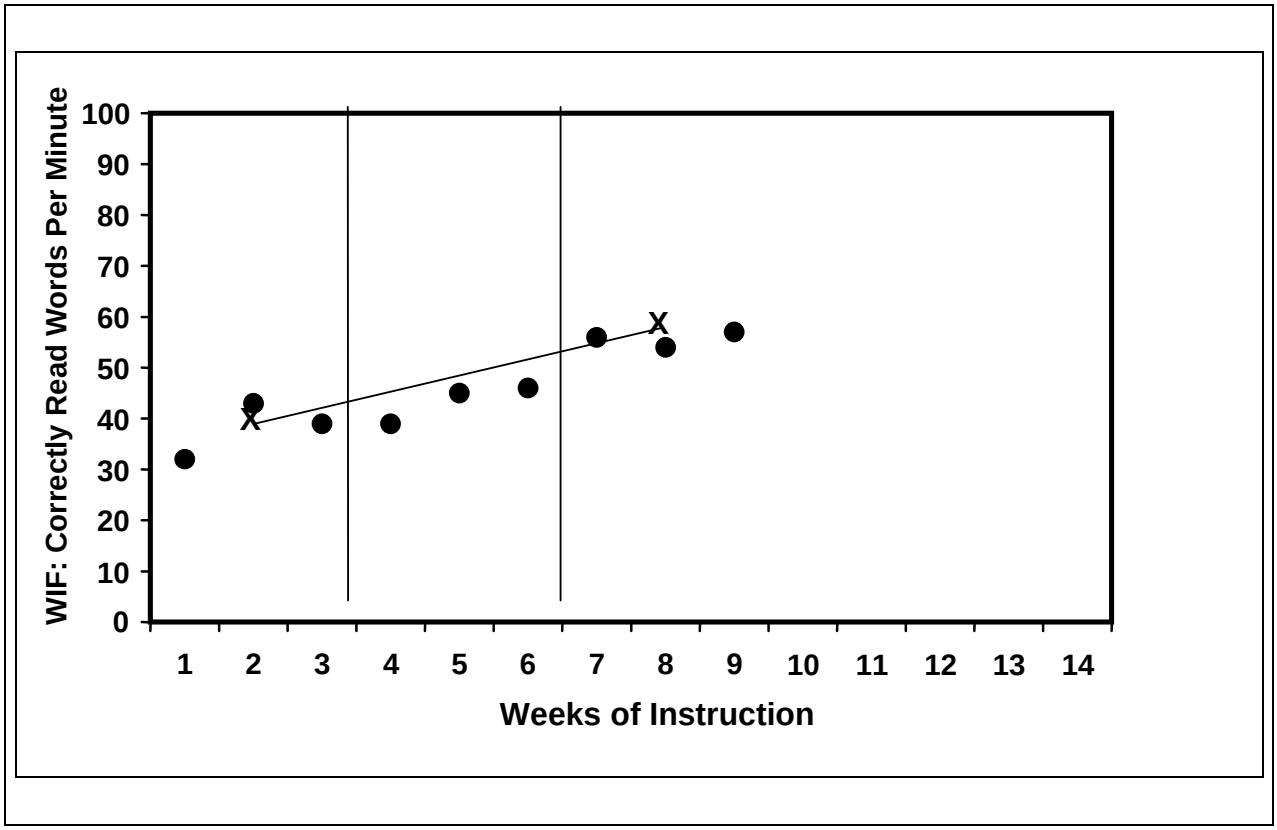


Figure 23. Drawing a Trend-line Using the Tukey Method: Practice 2



Computer Management Programs

CBM computer management programs are available for schools to purchase. The computer scoring programs create graphs for individual students after the student scores are entered into the program and aid teachers in making performance goals and instructional decisions. Other computer programs actually collect and score the data.

Various types of computer assistance are available at varying fees. Information on how to obtain the computer programs is in Appendix A.

AIMSweb provides a computer software program that allows teachers to enter student CBM data, once they have administered and scored the tests, and then receive graphs and automated reports based on a student's performance. Teachers can purchase the software from AIMSweb. A sample CBM report produced by AIMSweb is available in Appendix A.

DIBELS operates an online data system that teachers can use for the cost of $1 per student, per year. With the data system, teachers can administer and score tests and then enter student CBM scores and have student graphs automatically prepared. The data system also provides reports for the scores of an entire district or school. A sample CBM report produced by DIBELS is available in Appendix A.

Edcheckup operates a computer assistance program that allows teachers to enter student data. They administer and score online. Reports and graphs are automatically generated that follow class and student progress. The program also guides teachers to set annual goals and evaluate student progress. The Edcheckup program is available for a fee.

McGraw-Hill produces Yearly ProgressPro™, a computer-administered progress monitoring and instructional system to bring the power of Curriculum Based Measurement (CBM) into the classroom. Students take their CBM tests at the computer, eliminating the need for teachers to administer and score probes. Weekly diagnostic assessments provide teachers with the information they need to plan classroom instruction. Reports allow teachers to track progress against state and national standards at the individual student, class, building, or district level. A sample CBM report produced by Yearly ProgressPro™ is available in Appendix A.

Step 6: How to Apply Decision Rules to Graphed Scores to Know When to Revise Programs and Increase Goals

CBM can judge the adequacy of student progress and the need to change instructional programs. Researchers have demonstrated that CBM can be used to improve the scope and usefulness of program evaluation decisions (Germann & Tindal, 1985) and to develop instructional plans that enhance student achievement (Fuchs, Deno, & Mirkin, 1984; Fuchs, Fuchs, & Hamlett, 1989a).

After teachers draw CBM graphs and trend-lines, they use graphs to evaluate student progress and to formulate instructional decisions. Standard CBM decision rules guide decisions about the adequacy of student progress and the need to revise goals and instructional programs.

Decision rules based on the most recent 4 consecutive scores:

- If the most recent 4 consecutive CBM scores are above the goal-line, then the student's end-of-year performance goal needs to be increased.
- If the most recent 4 consecutive CBM scores are below the goal-line, then the teacher needs to revise the instructional program.

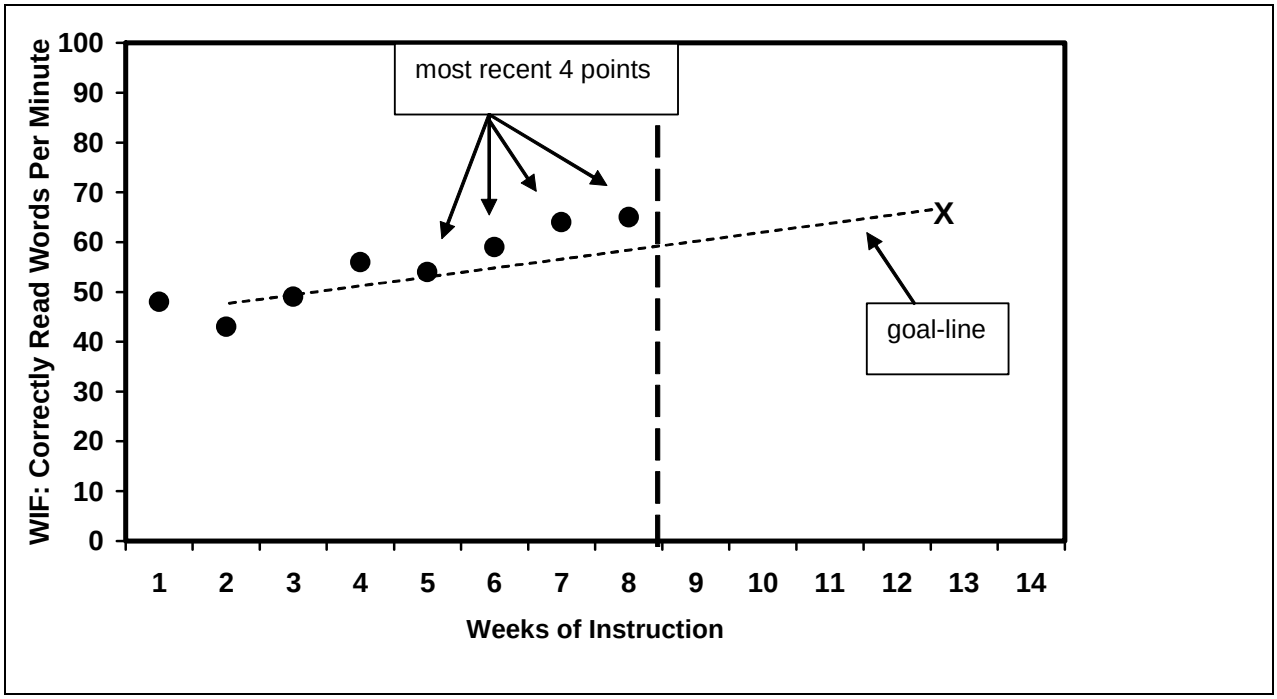
Decision rules based on the trend-line:

- If the student's trend-line is steeper than the goal-line, then the student's end-of-year performance goal needs to be increased.
- If the student's trend-line is flatter than the goal-line, then the teacher needs to revise the instructional program.
- If the student's trend-line and goal-line are the same, then no changes need to be made.

Let's look at each of these decision rules and the graphs that help teachers make decisions about a student's goals and instructional programs.

Look at the graph in Figure 24.

Figure 24. Four Consecutive Scores Above Goal-Line

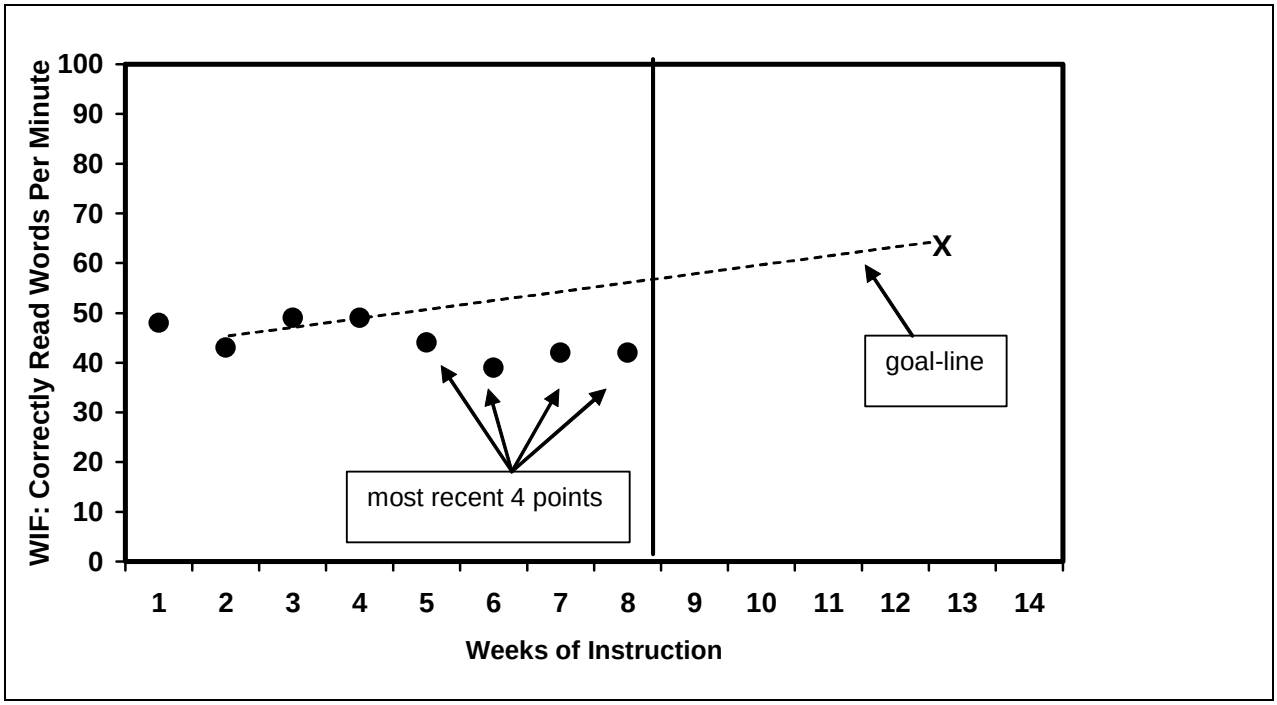


On this graph, the most recent 4 scores are *above* the goal-line. Therefore, the student's end-of-year performance goal needs to be adjusted. The teacher increases the desired rate (or goal) to boost the actual rate of student progress.

The point of the goal increase is notated on the graph as a dotted vertical line. This allows teachers to visually note when the student's goal was changed. The teacher re-evaluates the student graph in another 7 or 8 data points to determine whether the student's new goal is appropriate of whether a teaching change is needed.

Look at the graph in Figure 25.

