INTERVENTION CENTRAL

RTI Toolkit: A Practical Guide for Schools

How to Use Classroom Data to Set Goals and Monitor Student Progress: Classroom First Responder Series

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Workshop materials available: http://www.interventioncentral.org/nassau_boces_data

The RIOT/ICEL Matrix: Organizing Data to Answer Questions About Student Academic Performance & Behavior

When a student displays serious academic or behavioral deficits, the Response to Intervention model adopts an inductive approach that begins with educators collecting a range of information to better analyze and understand the student's intervention needs (Fuchs, Fuchs & Compton, 2010).

However, this investigative RTI problem-solving approach can be compromised at the outset in several ways (Hosp, 2008). For example, educators may draw from too few sources when pulling together information about the presenting problem(s)—e.g., relying primarily on interviews with one classroom teacher -- which can bias the findings. Also, educators may not consider the full range of possible explanations for the student's academic or behavioral problems—such as instructional factors or skill-deficits—and thus fail to collect information that would confirm or rule out those competing hypotheses. And finally, educators may simply not realize when they have reached the 'saturation point' in data collection (Hosp, 2008) when stockpiling still more data will not significantly improve the understanding of the student problem.

One tool that can assist schools in their quest to sample information from a broad range of sources and to investigate all likely explanations for student academic or behavioral problems is the RIOT/ICEL matrix. This matrix helps schools to work efficiently and quickly to decide what relevant information to collect on student academic performance and behavior—and also how to organize that information to identify probable reasons why the student is not experiencing academic or behavioral success.

The RIOT/ICEL matrix is not itself a data collection instrument. Instead, it is an organizing framework, or heuristic, that increases schools' confidence both in the quality of the data that they collect and the findings that emerge from the data (Hosp, 2006, May). The top horizontal row of the RIOT/ICEL table includes four potential sources of student information: Review, Interview, Observation, and Test (RIOT). Schools should attempt to collect information from a range of sources to control for potential bias from any one source.

The leftmost vertical column of the RIO/ICEL table includes four key domains of learning to be assessed: Instruction, Curriculum, Environment, and Learner (ICEL). A common mistake that schools often make is to assume that student learning problems exist primarily in the learner and to underestimate the degree to which teacher instructional strategies, curriculum demands, and environmental influences impact the learner's academic performance. The ICEL elements ensure that a full range of relevant explanations for student problems are examined.

Select Multiple Sources of Information: RIOT. The elements that make up the top horizontal row of the RIOT/ICEL table (Review, Interview, Observation, and Test) are defined as follows:

- Review. This category consists of past or present records collected on the student. Obvious examples include report cards, office disciplinary referral data, state test results, and attendance records. Less obvious examples include student work samples, physical products of teacher interventions (e.g., a sticker chart used to reward positive student behaviors), and

emails sent by a teacher to a parent detailing concerns about a student's study and organizational skills.

- Interview. Interviews can be conducted face-to-face, via telephone, or even through email correspondence. Interviews can also be structured (that is, using a pre-determined series of questions) or follow an open-ended format, with questions guided by information supplied by the respondent. Interview targets can include those teachers, paraprofessionals, administrators, and support staff in the school setting who have worked with or had interactions with the student in the present or past. Prospective interview candidates can also consist of parents and other relatives of the student as well as the student himself or herself.

- Observation. Direct observation of the student's academic skills, study and organizational strategies, degree of attentional focus, and general conduct can be a useful channel of information. Observations can be more structured (e.g., tallying the frequency of call-outs or calculating the percentage of on-task intervals during a class period) or less structured (e.g., observing a student and writing a running narrative of the observed events). Obvious examples of observation include a teacher keeping a frequency count of the times that she redirects an inattentive student to task during a class period and a school psychologist observing the number of intervals that a student talks with peers during independent seatwork Less obvious examples of observation include having a student periodically rate her own academic engagement on a 3-point scale (self-evaluation) and encouraging a parent to send to school narrative observations of her son's typical routine for completing homework.

