

Curriculum-Based Measurement in RTI

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While RTI holds great promise in theory, it has yet to be filled in practice. Because I feel so strongly about the importance of good education for our children, I have been unwilling to evade the hard facts. The unwillingness (perhaps better described as ‘inability’) of teachers, coupled with widespread confusion as to what RTI is and whether schools are required to use it (Council for Exceptional Children [CEC], 2011) has prompted me to put together this article. This article is provided for those seeking more detailed information about RTI.

The multi-tier RTI approach comprises three distinct tiers, or stages of increasing intensity, in relation to academic and/or behavioral interventions, within each tier. High-quality instruction for all is often referred to as Tier 1 (universal instruction) and generally meets the needs of roughly 70-80% of the students in the general education classroom, thus leaving the remaining 20-30% as needing additional instruction/intervention at the next level, Tier 2 (target intervention) (Vaughn, Wanzek, Woodruff, & Linan-Thompson, 2007). Tier 2 intervention is typically strategic/targeted and systematic small-group (4-5) supplemental instruction, and more frequent progress monitoring. Students whose progress monitoring data show insufficient progress transition to Tier 3 interventions where they receive Tier 3 intervention services — including individualized academic, social, and/or behavioral interventions — the most intensive set of services provided to the student. Tier 3 interventions are designed to be used concurrently with the Tier 1 and Tier 2 level supports and interventions (Casey, Robertson, Williamson, Serio, & Elswick, 2011). [It is important to note here that “regular progress monitoring (probes) and charting is required during all Tier 2 and Tier 3 interventions” (Dickman, 2006)].

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Table I below provides an overview of the main features of RTI and examples of how they could be applied to academic and social behavior. Hawken, Vincent, & Schuman (2008) describe its core features as a multi-tier model of service delivery, a problem-solving method to make decisions about appropriate levels of intervention, the use of evidence-based interventions, student progress monitoring to inform instruction and intervention, the use of data to make decisions regarding student response to intervention, and use of assessment for three different reasons—screening, diagnostic, and progress monitoring.

Table I
Response to Intervention (RTI) for Academic and Social Behavior in Action

Features of RTI	Academic Behavior (i.e., reading)	Social Behavior
Multi-tiered model of service delivery	Tier 1—evidence-based core reading curriculum Tier 2—standardized protocol intervention Tier 3—intensive (i.e., Title I or special education)	Tier 1—schoolwide discipline plan Tier 2—standardized protocol intervention Tier 3—individualized behavior support plans
Use of problem-solving methods to make decisions about appropriate levels of intervention	Problem-solving model, school-based teams	Problem-solving model, behavior support team
Use of evidence-based interventions	Tier 1 (e.g., Core reading program) Tier 2 (e.g., Read Naturally) Tier 3 (e.g., Kaleidoscope Levels A and B from SRA)	Tier 1—schoolwide discipline plan Tier 2 (e.g., Behavior Education Program, First Step to Success, Check & Connect) Tier 3—functional behavioral assessments and behavior support plans
Student progress monitoring to inform instruction and intervention	Dynamic Indicators of Basic Early Literacy Skills (DIBELS)/curriculum-based measurement (CBM) data	Percentage of points on daily progress reports Office discipline referrals Direct observation
Use of data to make decisions regarding student response to intervention	Risk status based on DIBELS data Low risk Some risk At risk	No research-based goals
Use of assessment for three different reasons – screening, diagnostic, and progress monitoring.	Screening-DIBELS Diagnostic-diagnostic reading assessment Monitoring-DIBELS	Screening-office discipline referrals, Systematic Screening for Behavior Disorders Diagnostic-functional behavioral assessments Progress monitoring-daily progress report data

*Hawken, L.S., Vincent, C.G., Schuman, J. (2008). Response to intervention for social behavior: Challenges and opportunities. *Journal of emotional and behavioral disorders*, 16(4), 213-225.