Figure 25. Four Consecutive Scores Below Goal-Line

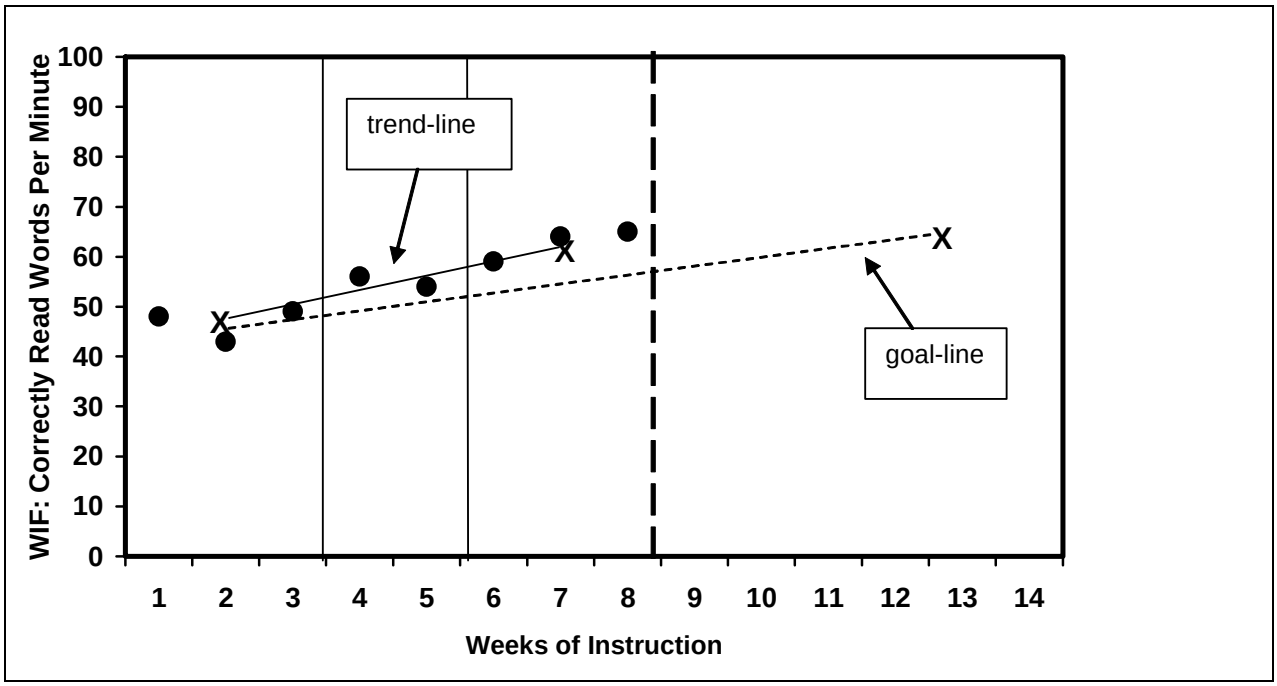


On this graph, the most recent 4 scores are *below* the goal-line. Therefore, the teacher needs to change the student's instructional program. The end-of-year performance-goal and goal-line never decrease, they can only increase. The instructional program should be tailored to bring a student's scores up so they match or surpass the goal-line.

The teacher draws a solid vertical line when making an instructional change. This allows teachers to visually note when changes to the student's instructional program were made. The teacher re-evaluates the student graph in another 7 or 8 data points to determine whether the change was effective.

Look at the graph in Figure 26.

Figure 26. Trend-line Above Goal-Line

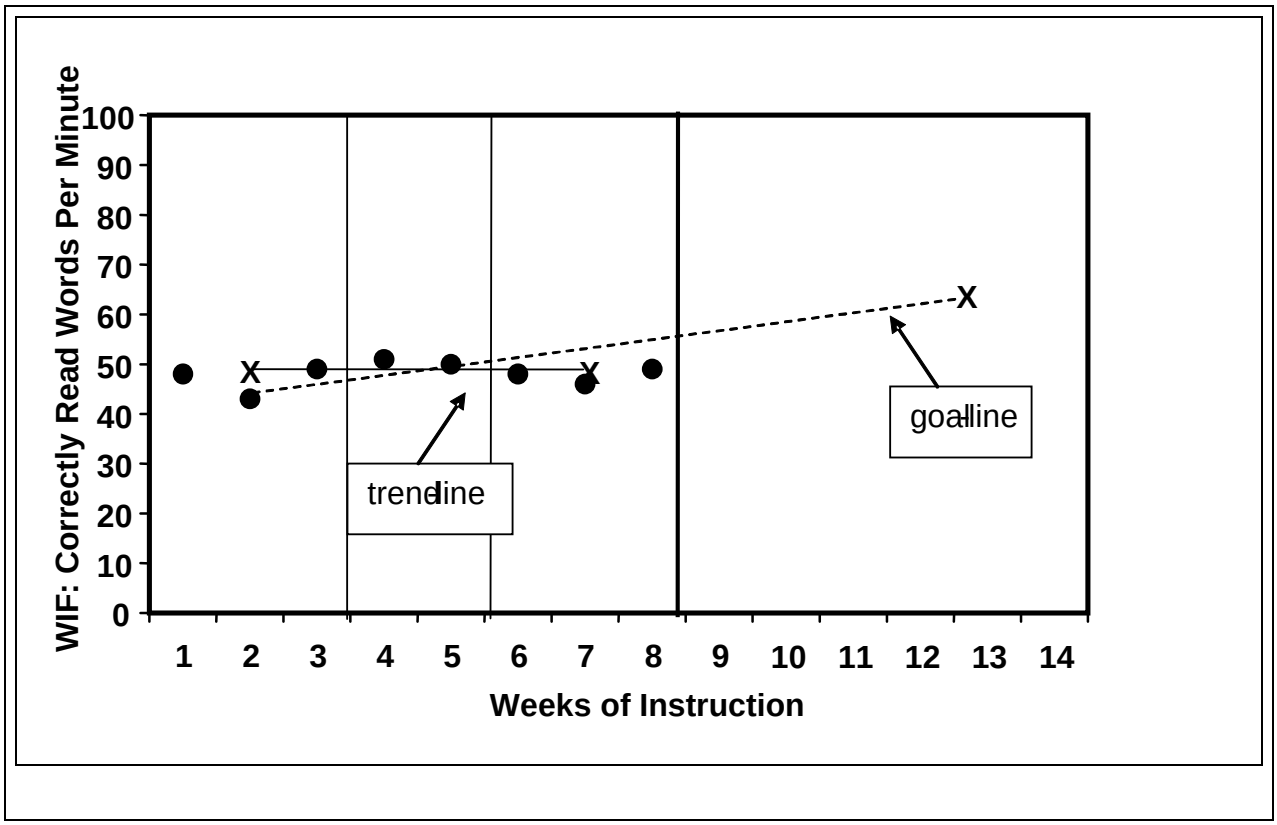


On this graph, the trend-line is steeper than the goal-line. Therefore, the student's end-of-year performance goal needs to be adjusted. The teacher increases the desired rate (or goal) to boost the actual rate of student progress. The new goal-line can be an extension of the trend-line.

The point of the goal increase is notated on the graph as a dotted vertical line. This allows teachers to visually note when the student's goal was changed. The teacher re-evaluates the student graph in another 7 or 8 data points to determine whether the student's new goal is appropriate or whether a teaching change is needed.

Look at the graph in Figure 27.

Figure 27. Trend-line Flatter than Goal-line

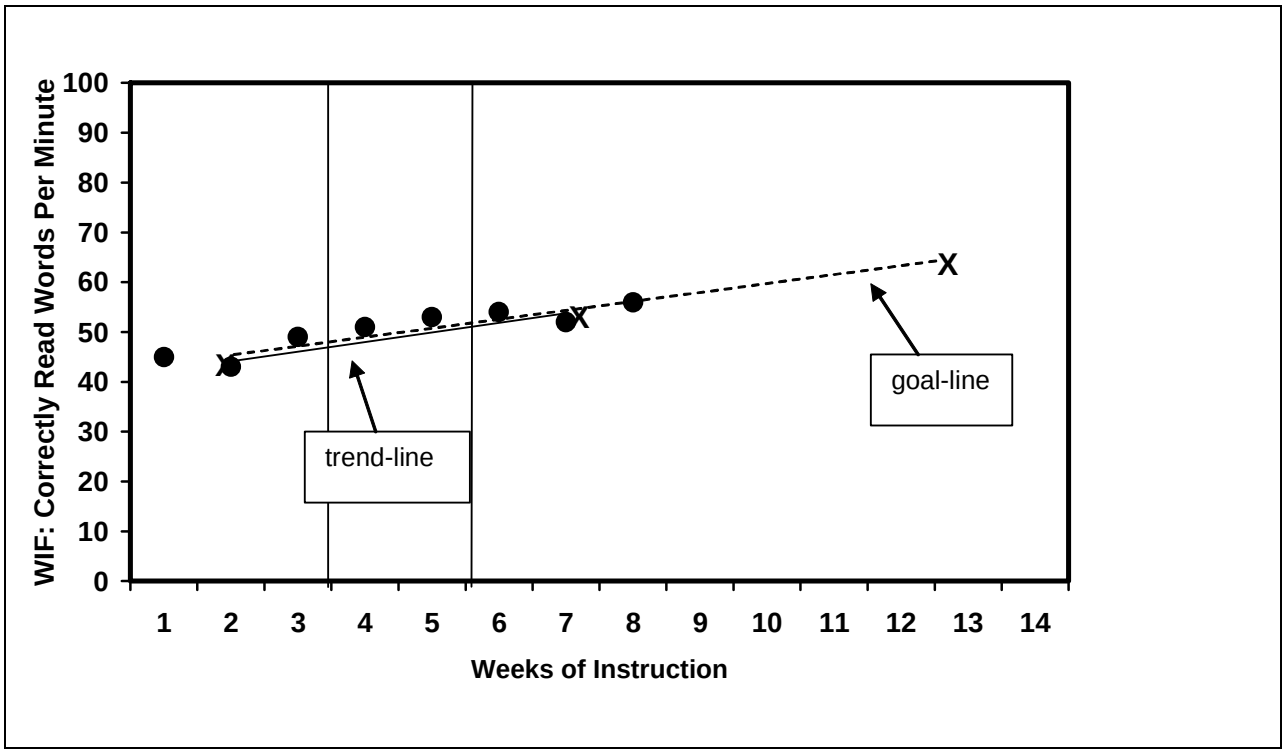


On this graph, the trend-line is flatter than the performance goal-line. The teacher needs to change the student's instructional program. Again, the end-of-year performance goal and goal-line are never decreased! A trend-line below the goal-line indicates that student progress is inadequate to reach the end-of-year performance goal. The instructional program should be tailored to bring a student's scores up so they match or surpass the goal-line.

The point of the instructional change is represented on the graph as a solid vertical line. This allows teachers to visually note when the student's instructional program was changed. The teacher re-evaluates the student graph in another 7 or 8 data points to determine whether the change was effective.

Look at the graph in Figure 28.

Figure 28. Trend-line Matches Goal-line



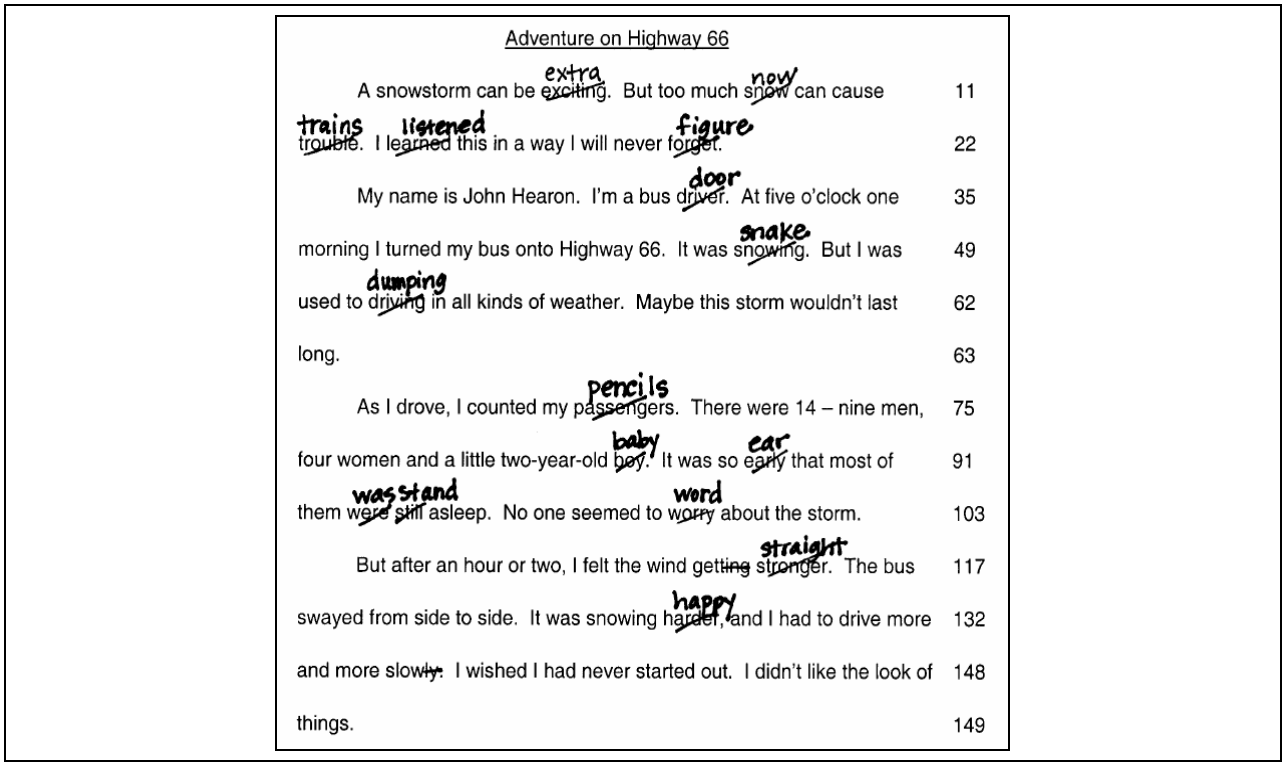
If the trend-line matches the goal-line, then no change is currently needed for the student.