- Test. Testing can be thought of as a structured and standardized observation of the student that is intended to test certain hypotheses about why the student might be struggling and what school supports would logically benefit the student (Christ, 2008). Obvious examples of testing include a curriculum-based measurement Oral Reading Fluency probe administered to determine a student's accuracy and fluency when reading grade-level texts and a state English Language Arts test that evaluates students' mastery of state literacy standards. A less obvious example of testing might be a teacher who teases out information about the student's skills and motivation on an academic task by having that student complete two equivalent timed worksheets under identical conditions—except that the student is offered an incentive for improved performance on the second worksheet but not on the first ('Can't Do/Won't Do Assessment'). Another less obvious example of testing might be a student who has developed the capacity to take chapter pre-tests in her math book, to self-grade the test, and to write down questions and areas of confusion revealed by that test for later review with the math instructor.

Investigate Multiple Factors Affecting Student Learning: ICEL. The elements that compose the leftmost vertical column of the RIO/ICEL table (Instruction, Curriculum, Environment, and Learner) are described below:

- Instruction. The purpose of investigating the 'instruction' domain is to uncover any instructional practices that either help the student to learn more effectively or interfere with that student's learning. More obvious instructional questions to investigate would be whether specific teaching strategies for activating prior knowledge better prepare the student to master

new information or whether a student benefits optimally from the large-group lecture format that is often used in a classroom. A less obvious example of an instructional question would be whether a particular student learns better through teacher-delivered or self-directed, computer-administered instruction.

- Curriculum. 'Curriculum' represents the full set of academic skills that a student is expected to have mastered in a specific academic area at a given point in time. To adequately evaluate a student's acquisition of academic skills, of course, the educator must (1) know the school's curriculum (and related state academic performance standards), (2) be able to inventory the specific academic skills that the student currently possesses, and then (3) identify gaps between curriculum expectations and actual student skills. (This process of uncovering student academic skill gaps is sometimes referred to as 'instructional' or 'analytic' assessment.) More obvious examples of curriculum questions include checking whether a student knows how to computer a multiplication problem with double-digit terms and regrouping or whether that student knows key facts about the Civil War. A less obvious curriculum-related question might be whether a student possesses the full range of essential academic vocabulary (e.g., terms such as 'hypothesis') required for success in the grade 10 curriculum.

- Environment. The 'environment' includes any factors in students' school, community, or home surroundings that can directly enable their academic success or hinder that success. Obvious questions about environmental factors that impact learning include whether a student's educational performance is better or worse in the presence of certain peers and whether having additional adult supervision during a study hall results in higher student work productivity. Less obvious questions about the learning environment include whether a student has a setting at home that is conducive to completing homework or whether chaotic hallway conditions are delaying that student's transitioning between classes and therefore reducing available learning time.

- Learner. While the student is at the center of any questions of instruction, curriculum, and [learning] environment, the 'learner' domain includes those qualities of the student that represent their unique capacities and traits. More obvious examples of questions that relate to the learner include investigating whether a student has stable and high rates of inattention across different classrooms or evaluating the efficiency of a student's study habits and test-taking skills. A less obvious example of a question that relates to the learner is whether a student harbors a low sense of self-efficacy in mathematics that is interfering with that learner's willingness to put appropriate effort into math courses.

Integrating the RIOT/ICEL Matrix into a Building's Problem-Solving. The power of the RIOT/ICEL matrix lies in its use as a cognitive strategy, one that helps educators to verify that they have asked the right questions and sampled from a sufficiently broad range of data sources to increase the probability that they will correctly understand the student's presenting concern(s). Viewed in this way, the matrix is not a rigid approach but rather serves as a flexible heuristic for exploratory problem-solving.

At the very least, RTI consultants should find that the RIOT/ICEL matrix serves as a helpful mental framework to guide their problem-solving efforts. And as teachers over time become more familiar

with the RTI model, they also might be trained to use the RIOT/ICEL framework as they analyze student problems in their classrooms and prepare Tier 1 interventions.

References

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RIOT/ICEL Matrix Example: The matrix below is filled out with some possible sources of information on a student, Rick, whose mathematics teacher is concerned at his apparent *lack of academic engagement in large-group settings*. NOTE: The examples in the matrix are for purposes of illustration only. It is probably somewhat unlikely that all of these sources of information would be collected for a single student, unless his or her needs were intensive.