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Currently there is no main procedure for how the teacher selects the evidence-based intervention at the third tier (Casey et al., 2011). Most will simply identify the specific area of need and select an intervention or strategy that matches the identified student need (e.g., an evidence-based writing intervention is selected for a struggling writer). But problems occur when the teacher selects a research-based instructional approach but does not evaluate the instructional practices for each child individually to determine whether the intervention works for them (Casey et al., 2011; Cook, Shepherd, Cook, & Cook, 2012). Accordingly, educators should monitor the progress of students regularly to (a) determine whether the intervention is working and (b) help inform instruction. How progress is monitored is dependent on whether or not it is an academic or social skill (Hawken, Vincent, & Schuman, 2008). Issues related to progress monitoring are now addressed.

RTI Assessment Model

Student assessment and progress monitoring are the critical parts of optimizing an individualized education program. They are, for example, particularly important where complex or important decisions are involved like the critical decision to move to a different level of intervention (e.g., Fuchs et al., 2003). In order to maintain the integrity of the problem-solving process within the RTI framework — which focuses on designing an individualized intervention for students (Barnes & Harlacher, 2008) — data collected should be comprehensive and come from multiple sources that collectively provide feedback information on student academic achievement and behavior, the instructional environment, and teacher effectiveness (Burns et al., 2008).

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Progress monitoring

The National Center on Student Progress Monitoring (n.d.) defines progress monitoring as “a scientifically based practice that is used to assess students’ academic performance and evaluate the effectiveness of instruction.” Progress monitoring is a well-planned and ongoing systematic collection, analysis, and interpretation of student response data from repeatable and brief probes. The student response data are used to compare the projected progress, and proper modifications (adjustments) to students’ academic programming are made as necessary to acquire the students’ academic goals (NCSPM, 2008). Without such accommodation, these students may be unable to take full advantage of their educational opportunities. The support of school staff is critical for the creation of an environment that values and welcomes diversity and inclusion.

Progress monitoring has often been used to assess student progress or performance in subjects such as reading, mathematics, writing, and spelling. To implement progress monitoring, the students’ current levels of academic performance and functional skills are determined and goals are identified for learning that will take place over time (NCSPM, n.d.). Research has demonstrated that when teachers use progress monitoring for instructional decision making purposes: (1) students achieve more; (2) teacher decision-making improves; and (3) students tend to be more aware of their performance (e.g., see Stecker, Fuchs, & Fuchs, 2005). Table 2 below shows the steps that are taken when conducting progress monitoring.

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Table 2: General Steps for Conducting Progress Monitoring

1. Decide on level of implementation (i.e., individual student, small group, classroom grade level, school level, district level).
2. Decide on what measures to use. Create or select appropriate tests/probes. The test should sample skills to be mastered across the school year. The tests/probes are generally 1-3 minutes in duration.
3. Collect screening or baseline data. Administer and score the test/probes. Probes are presented frequently to ensure that students' data are valid and reliable.
4. Decide on short-term objectives or end criteria.
5. Set long-range goals. Targets, which sometimes are called benchmarks, help students and teachers understand how much growth is expected and required.
6. Decide how often to monitor.
7. Graph the scores. Visual representations of students' performance enable students to see their progress and teachers to make instructional decisions.
8. Make instructional decisions. The students' performance is used to evaluate the instructional program in order to retain effective strategies and to discontinue ineffective ones.
9. Continue monitoring.
10. Communicate progress. The data and graphs facilitate communication with parents, other teachers, and students.

*Luckner, J.L., & Bowen, S.K. (2010). Teachers' use and perceptions of progress monitoring. *American Annals of the Deaf*, 155(4), 397- 406.

Curriculum-based measurement (CBM) and RtI

The use of curriculum-based assessment (CBA) to address instructional practices and curriculum-based measurement (CBM) to assess effectiveness of instruction have proven beneficial in an RTI model (Eichlorn, 2009). Often the terms are confounded and used interchangeably but they differ in important ways. Realizing the difference between the two is crucial to understanding why both contribute to the improvement of instruction. That said, I think it is important to emphasize that in most respects CBA is not particularly useful for determining the most appropriate evidence-based intervention to use to meet a particular

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student's need, determinations are likely to be tied more successfully to CBMs (Casey et al., 2011).