The teacher re-evaluates the student graph in another 7 or 8 data points to determine whether an end-of-year performance goal or instructional change needs to take place.

Step 7: How to Use the CBM Database Qualitatively to Describe Student Strengths and Weaknesses

Student miscues during CBM PRF can be analyzed to describe student reading strengths and weaknesses. To complete a miscue analysis, the student reads a CBM PRF passage following the standard procedures. While the student reads, the teacher writes student errors on the examiner copy. (See Figure 29.) The first 10 errors are written on the Quick Miscue Analysis Table (see Figure 30) and analyzed.

Figure 29. Miscue Analysis Story: Student #1



Adventure on Highway 66

A snowstorm can be ~~exciting~~ extra. But too much ~~snow~~ now can cause 11

~~trouble~~ trains. I ~~learned~~ listened this in a way I will never ~~forget~~ figure. 22

My name is John Hearon. I'm a bus ~~driver~~ door. At five o'clock one 35

morning I turned my bus onto Highway 66. It was ~~snowing~~ snake. But I was 49

used to ~~driving~~ dumping in all kinds of weather. Maybe this storm wouldn't last 62

long. 63

As I drove, I counted my ~~passengers~~ pencils. There were 14 – nine men, 75

four women and a little two-year-old ~~boy~~ baby. It was so ~~early~~ ear that most of 91

them ~~were still~~ wasstand asleep. No one seemed to ~~worry~~ word about the storm. 103

But after an hour or two, I felt the wind ~~getting~~ straight stronger. The bus 117

swayed from side to side. It was snowing ~~harder~~ happy, and I had to drive more 132

and more ~~slowly~~. I wished I had never started out. I didn't like the look of 148

things. 149

Figure 30. Quick Miscue Analysis

	Written Word	Spoken Word	Graphophonetic	Syntax	Semantics
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
		%			

To fill out the Quick Miscue Analysis table, the teacher writes the written word from the CBM PRF passage in the **Written Word** column. The student mistake, or miscue, is written in the **Spoken Word** column.

The teacher answers three questions for each mistake. If the student made a graphophonetic error, then the teacher writes a "yes" in the **Graphophonetic** column along with a brief description of the error. A graphophonetic error preserves some important phonetics of the written word, even if it does not make sense (i.e., written word "friend"; spoken word "fried.")

The teacher then answers "yes" or "no" in the **Syntax** and **Semantics** columns. A syntax error preserves the grammar of (i.e., is the same part of speech as) the written word. Does the error have the same part of speech as the written word? (i.e., "ran" is the same part of speech as "jogged"). A semantics error preserves the meaning of the sentence. Does the error preserve the meaning of the sentence? (i.e., "The *woman* is tall" means the same as "The *lady* is tall").

Once the entire table is complete, the teacher calculates the percentage of graphophonetic, syntax, or semantic errors that the student made. Let's look at this example (Figure 31).

Figure 31. Quick Miscue Analysis Table: Student #1

	Written Word	Spoken Word	Graphophonetic	Syntax	Semantic
1	exciting	extra	yes - first part	yes	no
2	snow	now	yes - except s	yes	yes
3	trouble	trains	yes - first part	yes	no
4	learned	listened	yes - first and end	yes	no
5	forget	figure	yes - first and middle	yes	no
6	driver	door	yes - first and last	yes	no
7	snowing	snake	yes - first part	no	no
8	driving	dumping	yes - first and end	yes	no
9	passengers	pencils	yes - first and last	yes	no
10	boy	baby	yes - first and last	yes	yes
		%	100 %	90%	20%

The examiner wrote the first 10 mistakes on the Quick Miscue Analysis Table. The percentage of the time the student error was a graphophonetic, syntax, or semantics error is calculated at the bottom of the table. To calculate the percentage, add together the number of "yes" answers and divide the sum by 10. In the Graphophonetic column, 10 "yes" answers divided by 10 miscues is 100%. In the Syntax column, 9 "yes" answers divided by 10 miscues is 90%. In the Semantics column, 2 "yes" answers divided by 10 miscues is 20%. Calculating the percentages allows teachers to glance at the various types of miscues and spot trends in student mistakes.

From the miscue analysis, the teacher gains insight about the strengths and weaknesses of the student's reading. This student appears to rely on graphophonetic cues (especially at the beginning and ending of words) and knowledge of syntax for identifying unknown words. The student appears to ignore the middle portion of the unknown words, so the teacher could help the student to sound out entire words, perhaps reading some words in isolation. However, the student's reading does not make sense. The teacher should help the student learn to self-monitor and self-correct. The student should ask himself/herself whether the word makes sense given the context. Practice with the cloze procedure (similar to CBM Maze Fluency) may also assist the student in focusing on comprehension. Tape recording the student's reading and having the student listen to the tape also may help alert the student to inaccuracies that do not make sense.

Now, look at another example (Figure 32). The examiner copy of the student reading is below. Use the blank Quick Miscue Analysis Table and write in the student miscues (Figure 33).

Figure 32. Miscue Analysis Story: Student #2

Adventure on Highway 66

A snowstorm ~~can~~ could be exciting. But ~~too~~ that much snow ~~can~~ could cause 11

trouble. I learned ~~this~~ it in a way I will never forget. 22

My name is John Hearon. ~~I'm~~ I am a bus driver. At five o'clock one 35

morning I turned ~~my~~ the bus onto Highway 66. It was snowing. But I was 49

used to driving ~~in~~ at all kinds of weather. Maybe this storm wouldn't last 62

long. 63

~~As~~ While I drove, I counted my passengers. There ~~were~~ was 14 – nine men, 75

four women and a little two-year-old boy. It was so early that ~~most of~~ they 91

~~them~~ were still asleep. No one seemed to worry about the storm. 103

But after an hour or two, I felt ~~the~~ a wind getting stronger. ~~The~~ That bus 117

swayed from side to side. It was snowing harder, and I had to drive more 132

~~and more~~ slowly. I wished I had never started out. I didn't like the look of 148

things. 149

Figure 33. Sample Quick Miscue Analysis: Student #2

	Written Word	Spoken Word	Graphophonetic	Syntax	Semantics
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
		%			

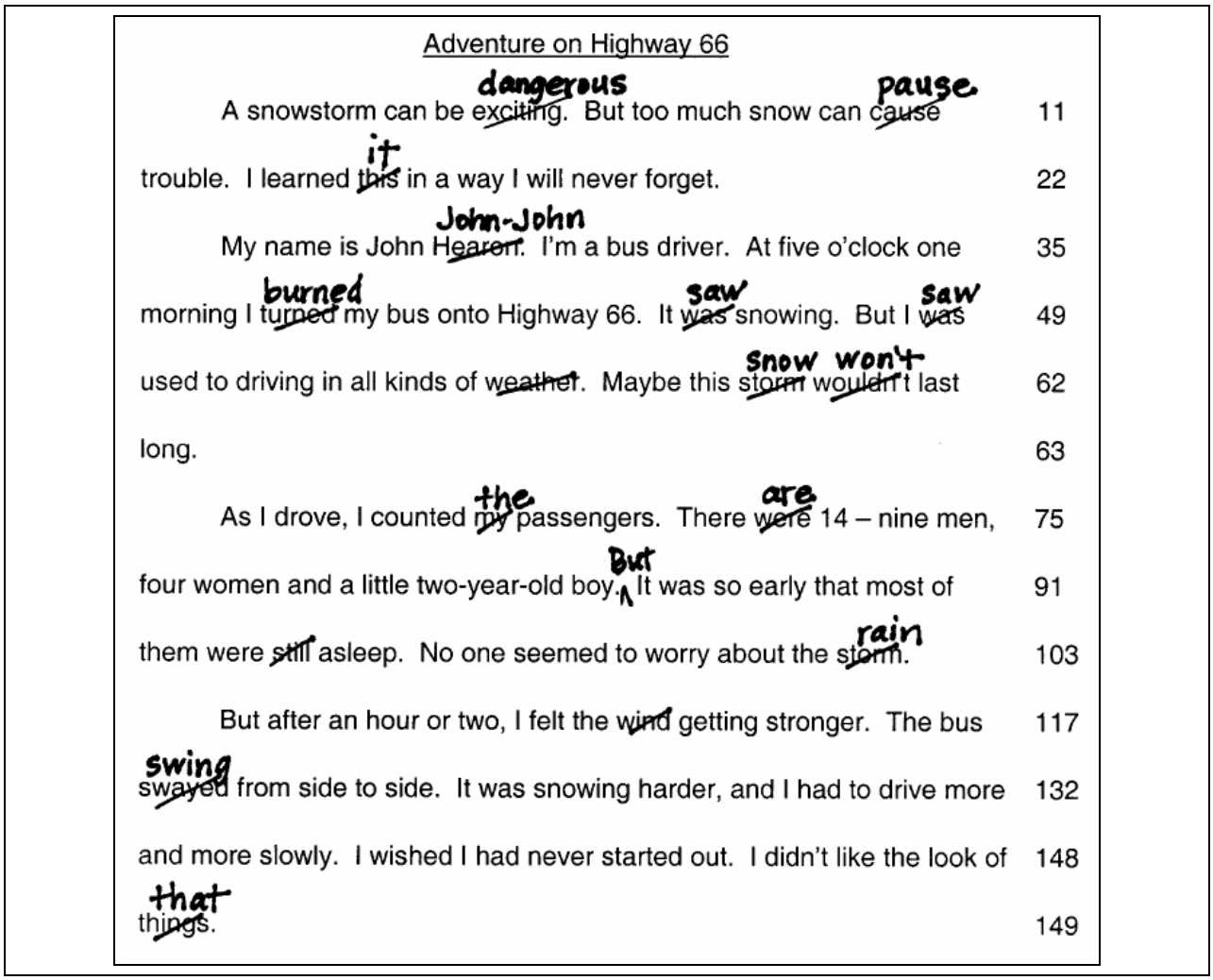
Your miscue analysis table should look like this (Figure 34). Based on this table, the teacher can see that the student's problem is mistakes on short, functional words rather than content words. The teacher might choose to practice discrimination between similar words (i.e., this / that / the) and similar phrases (i.e., The big boy…, This big boy…, That big boy…). The teacher might also choose to have the student echo read and complete writing and spelling exercises for the short, functional words.

Figure 34. Quick Miscue Analysis Table: Student #2

	Written Word	Spoken Word	Graphophonetic	Syntax	Semantic
1	can	could	yes-first letter only	yes	yes
2	too	that	yes-first letter only	yes	yes
3	can	could	yes-first letter only	yes	yes
4	this	it	no	yes	yes
5	I'm	I am	yes	yes	yes
6	my	the	no	yes	yes
7	in	at	no	yes	no
8	As	While	no	yes	yes
9	were	was	yes-first letter only	yes	yes
10	most of them	they	no	yes	yes
		%	50%	100%	90%

Let's look at one more (Figures 35 and 36).

Figure 35. Miscue Analysis Story: Student #3



Adventure on Highway 66

A snowstorm can be exciting. But too much snow can cause 11

trouble. I learned this in a way I will never forget. 22

My name is John Hearon. I'm a bus driver. At five o'clock one 35

morning I turned my bus onto Highway 66. It was snowing. But I was 49

used to driving in all kinds of weather. Maybe this storm wouldn't last 62

long. 63

As I drove, I counted my passengers. There were 14 – nine men, 75

four women and a little two-year-old boy. It was so early that most of 91

them were still asleep. No one seemed to worry about the storm. 103

But after an hour or two, I felt the wind getting stronger. The bus 117

swayed from side to side. It was snowing harder, and I had to drive more 132

and more slowly. I wished I had never started out. I didn't like the look of 148

things. 149

Figure 36. Quick Miscue Analysis: Student #3

	Written Word	Spoken Word	Graphophonetic	Syntax	Semantics
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
		%			

What are the strengths and weaknesses of this student? What teaching strategies might you choose to implement for this student?

Second Half of CBM Manual

The rest of this CBM manual provides teachers with the following information.

How to Use the CBM Database to Accomplish Teacher and School Accountability and for Formulating Policy Directed at Improving Student Outcomes

Federal law requires schools to show that they are achieving Adequate Yearly Progress (AYP) toward the "No Child Left Behind" proficiency goal. AYP is the annual minimum growth rate needed to eliminate the discrepancy between a school's initial proficiency status and universal proficiency within the established time frame.

Schools must determine the measure(s) to be used for AYP evaluation and the criterion for deeming an individual student "proficient" on this measure. Schools must quantify AYP for achieving the goal of universal proficiency by the school year 2113–2114. CBM can be used to fulfill the AYP evaluation in reading.

Schools can assess every student using CBM to identify the number of students who initially meet benchmarks. This number of students represents a school's initial proficiency status. Then the discrepancy between initial proficiency and universal proficiency can be calculated. Once the discrepancy between initial and universal proficiency is calculated, the discrepancy is divided by the number of years available before meeting the 2113–2114 goal. The resulting answer gives the number of additional students who must meet CBM end-of-year benchmarks each year.