	Review	Interview	Observe	Test
Instruction	• [Review-Instruction] **Review of past report cards**: The teacher searches for comments from former instructors about instructional techniques to which Rick did or did not respond.	• [Interview-Instruction] **Teacher interview**: The instructor is asked by the guidance counselor which instructional elements help Rick to attend in large-group instruction and which are less effective.	• [Observe-Instruction] **Classroom observation**: During large-group instruction, an observer calculates Rick's rate of on-task behavior (e.g., through momentary time-sampling).	• [Test-Instruction] **Note-taking conditions**: The teacher structures two large-group instruction conditions--regular note-taking and guided notes – and observes whether Rick's level of academic engagement improves with guided notes.
Curriculum	• [Review-Curriculum] **Work products**: The teacher collects the student's math homework and examines it for evidence about whether Rick is able correctly to use the algorithms taught in class.	• [Interview-Curriculum] **Student interview**: The guidance counselor meets with Rick to ask him a series of questions about his math skills.	• [Observe-Curriculum] **Classroom observation**: The teacher pairs students, directs each to describe to the other his/her reasoning for solving a multi-step word problem with math graphic. Rick is observed during this exercise.	• [Test-Curriculum] **Diagnostic test**: The teacher prepares and administers to the class a diagnostic test with problems that test essential foundation math knowledge required for success in the course. Rick's test results are carefully reviewed.
Environment	• [Review-Environment] **Folder review**: Rick's cumulative folder is reviewed for past instructor comments about aspects of the instructional environment (e.g., presence or absence of peers, teacher proximity) that helped or hindered academic performance.	• [Interview-Environment] **Parent interview**: At a parent conference, the teacher asks Rick's father to describe the student's nightly homework routine, as well as those factors in the homework setting that appear to help or hinder Rick's homework completion.	• [Observe-Environment] **Classroom observation**: During observations of Rick in a large-group math setting, the observer looks for environmental factors—e.g., presence or absence of peers, teacher proximity) that help or hinder academic performance.	• [Test-Environment] **Peer seating conditions**: On different occasions, the instructor (a) allows Rick to choose his own seat-mates and (b) seats Rick next to positive peer role models. The instructor observes whether Rick's level of academic engagement improves in the peer role-model condition.
Learner	• [Review-Learner] **Math journal**: The math teacher collects Rick's math journal and reviews the entries for hints about the student's attitude and level of self-confidence toward mathematics [Learner characteristic: math self-efficacy].	• [Interview-Learner] **Parent interview**: In an email exchange with the student's mother, the teacher asks her what her son's study habits [Learner characteristic: study & organizational skills]	• [Observe-Learner] **Behavior rating based on observation**: For one week, the math teacher rates the student daily on a behavior report card. One of the several rating items is the student's 'time on task' [Learner characteristic: attentional focus].	• [Test-Learner] **Reward conditions**: On different occasions, the teacher (a) has Rick participate in large-group instruction with no reward and (b) offers Rick an incentive (reward) if he requires no more than 1 teacher prompt per session to direct him back to task. The instructor observes whether Rick's engagement increases in the reward condition [Learner characteristic: attentional focus].

RIOT/ICEL Assessment Worksheet

Student: _____ Person Completing Worksheet: _____

Date: _____ Statement of Student Problem: _____

_____

Directions: Fill out the grid below to develop an assessment plan for the targeted student.

	Review	Interview	Observe	Test
Instruction				
Curriculum				
Environment				
Learner				

How To: Structure Classroom Data Collection for Individual Students

When a student is struggling in the classroom, the teacher will often implement an intervention matched to the student's deficient academic skills. However, classroom interventions are incomplete if the teacher is not also collecting data to document whether those interventions are actually benefiting students. Indeed, an intervention can be viewed as 'fatally flawed' (Witt, VanDerHeyden & Gilbertson, 2004) if it lacks any one of these 4 data elements:

- *Problem definition.* The teacher clearly and specifically defines the presenting student problem(s) needing intervention. If the student problem is not clearly defined, the teacher cannot accurately measure or fix it.

- *Baseline performance.* The teacher assesses the student's current skill or performance level (baseline performance) in the identified area(s) of concern. If the teacher lacks baseline information, he or she cannot judge at the end of the intervention how much progress was actually made.

- *Intervention goal.* Before starting the intervention, the teacher sets a specific outcome goal for student improvement. Without a goal in place before the start of the intervention, the teacher cannot judge at the end of the intervention whether it has in fact been a success.

- *Ongoing progress-monitoring.* The teacher selects a method to monitor the student's progress formatively during the intervention. Without ongoing monitoring of progress, the teacher is 'flying blind', unable to judge to judge whether the intervention is effective in helping the student to attain the outcome goal.

