How To: Assess Reading Comprehension With CBM: Maze Passages

A student's ability to comprehend text requires the presence of a bundle of component reading skills, including strong reading vocabulary, fluent decoding, and use of efficient and effective 'fix-up' strategies when encountering unknown words (National Institute of Child Health and Human Development, 2000). Motivation and attentiveness also play important roles in reading comprehension. While a student's understanding of text depends on many factors, however, teachers need a simple, time-efficient method both to screen students for reading-comprehension problems and to monitor the progress of any student who is receiving an academic intervention to improve text comprehension.

Curriculum-Based Measurement-Maze is a tool ideally suited to assess student reading comprehension (Parker, Hasbrouck, & Tindal, 1992). The student is given a specially formatted sample of text. The first sentence of the Maze passage is left intact. In the remainder of the passage, every seventh word is selected to be incorporated into a response item that consists of the original word plus two foils (words that would not make sense if substituted in the passage in place of the original, correct word). These three choices are randomly arranged and inserted back into the text. When reading the Maze passage, the reader reviews each response item and circles the word from the three choices that best restores the meaning of that segment of the passage.

Maze passages have been found to be better predictors of future reading performance than CBM oral reading fluency probes for students in grades 4 and higher (Hosp, Hosp & Howell, 2007).

CBM-Maze: How to Access Resources. Teachers can access a toolkit of resources for CBM-Maze, including: (1) materials for assessment, (2) guidelines for administration and scoring, and (3) research-based norms.

- *Materials for assessment.* Schools can access free Maze assessments with accompanying benchmarks for grades 2-6 at the DIBELS Next website: *http://dibels.org/next.html* Note: Users must create an account before they can download materials.

  Using the Maze Passage Generator, a free online application, teachers can generate their own CBM maze passages in PDF format from text typed in by the user:

  http://www.interventioncentral.org/teacher-resources/test-of-reading-comprehension

- *Guidelines for administration and scoring.* Instructions for preparing, administering, and scoring CBM-Maze assessments appear later in this document:

- *Research-based norms.* A table, *Curriculum-Based Measurement: Maze Passage Fluency Norms*, is included in this document. The norms include fluency benchmarks for grades 2-6 (Jenkins & Jewell, 1993; Graney, Missall, Martinez, & Bergstrom, 2009) and accompanying weekly growth norms (Fuchs et al., 1993).

References

Hosp, M.K., Hosp, J. L., & Howell, K. W. (2007). *The ABCs of CBM.* New York: Guilford.

National Institute of Child Health and Human Development. (2000). *Report of the National Reading Panel. Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction* (NIH Publication No. 00-4769). Washington, DC: U.S. Government Printing Office.

Parker, R., Hasbrouck, J. E., & Tindal, G. (1992). The maze as a classroom-based reading measure: Construction methods, reliability, and validity. Journal of Special Education, 26 (2), 195-218.

Curriculum-Based Measurement-Maze: Guidelines for Use

CBM-Maze: Description

CBM-Maze passages are timed (3-minute) reading comprehension assessments with a multiple-choice response format. The student reads and completes the passage silently. CBM-Maze can be administered to a single student, a small group, or an entire class (Espin et al., 2010).

CBM-Maze: Materials
The following materials are needed to administer CBM-Maze passages:

- Student and examiner copies of CBM Maze passage (the process for creating Maze passages is described below)
- Stopwatch
- Pencils for students

CBM-Maze: Preparation
Before administering CBM-Maze, the teacher creates or obtains a Maze passage, using these guidelines (Espin et al., 2010):

- Passages used for Maze should provide sufficient reading material to occupy students for 3 minutes of silent reading. Samples should be at least 300 words in length.
- The first sentence of the Maze passage is left intact.
- In the text following the first sentence, every seventh word is selected to be incorporated into a response item that consists of the original word plus two foils (words that would not make sense if substituted in the passage in place of the original, correct word). These three choices are randomly arranged and inserted back into the text. Here is a sample of a Maze response item: *The rain (sang, cement, fell) on the garden.*

Schools can obtain free Maze passages and Maze benchmarks for grades 2-6 from the DIBELS Next website: *http://dibels.org/next.html*

Schools can also obtain their own CBM Maze passages in PDF format based on text typed in by the user by accessing the Maze Passage Generator, a free online application: *http://www.interventioncentral.org/teacher-resources/test-of-reading-comprehension*