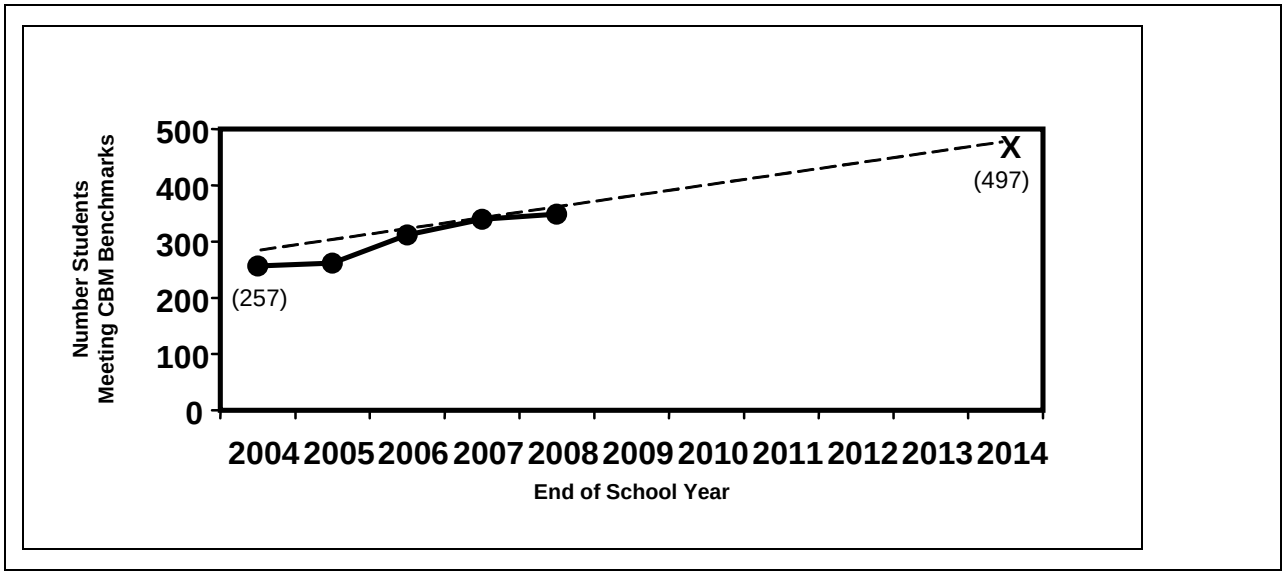
Relying on CBM for specifying AYP provides several advantages. First, the CBM measures are simple to administer and examiners can be trained to administer the tests in a reliable fashion in a short amount of time. Second, because the tests are brief, schools can measure an entire student body relatively efficiently and frequently. Routine testing allows a school to track its own progress over the school year. Progress can be examined at the school, teacher, or student level.

Using CBM for multi-level monitoring can transform AYP from a procedural compliance burden into a useful tool for guiding education reform at the school level, for guiding the instructional decision making of individual teachers about their reading programs, and for ensuring that the reading progress of individual students is maximized.

CBM provides a multi-level monitoring system that helps schools ensure greater levels of reading success. Here are a few examples of how CBM can be used in conjunction with a school's AYP.

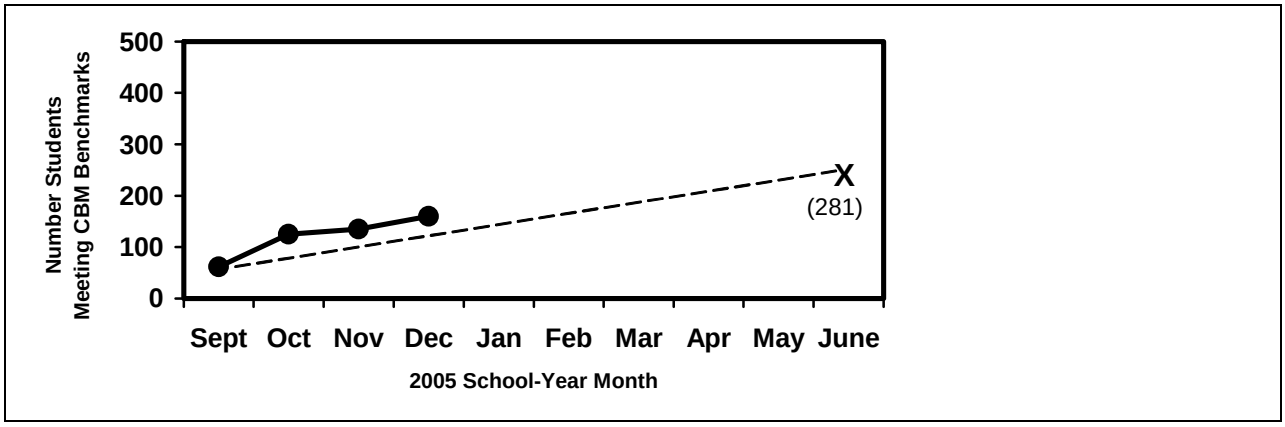
CBM can be used to monitor across-year progress in achieving AYP (and toward achieving universal proficiency by the 2113–2114 deadline) (Figure 37).

Figure 37. Across-Year School Progress



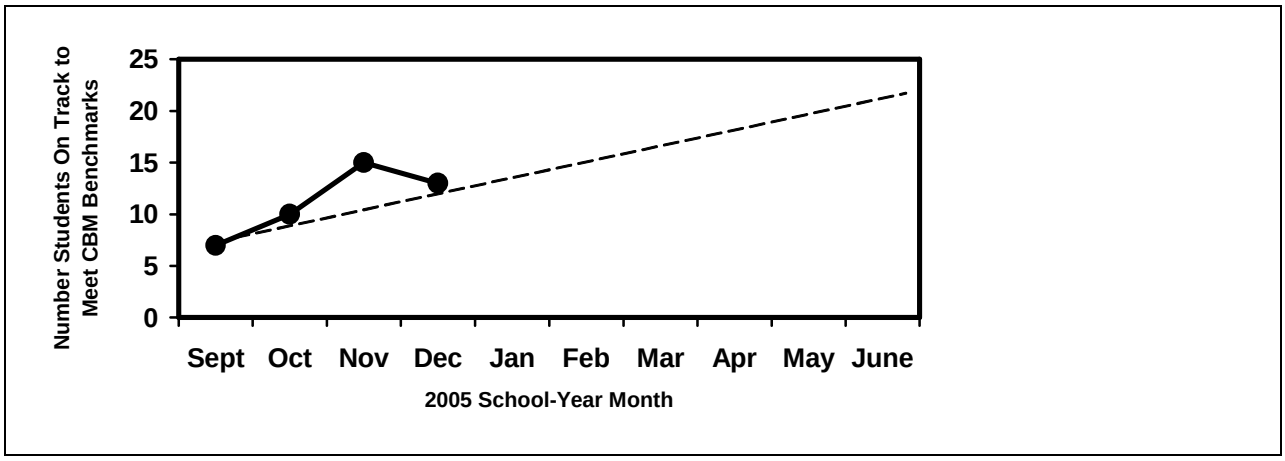
CBM can be used to monitor a school's within-year progress towards achieving the AYP for the year (Figure 38).

Figure 38. Within-Year School Progress



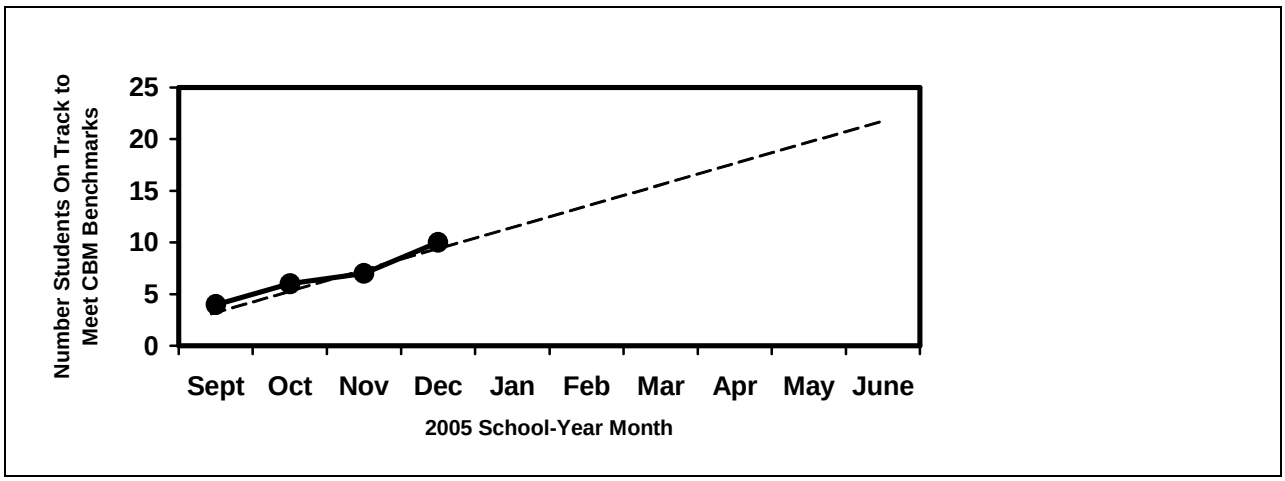
CBM can be used to monitor a teacher's within-year progress (Figure 39).

Figure 39. Within-Year Teacher Progress



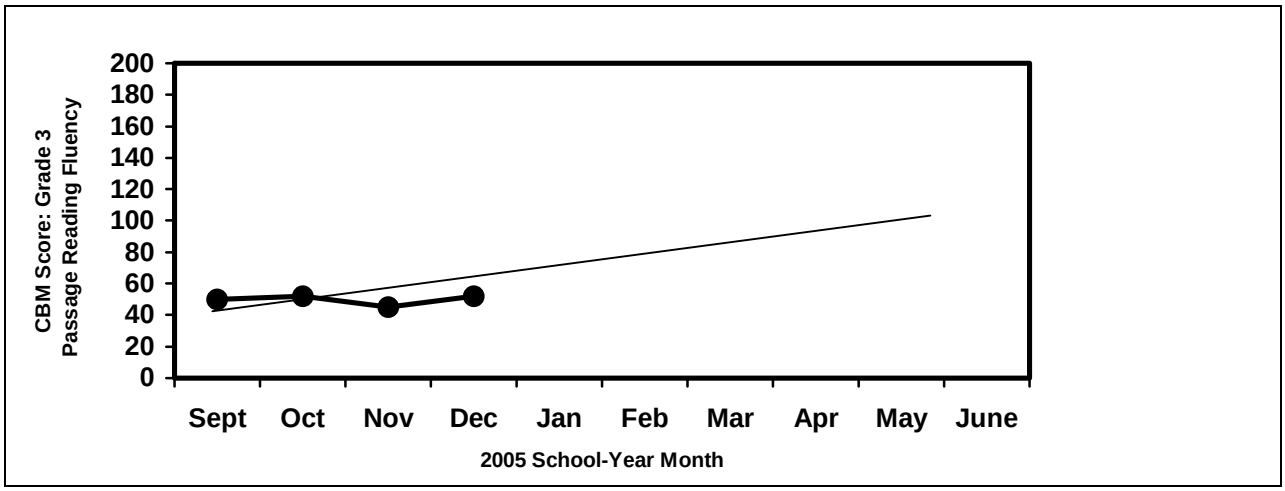
CBM can be used to monitor a school's special education performance within a school year (Figure 40).

Figure 40. Within-Year Special Education Progress



CBM can monitor a student's within-year progress (Figure 41).

Figure 41. Within-Year Student Progress



For more information on using CBM for school accountability and AYP, see:

Fuchs, L. S., & Fuchs, D. (in press). Determining adequate yearly progress from kindergarten through grade 6 with curriculum-based measurement. *Assessment for Effective Intervention.*

How to Incorporate Decision-Making Frameworks to Enhance General Educator Planning

A CBM report like the one shown in Figures 42–44 provides the teacher with information about her class.

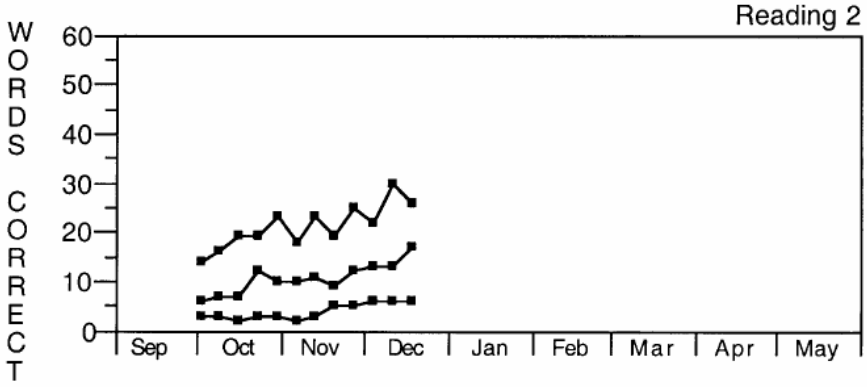
The first page of the CBM Class Report shows three graphs: one for the progress of the lower-performing readers, another for the middle-performing readers, and one for the higher-performing readers (Figure 42). The report also gives teachers a list of students to watch. These are students who are in the bottom 25% of the class.

Figure 42. Sample CBM Teacher Report for Maze Fluency: Page 1

CLASS GRAPH

Class Report
Page 1

School: Westgate
Teacher: Smith
12/20/03



Students to Watch (lowest 25%):

Michael Cox
David Perry
Alan Craig
LaShonda Jones
Carson Wilkins
Dana Sommers

The second page of the CBM Class Report provides teachers with a list of each student's CBM Maze Fluency raw score, the percentage of words read correctly, and the slope of the student's CBM graph (Figure 43).