Curriculum-based measurement (CBM) is a procedure in which multiple probes are administered repeatedly to provide student progress data over time (SEDL, 2009). As it relates to the Rtl model, Casey et al. (2011) explain the following:

CBM are used to determine what tiered intervention a student should be receiving. Elliot (2006) noted that for a student who has been identified as needing more intensive interventions, Tier 2 or 3 students should not stay within that tier for more than a grading period. However, because of the flexibility of the grading periods employed by each school, this time frame will vary from district to district (nine week block scheduling, six week standard grading period, and year round schools). Ultimately prolonging the intervention for more than a grading period could be detrimental to the learner and his or her academic progress. For example, if the intervention is not successful, then extending the time in intervention is not helpful to the student or the school; if the intervention is successful, then the goal should be to quickly move the student back to previous tier. Even for countries or locations not using Rtl, the same arguments can be made about using time efficiently and not spending time and money on ineffective interventions. (p. 36)

Intervention Probes

The use of CBM has proven to be very effective in increasing student achievement (Stecher, Fuchs, & Fuchs, 2005). The most important aspect of CBM is not just gathering and processing data, but also graphing and using the data. Casey et al. (2011) explain:

CBM uses intervention probes to determine student progress. Probes are standardized teaching segments that last usually 1-5 minutes (Wright, 2003). Since the probes are efficient, they can be done repeated times to collect data on a student's progress. A brief intervention probe can serve many functions. For example, one purpose for using a brief intervention probe is to identify simpler and more efficient interventions (Gortmaker, Daly, McCurdy, Persampieri, & Hergenrader, 2007); another is to eliminate ineffective interventions. In recent studies aimed at improving academic skills, a brief experimental analysis has been used in the early stages of the intervention phase to "test

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out” interventions for improving the participants’ academic deficits (Daly, Martens, Dool, & Hintze, 1998; Daly, Martens, Hamler, Dool, & Eckert, 1999; Daly, Murdock, Lillenstein, Webber, & Lentz, 2002; Daly, Shroder, & Robinson, 2002; Eckert, Ardoin, Daly, & Martens, 2002). (p. 36)

A list of steps for constructing and scoring CBM probes in math and written expression (e.g., writing fluency) are presented below in Tables 3 and 4, respectively.

Table 3: Constructing and Scoring CBM Curriculum Materials in Mathematics

Constructing a CBM Mathematics Probe:

1. Determine the specific types of skills that you want to access from the student’s grade level curriculum.
2. Choose problems that represent these skills and mix the problems on each probe.
3. State directions to student and begin time.
4. At two minutes, stop the administration and collect the probe.

To score the CBM math probe:

1. Score below the line. In this example, the student made 2 errors and received 8 correct out of 10 possible correct digits.
2. Only count an error once.

$$\begin{array}{r} 45 \\ \times 28 \\ \hline 350 \\ +800 \\ \hline 1,150 \end{array}$$

Correct = 8 (7 plus the place holder). This result is the number that is graphed.

3. In long division, count digits above and below the line.

$$\begin{array}{r} \underline{244}R1 \\ 2)489 \\ \underline{4} \\ 08 \\ \underline{8} \\ 09 \\ \underline{8} \\ 1 \end{array}$$

Correct = 11 (count remainder once). This result is the number that is graphed.

Math probe scoring criteria:

To calculate digits per minute (DPM), divide number of digits correct on a 2-minute probe by 2.

If the student completes the probe in less than 2 minutes then calculate the number of correct digits ÷ number of seconds × 60.

The teacher constructs one probe for each time in which the student will be assessed. A probe may be administered every 3-4 weeks over the course of the academic year.

*Fore, C., Lawson, C., & Martin, C. (2007). Using curriculum-based measurement for formative instructional decision-making in basic mathematical skills. *Education*, 128(2), 324-332.