Bringing Structure to Classroom Data-Collection. The *Student Intervention: Monitoring Worksheet*. As teachers take on the role of 'first responder' interventionist, they are likely to need guidance – at least initially—in the multi-step process of setting up and implementing classroom data collection, as well as interpreting the resulting data.

A form designed to walk teachers through the data-collection process-- The *Student Intervention: Progress-Monitoring Worksheet*—appears at the end of this document, along with a completed example. The *Worksheet* is a 7-step 'wizard' form to show teachers how to structure their progress-monitoring to ensure that their data collection is adequate to the task of measuring the impact of their classroom interventions:

Identify the student problem. The teacher defines the student problem in clear, specific terms that allow the instructor to select an appropriate source of classroom assessment to measure and monitor the problem.

Decide on a data collection method. The teacher chooses a method for collecting data that can be managed in the classroom setting and that will provide useful information about the student problem. Examples of data collection methods are curriculum-based measurement (e.g., oral reading fluency; correct writing sequences), behavior-frequency counts, and daily behavior report cards. When selecting a data collection method, the teacher also decides how frequently that data will be collected during intervention progress-monitoring. In some cases, the method of data collection being used will dictate monitoring frequency. For example, if homework completion and accuracy is being tracked, the frequency of data collection will be equal to the frequency of homework assignments. In other cases, the level of severity of the student problem will dictate monitoring frequency. In schools implementing Response to Intervention (RTI), students on Tier 2 (standard-protocol) interventions should be monitored 1-2 times per month, for example, while students on Tier 3 (intensive problem-solving protocol) interventions should be monitored at least weekly (Burns & Gibbons, 2008).

Collect data to calculate baseline. The teacher should collect 3-5 data-points prior to starting the intervention to calculate the student's baseline, or starting point, in the skill or behavior that is being targeted for intervention. The student's baseline performance serves as an initial marker against which to compare his or her outcome performance at the end of the intervention. (Also,--because baseline data points are collected prior to the start of the intervention--they collectively can serve as an prediction of the trend, or rate of improvement, if the student's current academic program were to remain unchanged with no additional interventions attempted.). In calculating baseline, the teacher has the option of selecting the median, or middle, data-point, or calculating the mean baseline performance.

Determine the timespan of the intervention. The length of time reserved for the intervention should be sufficient to allow enough data to be collected to clearly demonstrate whether that intervention was successful. For example, it is recommended that a high-stakes intervention last at least 8 instructional weeks (e.g., Burns & Gibbons, 2008).

Set an intervention goal. The teacher calculates a goal for the student that, if attained by the end of the intervention period, will indicate that the intervention was successful.

Decide how student progress is to be summarized. A decision that the teacher must make prior to the end of the intervention period is how he or she will summarize the actual progress-monitoring data. Because of the variability present in most data, the instructor will probably not elect simply to use the single, final data point as the best estimate of student progress. Better choices are to select several (e.g. 3) of the final data points and either select the median value or calculate a mean value. For charted data with trendline, the teacher may calculate the student's final performance level as the value of the trendline at the point at which it intercepts the intervention end-date.

Evaluate the intervention outcome. At the conclusion of the intervention, the teacher directly compares the actual student progress (summarized in the previous step) with the goal originally set. If actual student progress meets or exceeds the goal, the intervention is judged to be successful.

References

Burns, M. K., & Gibbons, K. A. (2008). Implementing *response-to-intervention in elementary and secondary schools*. Routledge: New York.

Witt, J. C., VanDerHeyden, A. M., & Gilbertson, D. (2004). Troubleshooting behavioral interventions. A systematic process for finding and eliminating problems. *School Psychology Review, 33*, 363-383.

Student Intervention: Progress-Monitoring Worksheet

Student: Brian Jones Teacher: Mrs. Braniff Classroom or Course: Gr 3

SET-UP

A. **Identify the Student Problem:** Describe in clear, specific terms the student academic or behavioral problem:
Need to Become Fluent in Multiplication Facts: 0 to 9

B. **Select a Data Collection Method:** Choose a method of data collection to measure whether the classroom intervention actually improves the identified student problem (e.g., curriculum-based measurement, etc.).
Curriculum-Based Measurement: 2-Minute Timed Math Computation Probes
How frequently will this data be collected?: 1 times per Week

BASELINE

C. **Collect Data to Calculate Baseline:** What method from the choices below will be used to estimate the student's baseline (starting) performance? (NOTE: Generally, at least 3-5 baseline data points are recommended.)