Figure 43. Sample CBM Teacher Report for Maze Fluency: Page 2

RANKED SCORES

Class Report
Page 2

School: Westgate
Teacher: Smith
12/20/03

Name	Score	Percent	Slope
Jason Dunning	37	100%	+1.44
Katherine Rogers	33	94%	+1.57
Lee Tang	26	98%	+0.96
Andy Farrell	25	98%	+1.72
Stephanie Sampras	21	98%	+1.17
Julie Page	20	98%	+1.36
William Curtis	18	95%	+0.91
Jimmy Smithson	18	90%	+0.53
Caleb Jacobs	18	92%	+0.77
Eddie Danforth	15	91%	+0.82
Meagam MacKenzie	13	84%	+0.88
Adrian Alexander	12	81%	+0.35
Bryan Gunter	11	96%	+0.74
Kai-Yun Nguyen	10	70%	+0.49
Brad Williams	10	78%	+0.70
Shawn Brooks	9	73%	+0.56
Mark Mason	7	71%	-0.09
Alex Davis	7	100%	+0.48
Michael Cox	7	82%	+0.60
David Perry	6	86%	+0.48
Alan Craig	6	71%	+0.31
LaShonda Jones	5	65%	-0.20
Carson Wilkins	4	80%	+0.11
Dana Sommers	3	64%	+0.05

The third page of the CBM Class Report provides teachers with an average of the students in the classroom and identifies students who are performing below their classroom peers both in terms of the level ("score") of their CBM performance and their rate ("slope") of CBM improvement (Figure 44).

Figure 44. Sample CBM Teacher Report for Maze Fluency: Page 3

CLASS STATISTICS Class Report Page 3

School: Westgate
Teacher: Smith
12/20/03

Score

Average score	14.5
Standard deviation	9.2
Discrepancy criterion	5.3

Slope

Average Slope	+0.70
Standard deviation	0.50
Discrepancy criterion	+0.20

Students identified with dual discrepancy criterion

	Score	Slope
Carson Wilkins	4.0	+0.11
Dana Sommers	3.5	+0.05

For more information on using CBM in general education, see:

Fuchs, L. S., Fuchs, D., Hamlett, C. L., Phillips, N. B., Karns, K., & Dutka, S. (1997). Enhancing students' helping behavior during peer-mediated instruction with conceptual mathematical explanations. *Elementary School Journal, 97,* 223–250.

How to Use Progress Monitoring to Identify Non-Responders Within a Response-to-Intervention Framework to Identify Disability

The traditional assessment framework for identifying students with learning disabilities relies on discrepancies between intelligence and achievement tests. This framework has been scrutinized and attacked due to measurement and conceptual differences.

An alternative framework is one in which learning disability is conceptualized as non-responsiveness to otherwise effective instruction. It requires that special education be considered only when a student's performance reveals a dual discrepancy: The student not only performs below the level demonstrated by classroom peers but also demonstrates a learning rate substantially below that of classmates.

Educational outcomes differ across a population of learners and a low-performing student may ultimately perform not as well as his or her peers. All students do not achieve the same degree of reading competence. Just because reading growth is low, it does not mean the student should automatically receive special education services.

If a low-performing student is learning at a rate similar to the growth rate of other students in the same classroom environment, he or she is demonstrating the capacity to profit from the educational environment. Additional intervention is unwarranted.

However, when a low-performing student is not manifesting growth in a situation where others are thriving, consideration of special intervention is warranted. Alternative instructional methods must be tested to address the apparent mismatch between the student's learning requirements and those represented in the conventional instructional program.

CBM is a promising tool for identifying treatment responsiveness due to its capacity to model student growth, to evaluate treatment effects, and to simultaneously inform instructional programming.

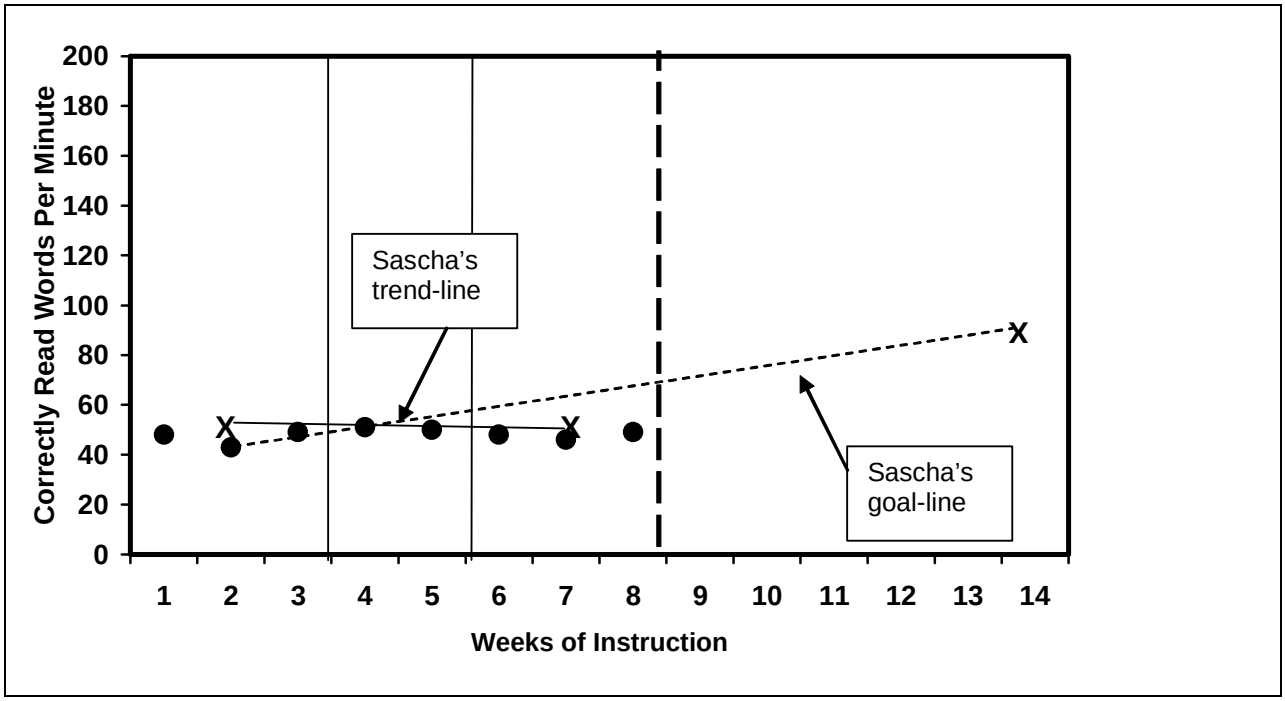
For more information on using CBM within a response-to-intervention approach to learning disability identification, see:

Fuchs, L. S., & Fuchs, D. (2002). Curriculum-based measurement: Describing competence, enhancing outcomes, evaluating treatment effects, and identifying treatment nonresponders. *Peabody Journal of Education, 77*, 64–84.

CBM Case Study #1: Sascha

Mr. Miller has been monitoring his entire class using weekly CBM Passage Reading Fluency tests. He has been graphing student scores on individual student graphs. Mr. Miller used the Tukey method to draw a trend-line for Sascha's CBM PRF scores. This is Sascha's graph (Figure 45).

Figure 45. Sascha's CBM PRF Graph



Since Sascha's trend-line is flatter than her goal-line, Mr. Miller needs to make a change to Sascha's instructional program. He has marked the week of the instructional change with a dotted vertical line. To decide what type of instructional change might benefit Sascha, Mr. Miller decides to do a Quick Miscue Analysis on Sascha's weekly CBM PRF to find her strengths and weaknesses as a reader.

The following is Sascha's CBM PRF test (Figure 46).

Figure 46. Sascha's CBM PRF

Lars was a big ~~dragon~~ doggie. He was green and had red 11

eyes. He shot ~~long~~ log ~~flames~~ flies from his ~~mouth~~ month. The grass 21

~~around~~ round his cave was ~~scorched~~ scratched. 26

Lars was the meanest ~~dragon~~ doggie in the land. He 35

~~scared~~ scratched the people in the ~~village~~ villain. At night the people 45

would look up ~~to~~ at Lar's cave. They saw the mighty 55

flames he breathed. He blew the smoke down to the 65

village. Often the people could not breathe. The 73

smoke was too thick. 77

This is Sascha's Quick Miscue Analysis for her CBM PRF test (Figure 47).

Figure 47. Sascha's Quick Miscue Analysis

Quick Miscue Analysis

	Written Word	Spoken Word	Grapho-Phonetic	Syntax	Semantics
1.	dragon	doggie	yes-d & g	yes	no
2.	long	log	yes-first & last	no	no
3.	flames	flies	yes-first & last	yes	yes
4.	mouth	month	yes-first & last	yes	no
5.	around	round	yes-all letters except 'a'	yes	yes
6.	scorched	scratched	yes-first & last	yes	no
7.	dragon	doggie	yes-d & g	yes	no
8.	scared	scratched	yes-first & last	yes	no
9.	village	villain	yes-first	yes	no
10.	to	at	no	yes	yes
		%	90%	90%	30%

Based on the Quick Miscue Analysis Table, what instructional program changes should Mr. Miller introduce into Sascha's reading program?

CBM Case Study #2: Harrisburg Elementary

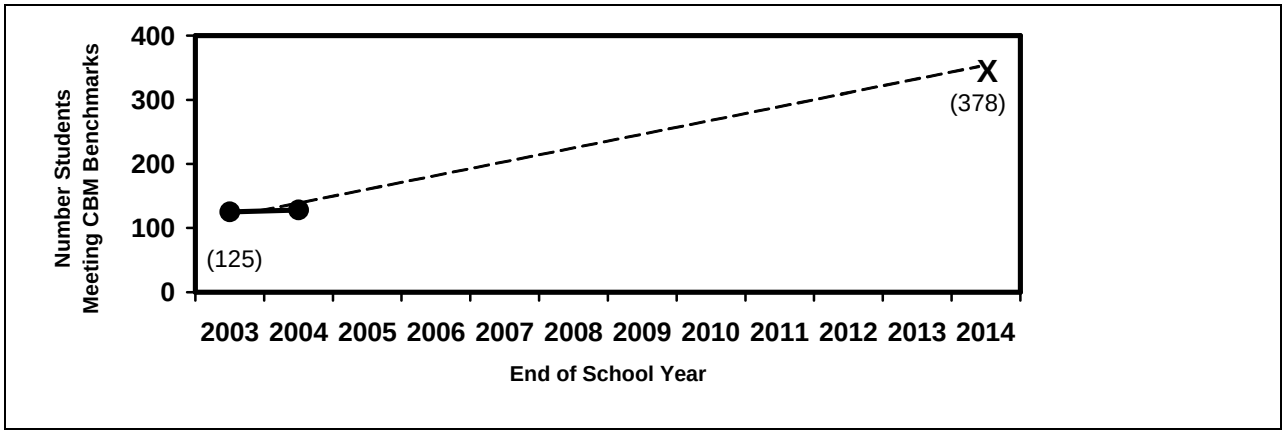
Dr. Eckstein is the principal of Harrisburg Elementary School. She has decided, along with the school teachers and district administration, to use CBM to monitor progress towards reaching Adequate Yearly Progress (AYP) towards their school's "No Child Left Behind" proficiency goal.

Last school year (2002–2003), all 378 students at the school were assessed using CBM PRF at the appropriate grade level. 125 students initially met CBM benchmarks, and so 125 represents Harrisburg's initial proficiency status. The discrepancy between initial proficiency and universal proficiency is 253 students. To find the number of students who must meet CBM benchmarks each year before the 2113–2114 deadline, the discrepancy of 253 students is divided by the number of years until the deadline (11). 253 ÷ 11 = 23. 23 students need to meet CBM benchmarks each year in order for the school to demonstrate AYP.

During the 2003–2004 school year, Dr. Eckstein is provided with these CBM graphs based on the performance of the students in her school.

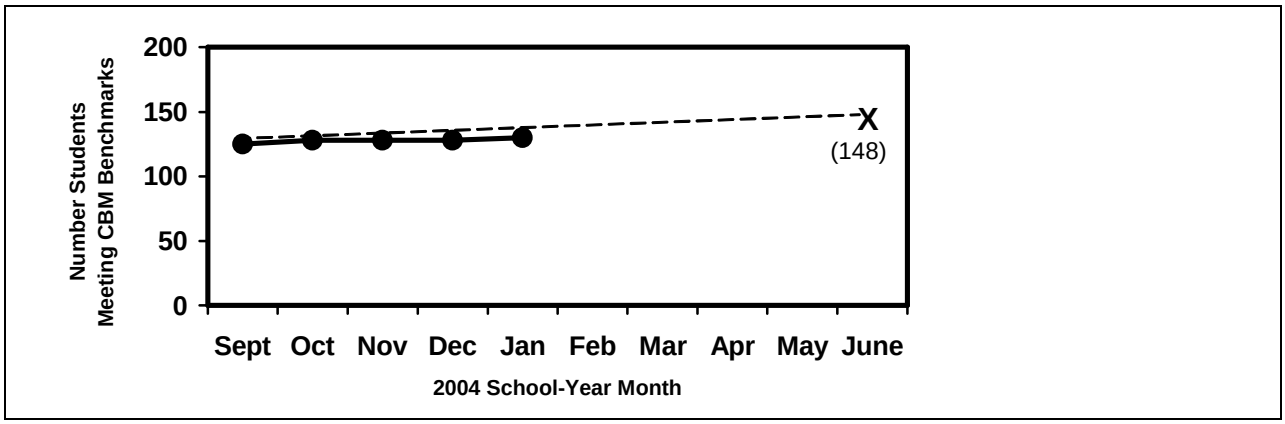
Based on this graph (Figure 48), what can Dr. Eckstein decide about her school's progress since the initial year of benchmarks?