CBM-Maze: Directions for Administration (adapted from Sarasti, 2009)

1. The examiner distributes copies of CBM Maze probes to all the students in the group.
2. The examiner says: "When I say 'begin', start reading the story silently. Wherever you come to a group of 3 word-choices, circle the word that makes sense. Work as fast as you can but do your best work. If you finish the first page, go to the next page and continue working until I tell you to stop."
3. The examiner says: "Ready? Begin" and starts the stopwatch.
4. After 3 minutes, the examiner stops the stopwatch and says:"Stop. Pencils down".
5. These directions are repeated for each Maze passage administered in a session. The examiner then collects and scores the passages.
6. *Initial Assessment:* If the examiner is assessing the student for the first time, the examiner administers a total of 3 Maze probes during the session, using the above procedures and takes the median (middle) score as the best estimate of the student's reading-comprehension skills.
   Progress-Monitoring: If the examiner is monitoring student growth in computation (and has previously collected Maze data), only one Maze probe is given in the session.

CBM-Maze: Directions for Practice

If students are not yet familiar with the Maze, use the Maze practice page and accompanying examiner directions appearing later in this document to ensure student understanding of the activity before administering the assessment.

CBM-Maze: Scoring Guidelines

The examiner adds up the total number of correct responses, giving the student credit for each Maze choice-item in which the correct word is circled.

References

Espin, C. Wallace, T., Lembke, E., Campbell, H., & Long, J. D. (2010). Creating a progress-monitoring system in reading for middle-school students: Tracking progress toward meeting high-stakes standards. *Learning Disabilities Research & Practice, 25*(2), 60-75.

Sarasti, I. A. (2009). *An investigation of the reliability and validity of curriculum-based measurement maze probes: A comparison of 1-minute, 2-minute, and 3-minute time frames.* Unpublished doctoral dissertation, Temple University, Philadelphia, PA.

CBM-Maze: **Directions for Practice** (adapted from Sarasti, 2009)

If students are not yet familiar with the Maze, use the Maze practice page and these examiner directions to ensure student understanding of the assessment activity:

1. The examiner hands out copies of the Maze practice page to students.

2. The examiner says: "We will practice a story together. Look at the practice page. Read the first sentence to yourself while I read it aloud*: The rain (sang, cement, fell) on the garden.* The three choices are sang, cement, fell.

    The rain sang on the garden. That sentence does not make sense.
    The rain cement on the garden. That sentence does not make sense.
    So the correct word to circle is *fell*."

    [The examiner scans the group to ensure that all students circle the correct word before continuing.]

3. The examiner says: "Now go to the next sentence on the practice page. Read it to yourself while I read it aloud: *The teacher walked (quickly, blue, trust) down the hall.* Which word is the correct choice to complete the sentence?

    [Ensure that students chorally give the correct response before continuing.]

    That's right: *The teacher walked quickly down the hall* is correct, so circle the word *quickly*."

4. The examiner says: "Now read the next sentence on your practice page to yourself. Raise your hand when you have the answer.

    [When students are ready, the examiner reads the practice sentence with correct answer: *The ship sailed (blank, toward, eight) the port.*]

    Yes, the correct sentence is *The ship sailed toward the port*. Now that you have chosen the correct word, what do you do?"

    [The students should say "Circle it." The examiner ensures that all students fully understand the Maze response task.]

    Yes, you circle the correct word. You are ready to do the next story on your own."

CBM-Maze: Practice Page

1. The rain (sang, cement, fell) on the garden.

2. The teacher walked (quickly, blue, trust) down the hall.

3. The ship sailed (blank, toward, eight) the port.

Curriculum-Based Measurement: Maze Passage Fluency Norms
(Fuchs, Fuchs, Hamlett, Waltz, & Germann, 1993; Graney, Missall, Martinez, & Bergstrom, 2009; Jenkins & Jewell, 1993)*

CBM-Maze assesses basic student reading comprehension. In a Maze assessment, the student is given a passage in which every seventh word has been selected as a choice item. The student reads the passage silently. Each time the student comes to a choice item, the student chooses from among 3 replacement words: the correct word and two distractors. The student circles the replacement word that he or she believes best restores the meaning of the text. The Maze is timed: while the length of Maze assessments can vary, the most common time-standard is 3 minutes (Graney et al., 2009).