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Table 4: Constructing and Scoring CBM in Written Expression

Constructing a CBM Writing Probe:

1. Determine the specific type of writing skill that the student is expected to master during the school year.
2. Provide student with a writing prompt (i.e., story starter); a minute of “think time”; and three to seven minutes of writing time.
3. Once student has finished writing, collect the writing sample and score it for appropriate measures of writing such as total words written; words spelled correctly; correct writing sequences; correct punctuation marks; and number of different words (vocabulary).

To score the CBM writing probe for the Total Words Written (TWW):

1. Count the total words written (TWW) and record that number on student’s graph.
2. Words do not have to be spelled correctly to be counted in TWW.

To score the CBM writing probe for Words Spelled Correctly (WSC):

1. Read the sample, circle any words that are spelled incorrectly, and then subtract the number of words spelled incorrectly from TWW.
2. Plot data on the same graph as TWW.

To score the CBM writing probe for Correct Writing Sequences (CWS):

1. A CWS is defined as two adjacent correctly spelled words that are acceptable within the context of the phrase; correct capitalization and punctuation are considered when counting CWS.
2. To determine CWS, mark each writing sequence as correct (?) or incorrect (-).
^ My ^ mom ^ took ^ me ^ to ^ the ^ park – went – their – yesterday ^. 8 CWS.

To score the CBM writing probe for Correct Punctuation Marks (CPM):

1. Count the number of punctuation marks student used correctly.
Next, you take the peanut butter, jelly, and bread to the counter. 4 CPM
Next you take the peanut butter jelly and bread to the counter. 1 CPM (i.e., the period)

To score the CBM writing probe for Number of Different Words (NDW):

1. Count the number of different words in order to capture vocabulary usage.
2. Mark each repeated word, and then count all unmarked words to yield the total number of different words.
I have a big dog, a big cat, and a big house. 8 different words
I have a big dog, an enormous cat, and a mammoth house. 11 different words

*Hessler, T., Konrad, M. (2008). Using curriculum-based measurement to drive IEPs and instruction in written expression. *Teaching Exceptional Children*, 41(2), 28-38.

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Procedures for Graphing

The basic procedures involved in graphing (picture of growth over time) baseline (current performance level for the targeted skill/behavior) data, setting goals (e.g., LRG), summarizing data (e.g., aimlines, trendlines), and decision making (instructional/intervention change or change in goal) are outlined in Table 5 below. Lembke and Stecker (2007) note that decision rules for decision making need to be “determined prior to the beginning of data collection and [decision rules] are data examination guidelines that teachers use as they look at student graphs and determine whether instructional changes need to be implemented.”

Table 5: Procedures for Graphing

Graphing baseline data	<ul style="list-style-type: none">• Locate week in which data were collected (horizontal axis)• Locate day within that week that probe was administered (horizontal axis)• Locate student’s score (vertical axis)• Place a dot at intersection of day and value• Repeat above steps for each baseline data point• Draw vertical line from top to bottom of graph after the last baseline data point
Setting a long range goal (LRG)	<ul style="list-style-type: none">• Determine median of baseline.• Put an “X” on the vertical line at the level of the median value.• Set an ambitious goal for improvement in maze (number of choices improvement) or written expression (number of C-IWS improvement).• Determine number of weeks you will progress monitor.• Multiply the number of weeks by the criterion (e.g., expected rate of growth per week).• Add this number to the median baseline point.• Calculate LRG; place an “X” at the intersection of the date of the last data point and the value of the LRG.• Draw a line that connects the baseline data with the LRG.
Utilizing data and making decisions	<ul style="list-style-type: none">• You should ask yourself the following: Is the student progressing? Is my instruction effective? Do I need to change instruction? Is the instructional change I’ve made effective? Should I raise the student’s goal?• After three consecutive points below the goal line, change instruction.• After six consecutive points above the goal line, raise the goal.

SOURCE: http://www.progressmonitoring.net/CBM_handout.pdf

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