Figure 48. Harrisburg Elementary: Across-Year School Progress



Based on this graph (Figure 49), what can Dr. Eckstein decide about her school's progress since the beginning of the school year?

Figure 49. Harrisburg Elementary: Within-Year School Progress



Dr. Eckstein receives the next two graphs from two different second-grade teachers (Figures 50 and 51). What information can she gather from these graphs?

Figure 50. Harrisburg Elementary: Mrs. Chin

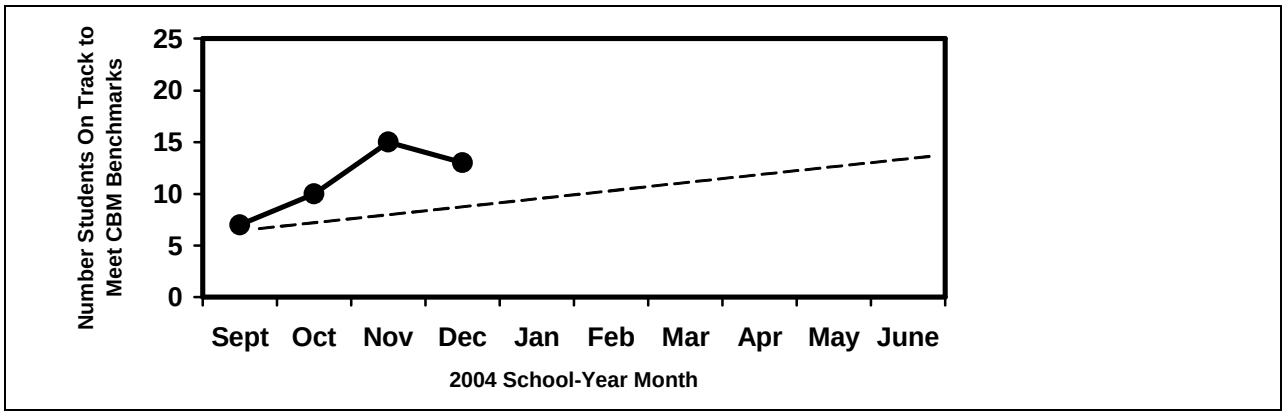
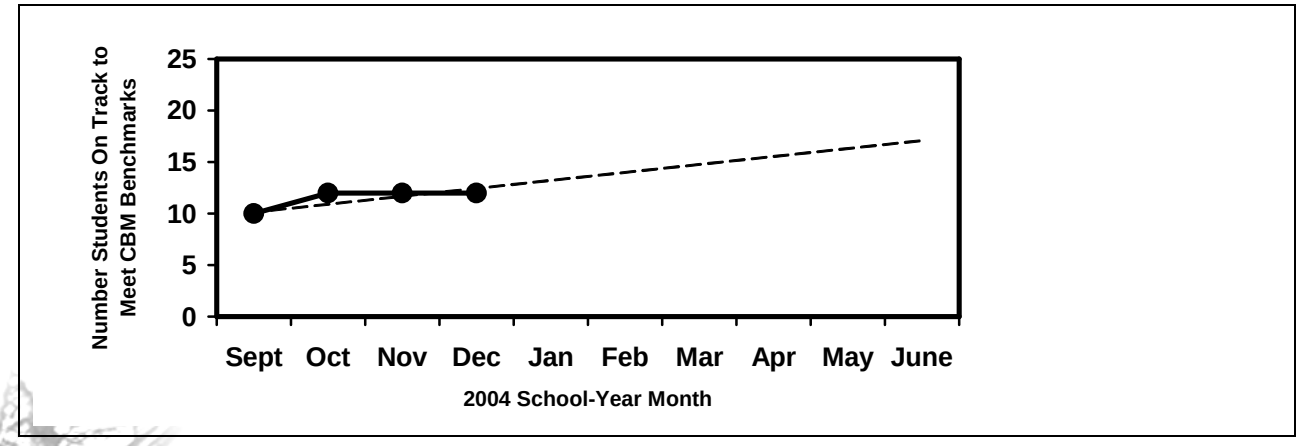
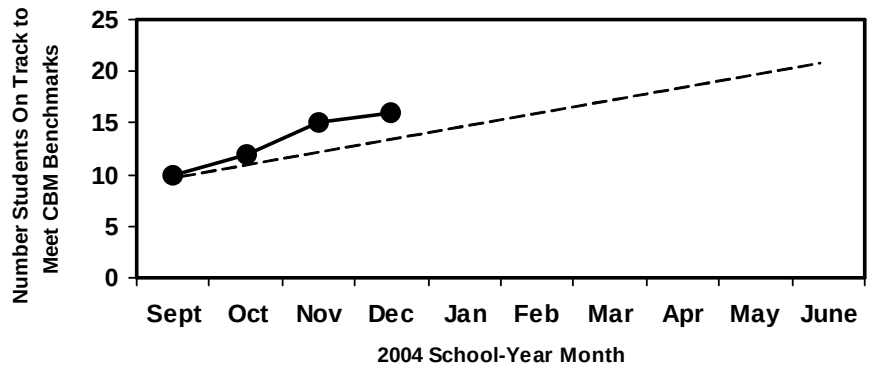


Figure 51. Harrisburg Elementary: Mr. Elliott



This is the graph that Dr. Eckstein receives based on the performance of Harrisburg's Special Education students (Figure 52). What should she learn from this graph?

Figure 52. Harrisburg Elementary: Within-Year Special Education Progress



Dr. Eckstein receives a graph for every student in the school. She gives these graphs to the respective teachers of each student. How can the teachers use the graphs (Figures 53 and 54)?

Figure 53. Hallie Martin

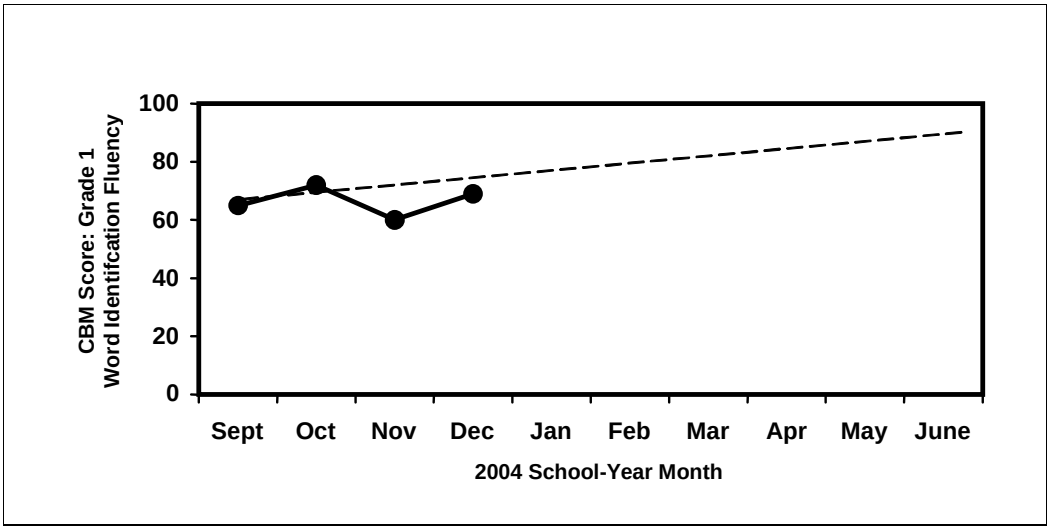
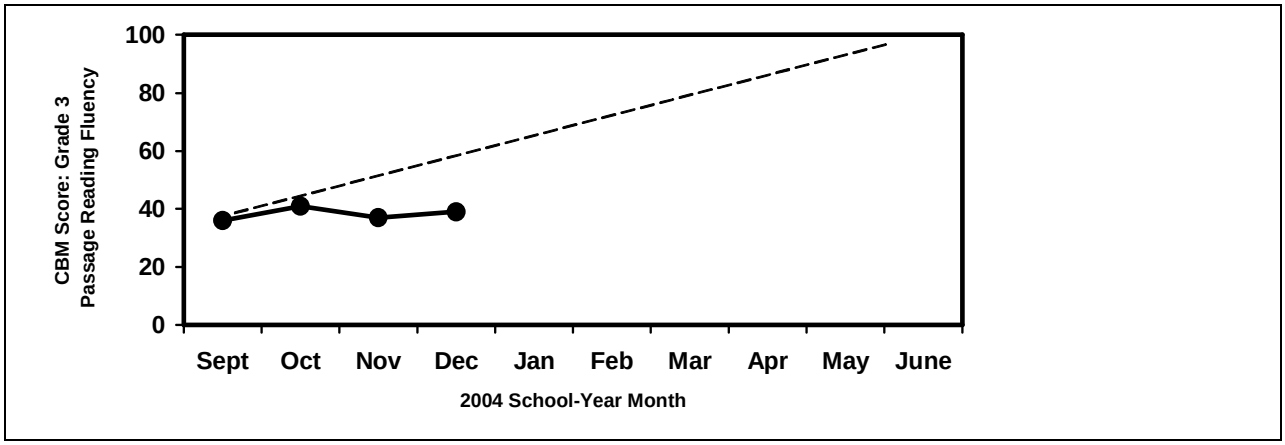


Figure 54. Davindra Sindy

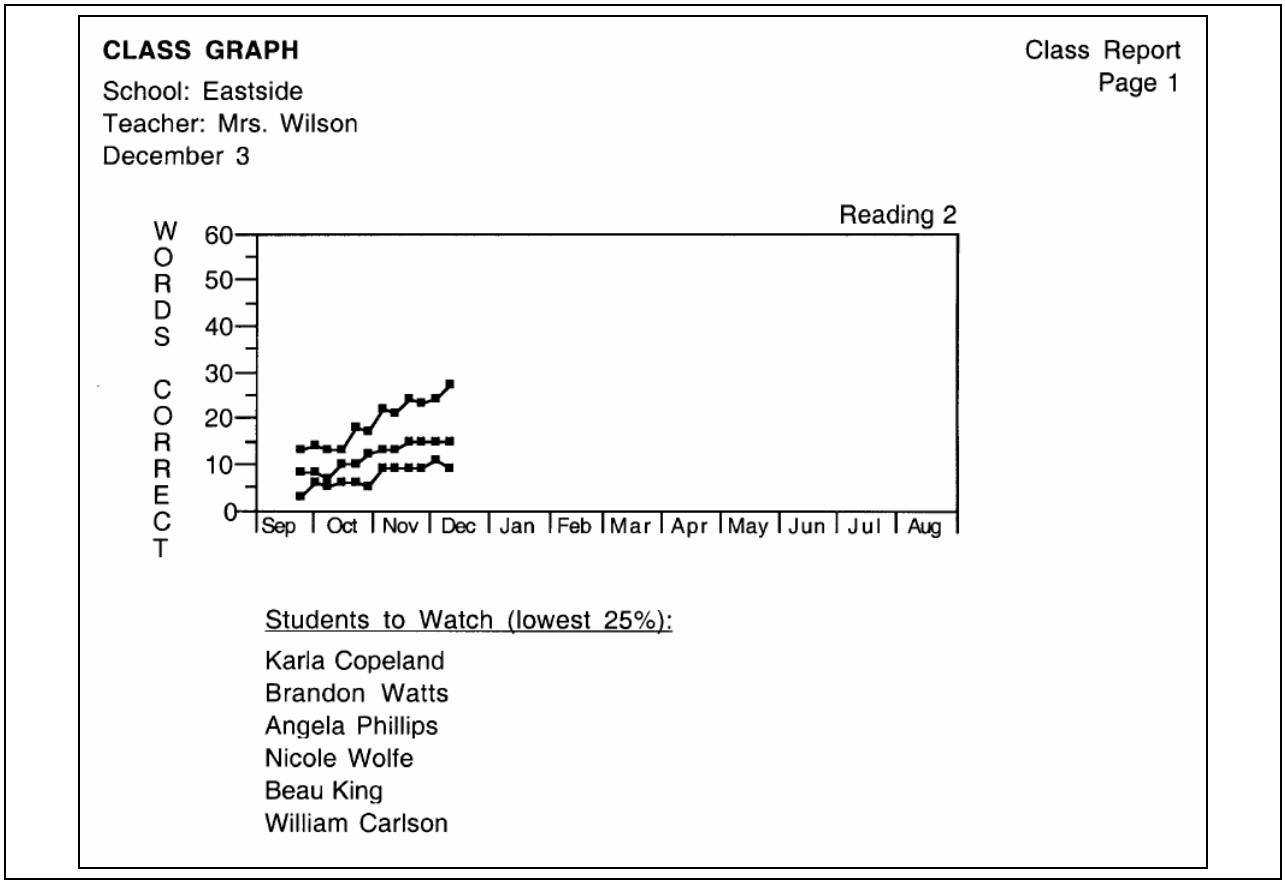


CBM Case Study #3: Ms. Wilson

Mrs. Wilson has conducted CBM since the beginning of the school year with all of the students in her classroom. She has received the following printout from the progress monitoring computer software program.