Grade	Fall Maze (Jenkins & Jewell, 1993)	Fall:+/-1 SD (≈16th%ile to 84th%ile)	Spring Maze (Jenkins & Jewell, 1993)	Spring: +/-1 SD (≈16th%ile to 84th%ile)	Weekly Growth (Fuchs et al., 1993)
2	6	1↔11	15	7↔23	0.40

Grade	Fall Maze (Graney et al., 2009)	Fall:+/-1 SD (≈16th%ile to 84th%ile)	Winter Maze (Graney et al., 2009)	Winter: +/-1 SD (≈16th%ile to 84th%ile)	Spring Maze (Graney et al., 2009)	Spring: +/-1 SD (≈16th%ile to 84th%ile)	Weekly Growth (Fuchs et al., 1993)
3	13	7↔19	14	8↔20	15	9↔21	0.40
4	14	9↔19	21	12↔30	20	12↔28	0.40
5	18	11↔25	22	14↔30	26	18↔34	0.40

Grade	Fall Maze (Jenkins & Jewell, 1993)	Fall:+/-1 SD (≈16th%ile to 84th%ile)	Spring Maze (Jenkins & Jewell, 1993)	Spring: +/-1 SD (≈16th%ile to 84th%ile)	Weekly Growth (Fuchs et al., 1993)
6	33	22↔44	39	26↔52	0.40

References:
- Fuchs, L. S., Fuchs, D., Hamlett, C. L., Waltz, L., & Germann, G. (1993). Formative evaluation of academic progress: How much growth can we expect? *School Psychology Review, 22,* 27−48.
- Graney, S. B., Missall, K. N., Martinez, R. S., & Bergstrom, M. (2009). A preliminary investigation of within-year growth patterns in reading and mathematics curriculum-based measures. *Journal of School Psychology, 47,* 121-142.
- Jenkins, J. R., & Jewell, M. (1993). Examining the validity of two measures for formative teaching: Read aloud and maze. *Exceptional Children, 59,* 421-432.

Reported Characteristics of Student Sample(s) Used to Compile These Norms:
- **Fuchs et al., 1993:** *Number of Students Assessed:* 257 students across grades 2-6/*Geographical Location:* Upper Midwest: Sample drawn from 5 elementary schools/ *Socioeconomic Status:* 33%-55% rate of Free & Reduced Lunch across participating schools/ *Ethnicity of Sample:* Not reported/*Limited English Proficiency in Sample:* Not reported.
- **Graney, 2009:** *Number of Students Assessed:* Average of 444 students in each year of this 2-year study.; Grade 3: 151; Grade 4: 149; Grade 5: 144/*Geographical Location:* Midwest: Sample drawn from grades 3-5 in one rural school: 8 classrooms in grade 3; 7 classrooms in grade 4; 7 classrooms in grade 5/ *Socioeconomic Status:* 31% Free & Reduced Lunch/ *Ethnicity of Sample:* 93% White; 4% Multiracial; 2% African-American; 1% Latino/*Limited English Proficiency in Sample:* Not reported.
- **Jenkins & Jewell, 1993:** *Number of Students Assessed:* Grade 2: 47; Grade 6: 125/*Geographical Location:* Pacific Northwest: Sample drawn from grades 2 & 6 in two elementary schools/ *Socioeconomic Status:* 33% Free & Reduced Lunch/ *Ethnicity of Sample:* Not reported/*Limited English Proficiency in Sample:* Not reported.

Where to Find Materials: Schools can access free Maze assessments with accompanying benchmarks for grades 2-6 at the DIBELS Next website: *http://dibels.org/next.html* Note: Users must create an account before they can download materials.

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Limitations of These Research Norms: Norms generated from small-scale research studies--like those used here--provide estimates of student academic performance based on a sampling from only one or two points in time, rather than a more comprehensive sampling across separate fall, winter, and spring screenings. These norms also have been compiled from a relatively small student sample that is not fully representative of a diverse 'national' population. Nonetheless, norms such as these are often the best information that is publically available for basic academic skills and therefore do have a definite place in classroom instruction decision-making.

These norms can be useful in general education for setting student performance outcome goals for core instruction and/or any level of academic intervention. Similarly, these norms can be used to set performance goals for students with special needs. In both cases, however, single-sample norms would be used only if more comprehensive fall/winter/spring academic performance norms are not available.