This is the first page of Mrs. Wilson's CBM Class Report (Figure 55). How would you characterize how her class is doing? How can she use this information to improve the reading of the students in her classroom?

Figure 55. CBM Class Report for Mrs. Wilson: Page 1



This is the second page of Mrs. Wilson's Class Report (Figure 56). How can she use this class report to improve her classroom instruction?

Figure 56. CBM Class Report for Mrs. Wilson: Page 2

RANKED SCORES Class Report
Page 2

School: Eastside
Teacher: Mrs. Wilson
December 3

Name	Score	Percent	Slope
Jeff Griswold	34	97%	+0.45
Shala Joiner	27	100%	+0.29
Danielle Stevens	27	96%	+1.00
Josh Brown	23	98%	+0.30
Jacob McElroy	23	96%	+0.40
Erin Watson	23	100%	+0.22
Don Larkins	22	98%	+0.39
Ellis Carpenter	20	98%	+0.34
Shane Ralston	19	97%	+0.35
Rachel Robinson	19	95%	+0.15
David Byers	18	95%	+0.27
Allison Burns	18	95%	+0.47
Lauren Picard	18	97%	+0.38
Kenneth Farmer	17	97%	+0.33
Kayla Stewart	17	94%	+0.25
Marshall McShane	16	89%	+0.27
Josh Kincaid	15	97%	+0.33
Anita Horn	15	100%	+0.23
Michael Murphy	15	88%	+0.21
Kim Lee	15	86%	+0.42
Karla Copeland	13	96%	+0.34
Brandon Watts	12	93%	+0.21
Angela Phillips	12	96%	+0.54
Nicole Wolfe	11	92%	+0.24
Beau King	6	87%	+0.22
William Carlson	3	50%	-----

This is the third page of Mrs. Wilson's Class Report (Figure 57). What information does she learn on this page? How can she use this information?

Figure 57. CBM Class Report for Mrs. Wilson: Page 3

CLASS STATISTICS Class Report
Page 3

School: Eastside
Teacher: Mrs. Wilson
December 3

Score

Average score	17.9
Standard deviation	6.6
Discrepancy criterion	11.3

Slope

Average Slope	+0.34
Standard deviation	+0.17
Discrepancy criterion	+0.17

Students identified with dual discrepancy criterion

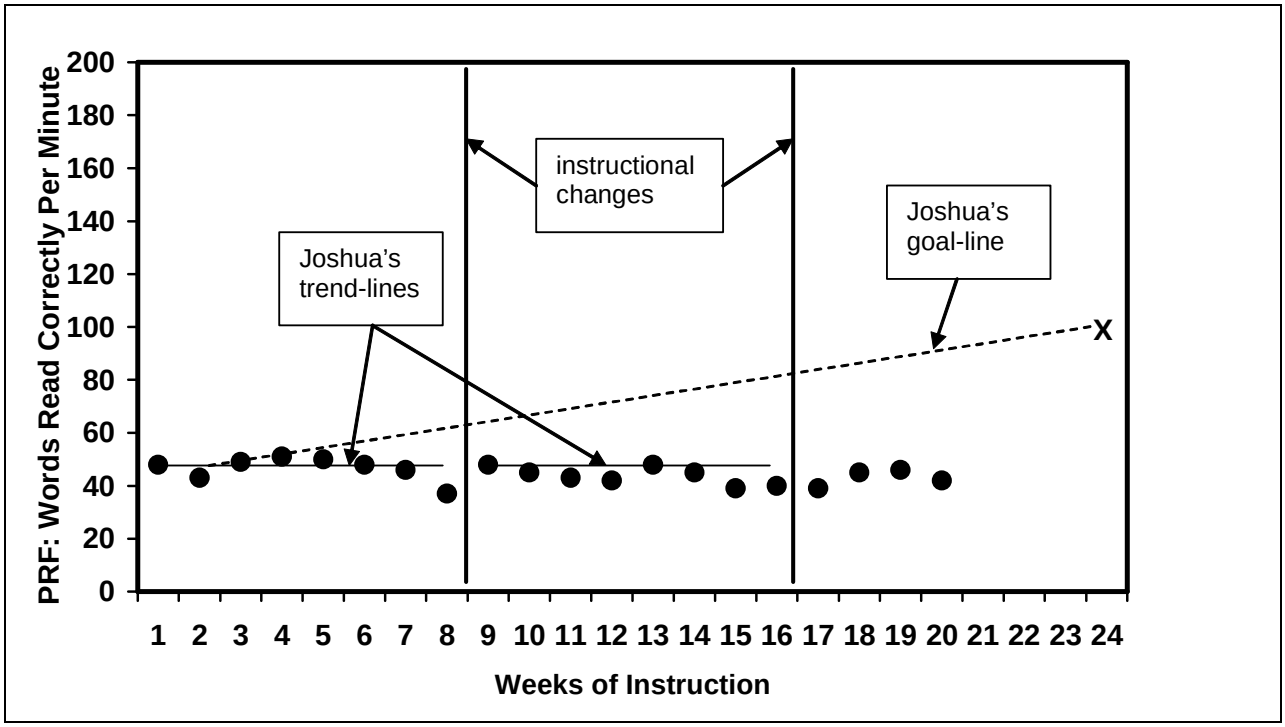
	Score	Slope

CBM Case Study #4: Joshua

Mrs. Sanchez has been using CBM to monitor the progress of all of the students in her classroom for the entire school year. She has one student, Joshua, who has been performing extremely below his classroom peers, even after two instructional changes.

Look at Joshua's CBM graph (Figure 58).

Figure 58. Joshua's CBM Graph

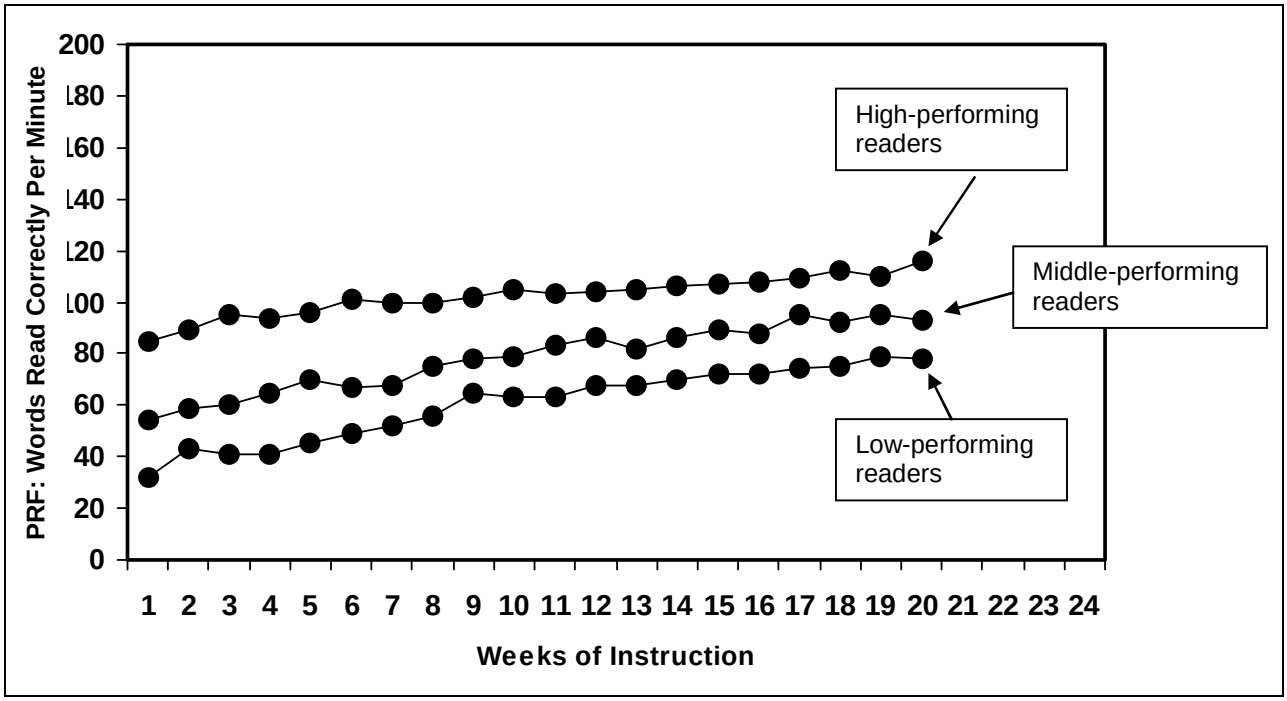


After eight weeks, Mrs. Sanchez determined that Joshua's trend-line was flatter than his goal-line, so she made an instructional change to Joshua's reading program. This instructional change included having Joshua work on basic sight words that he was trying to sound out when reading. The instructional change is the first thick, vertical line on Joshua's graph.

After another eight weeks, Mrs. Sanchez realized that Joshua's trend-line was still flatter than his goal-line. His graph showed that Joshua had made no improvement in reading. So, Mrs. Sanchez made another instructional change to Joshua's reading program. This instructional change included having Joshua work on basic letter sounds and how those letter sounds combine to form words. The second instructional change is the second thick, vertical line on Joshua's graph.

Mrs. Sanchez has been conducting CBM for 20 weeks and still has yet to see any improvement with Joshua's reading despite two instructional teaching changes. What could this graph tell Mrs. Sanchez about Joshua? Pretend you're at a meeting with your principal and IEP team members, what would you say to describe Joshua's situation? What would you recommend as the next steps? How could Mrs. Sanchez use this class graph to help her with her decisions about Joshua (Figure 59)?

Figure 59. Mrs. Sanchez's CBM Class Report



Appendix A: CBM Materials

The various CBM reading measures and computer software may be obtained from the following sources.

AIMSweb / Edformation (CBM reading passages and computer software)

AIMSweb is based on CBM. It provides materials for CBM data collection and supports data use.

The following reading measures are available:

- Standard Benchmark Reading Assessment Passages:
  - 3 graded and equivalent passages for Grades 1–8 for establishing fall, winter, and spring benchmarks
  - 24 total passages
  - Also available in Spanish
- Standard Progress Monitoring Reading Assessment Passages:
  - 30 graded and equivalent passages for Grades 2–8
  - 23 graded and equivalent passages for Grade 1
  - 23 graded and equivalent passages for primer level
  - 256 passages total
- Standard Benchmark Early Literacy Assessment Measures:
  - 3 equivalent Standard Benchmark Early Literacy Measures to assess Phonemic Awareness and Phonics for kindergarten and Grade 1 for establishing fall, winter, and spring benchmarks
- Standard Progress Monitoring Early Literacy Measures:
  - 30 equivalent Standard Early Literacy Measures for kindergarten and Grade 1
  - 30 tests for each indicator
- Standard Benchmark Reading Maze Passages:
  - 3 Standard Assessment Reading Passages for Grades 1–8 have been prepared in a maze (multiple choice close) format to use as another measure of reading comprehension
  - 24 maze passages total
- Standard Progress Monitoring Reading Maze Passages:
  - 30 graded and equivalent passages prepared in maze format for Grades 2–8

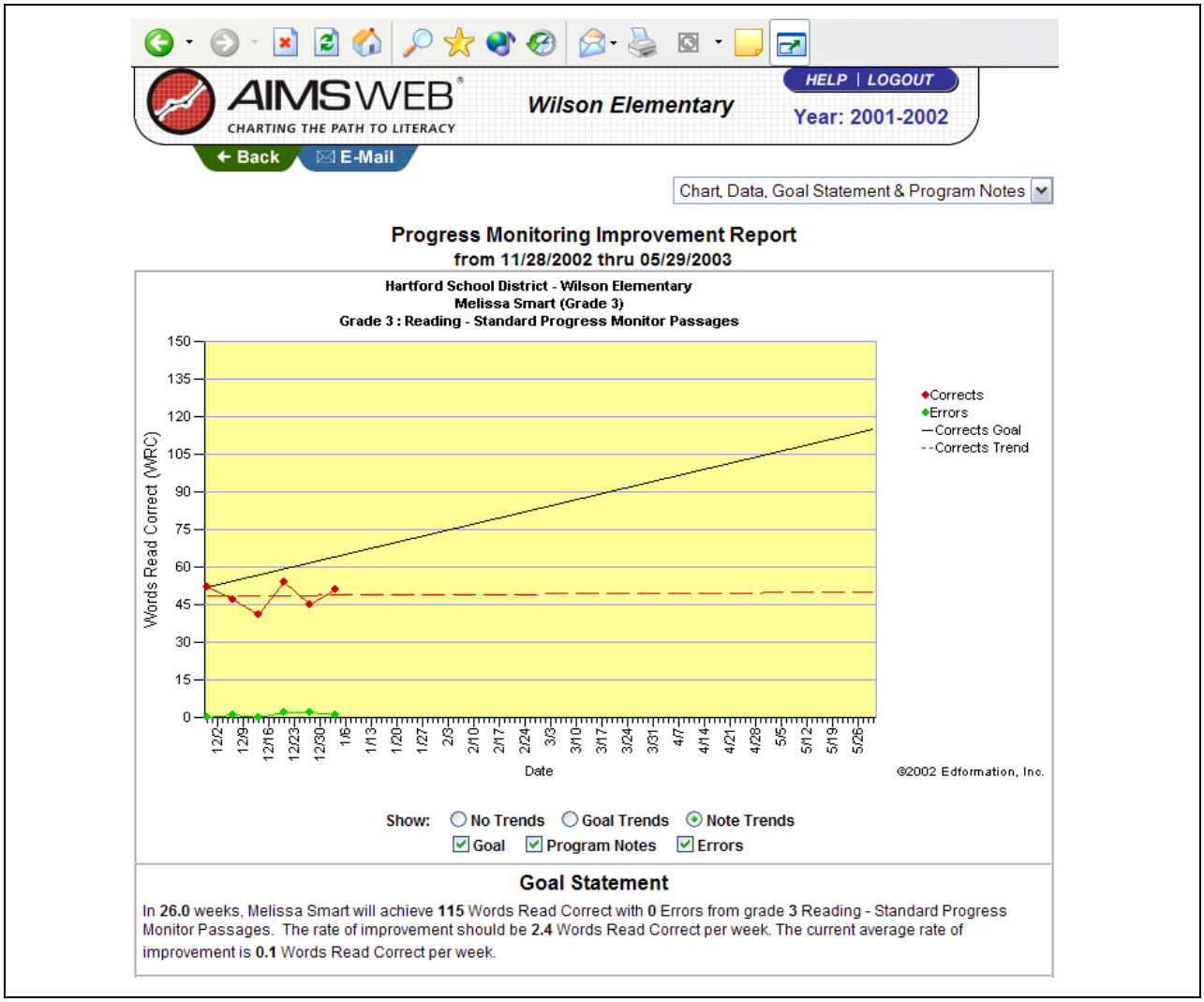
- 23 graded and equivalent passages prepared in maze format for Grade 1
- 23 graded and equivalent passages prepared in maze format for pre-primer level
- 256 passages total

The following are provided with the passages:

- Administration and Scoring Directions
- Directions for Organizing and Implementing a Benchmark Assessment Program

AIMSweb also has a progress monitoring computer software program available for purchase. Once the teacher administers and scores the CBM tests, the scores can be entered into the computer program for automatic graphing and analysis.

Sample AIMSweb Report



AIMSweb measures, administration guides, scoring guides, and software are available for purchase on the internet:

http://www.aimsweb.com or http://www.edformation.com

Phone: 888-944-1882

Mail: Edformation, Inc.
6420 Flying Cloud Drive, Suite 204
Eden Prairie, MN 55344

DIBELS (CBM reading passages and computer assistance)

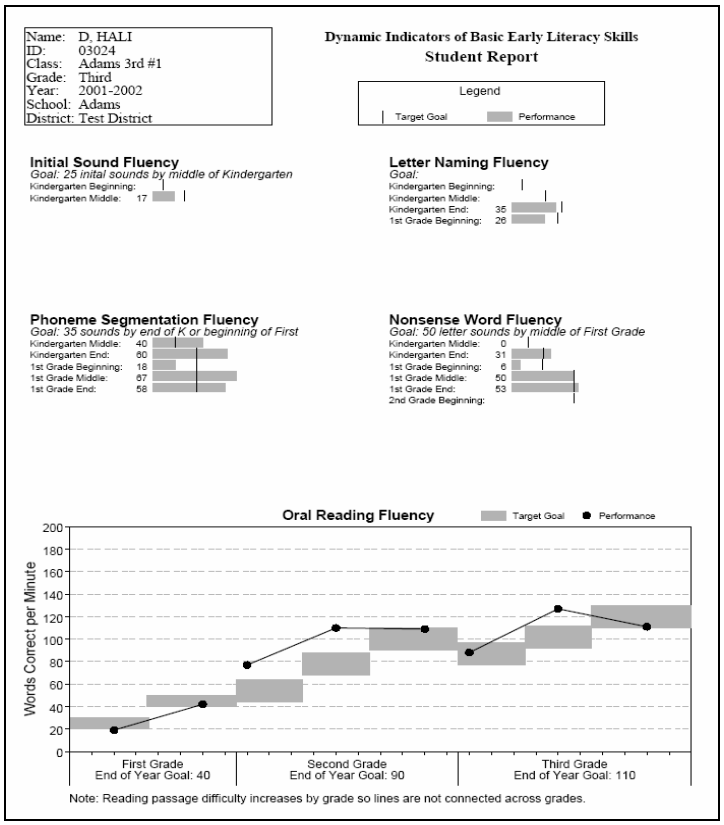
Dynamic Indicators of Basic Early Literacy Skills (DIBELS) are a set of standardized, individually administered measures of early literacy development. They are designed to be short (one minute) fluency measures used to regularly monitor the development of pre-reading and early reading skills. DIBELS measures are free to download and use. To obtain the measures, teachers must register on the DIBELS Web site.

The following reading measures are available:

- Phoneme Segmentation Fluency (kindergarten)
- Benchmark reading passages for Grades 1–6 (9 per grade)
- Assessment reading passages for Grades 1–6 (20 per grade)
- Benchmark and Assessment reading passages also available in Spanish

DIBELS also operates a DIBELS Data System that allows teachers to enter students' scores, once the teacher has administered and scored the tests, online to generate automated reports. The cost for this service is $1 per student, per year.

Sample DIBELS Report



DIBELS measures, administration guides, scoring guides, and information on the automated Data System are on the internet:

http://dibels.uoregon.edu/

Edcheckup (CBM reading passages)

Edcheckup offers an assessment system for screening student performance and measuring student progress toward goals in reading, based on the CBM model. The assessment system administers and scores student tests via computer.

The following reading passages are available:

- 138 Oral Reading passages for Grades 1–6
- 138 Maze Reading passages for Grades 1–6
- 23 Letter Sounds reading probes
- 23 Isolated Words reading probes

The following computer assistance is available:

- Student data and scores are entered online.
- Reports and graphs are automatically generated that follow class and student progress.
- Guidelines for setting annual goals and evaluating student progress are provided.

Edcheckup reading passages are available for purchase on the internet:

http://www.edcheckup.com

Phone: 952-229-1440

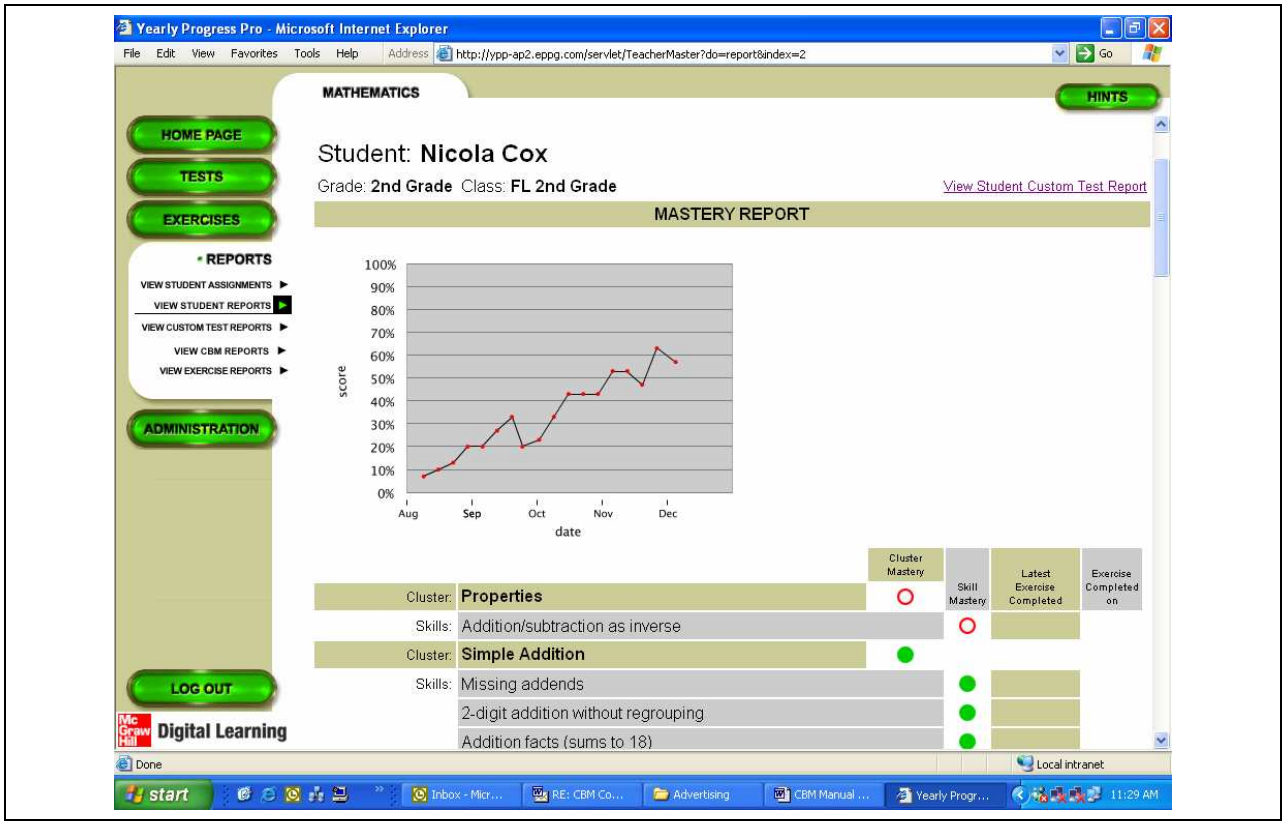
Mail: WebEdCo
7701 York Avenue South – Suite 250
Edina, MN 55435

McGraw-Hill (CBM computer software)

Yearly ProgressPro™, from McGraw-Hill Digital Learning, combines ongoing formative assessment, prescriptive instruction, and a reporting and data management system to give teachers and administrators the tools they need to raise student achievement. Yearly ProgressPro™ is a computer-administered progress monitoring and instructional system to bring the power of Curriculum Based Measurement (CBM) into the classroom. Students take tests on the computer, eliminating teacher time in administration and scoring.

Weekly 15-minute diagnostic CBM assessments provide teachers with the information they need to plan classroom instruction and meet individual student needs. Ongoing assessment across the entire curriculum allows teachers to measure the effectiveness of instruction as it takes place and track both mastery and retention of grade level skills. Yearly ProgressPro™ reports allow teachers and administrators to track progress against state and national standards at the individual student, class, building, or district level. Administrators can track progress towards AYP goals and disaggregate date demographically to meet NCLB requirements.

Sample Yearly ProgressPro™ Student Report



Information on the McGraw-Hill computer software is available on the internet:

http://www.mhdigitallearning.com

Phone: 1-800-848-1567 ext. 4928

Vanderbilt University (CBM reading passages)

CBM materials were developed and researched using standard CBM procedures.

The following reading passages are available:

- Letter Sound Fluency Test for kindergarten (5 tests)
- Word Identification Fluency Test for Grade 1 (20 tests)

- CBM Reading passages for Grades 1–8 (30 passages per grade)
- Maze Fluency passages for Grades 1–6 (30 passages per grade)

The CBM measures are free, except for copying costs, postage, and handling. The CBM measures, scoring sheets, administration instructions, and scoring instructions are available:

Phone: 615-343-4782

Email: flora.murray@vanderbilt.edu

Mail: Flora Murray
Peabody #328
230 Appleton Place
Nashville, TN 37203-5721

Appendix B: Resources

Deno, S. L. (1985). Curriculum-based measurement: The emerging alternative. *Exceptional Children, 52,* 219–232.

Deno, S. L., Fuchs, L. S., Marston, D., & Shin, J. (2001). Using curriculum-based measurement to establish growth standards for students with learning disabilities. *School Psychology Review, 30,* 507–524.

Deno, S. L., & Mirkin, P. K. (1977). *Data-based program modification: A manual*. Reston, VA: Council for Exceptional Children.

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Fuchs, L. S., & Deno, S. L. (1987). Developing curriculum-based measurement systems for data-based special education problem solving. *Focus on Exceptional Children, 19,* 1–16.

Fuchs, L. S., & Deno, S. L. (1991). Paradigmatic distinctions between instructionally relevant measurement models. *Exceptional Children, 57,* 488–501.

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Fuchs, L. S., & Fuchs, D. (1990). Curriculum-based assessment. In C. Reynolds & R. Kamphaus (Eds.), *Handbook of psychological and educational assessment of children (Vol. 1): Intelligence and achievement.* New York: Guilford Press.

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Fuchs, D., Roberts, P. H., Fuchs, L. S., & Bowers, J. (1996). Reintegrating students with learning disabilities into the mainstream: A two-year study. *Learning Disabilities Research and Practice, 11,* 214–229.

Germann G., & Tindal, G. (1985). An application on curriculum-based assessment: The use of direct and repeated measurement. *Exceptional Children, 52,* 244–265.

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Gickling, E. E. (1981). The forgotten learner. *Nevada Public Affairs Review, 1,* 19–22.

Hosp, M. K., & Hosp, J. (2003). Curriculum-based measurement for reading, math, and spelling: How to do it and why. *Preventing School Failure, 48*(1), 10–17.

Hosp, M. K., & Hosp, J. (2003). Progress monitoring: An essential factor for student success. *The Utah Special Educator, 24*(2), 26–27.

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Hutton, J. B., Dubes, R., & Muir, S. (1992). Estimating trend progress in monitoring data: A comparison of simple line-fitting methods. *School Psychology Review, 21,* 300–312.

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