☑ From a total of 3 observations, select the median value. ❑ Other: _____

❑ From a total of _____ observations, calculate the mean value. _____

Baseline	
1. Date: 11 / 14 /2011 Obsv: 31	3. Date: 11 / 21 /2011 Obsv: 34
2. Date: 11 / 17 /2011 Obsv: 28	4. Date: ___/___/___ Obsv: _____
	5. Date: ___/___/___ Obsv: _____

Baseline Performance: Based on the method selected above, it is calculated that the student's baseline performance is:
31 Correct Digits in 2 minutes

PROGRESS-MONITORING

D. **Determine Intervention Timespan:** The intervention will last 6 instructional weeks and end on 1 / 13 /2012

E. **Set a Performance Goal:** What goal is the student expected to achieve if the intervention is successful?
At the end of the intervention, it is predicted that the student will reach this performance goal:
40 Correct Digits in 2 minutes

F. **Decide How Student Progress is to Be Summarized:** Select a method for summarizing student progress ('outcome') attained when the intervention ends. S*tudent progress at the end of the intervention is to be summarized by:*

❑ Selecting the median value from the final ____ data-points (e.g.,3).

☑ Computing the mean value from the final 2 data-points (e.g.,3).

❑ [For time-series graphs]: Calculating the value on the graph trend line at the point that it intercepts the intervention end date.

G. **Evaluate the Intervention Outcome:** At the end of the intervention, compare student progress to goal. If actual progress meets or exceeds goal, the intervention is judged successful.

The student's ACTUAL Progress (Step F) is:	42
The PERFORMANCE GOAL for improvement (Step E) is:	40

Progress-Monitoring	
1. Date: 12 / 02 /2011 Obsv: 29	5. Date: 01 / 06 /2012 Obsv: 41
2. Date: 12 / 09 /2011 Obsv: 34	6. Date: 01 / 13 /2012 Obsv: 43
3. Date: 12 / 16 /2011 Obsv: 35	7. Date: ___/___/___ Obsv: _____
4. Date: 12 / 22 /2011 Obsv: 39	8. Date: ___/___/___ Obsv: _____
	9. Date: ___/___/___ Obsv: _____

Student Intervention: Progress-Monitoring Worksheet

Student: _____ Teacher: _____ Classroom or Course: _____

SET-UP

A. **Identify the Student Problem:** Describe in clear, specific terms the student academic or behavioral problem:

_____

B. **Select a Data Collection Method:** Choose a method of data collection to measure whether the classroom intervention actually improves the identified student problem (e.g., curriculum-based measurement, etc.).

_____

How frequently will this data be collected?: _____ times per _____

BASELINE

C. **Collect Data to Calculate Baseline:** What method from the choices below will be used to estimate the student's baseline (starting) performance? (NOTE: Generally, at least 3-5 baseline data points are recommended.)

❑ From a total of _____ observations, select the **median** value.

❑ From a total of _____ observations, calculate the **mean** value.

❑ Other: _____

Baseline	
1. Date: ____/____/____ Obsv: _____	3. Date: ____/____/____ Obsv: _____
2. Date: ____/____/____ Obsv: _____	4. Date: ____/____/____ Obsv: _____
	5. Date: ____/____/____ Obsv: _____

Baseline Performance: Based on the method selected above, it is calculated that the student's baseline performance is:

_____

PROGRESS-MONITORING

D. **Determine Intervention Timespan:** The intervention will last _____ instructional weeks and end on ____/____/____.

E. **Set a Performance Goal:** What goal is the student expected to achieve if the intervention is successful?
At the end of the intervention, it is predicted that the student will reach this performance goal:

_____

F. **Decide How Student Progress is to Be Summarized:** Select a method for summarizing student progress ('outcome') attained when the intervention ends. *Student progress at the end of the intervention is to be summarized by:*

❑ Selecting the **median** value from the final ____ data-points (e.g.,3).

❑ Computing the **mean** value from the final ____ data-points (e.g.,3).

❑ [For time-series graphs]: Calculating the **value on the graph trend line** at the point that it intercepts the intervention end date.

G. **Evaluate the Intervention Outcome:** At the end of the intervention, compare student progress to goal. If **actual progress** meets or exceeds **goal**, the intervention is judged successful.

The student's ACTUAL Progress (Step F) is:	
The PERFORMANCE GOAL for improvement (Step E) is:	

Progress-Monitoring	
1. Date: ____/____/____ Obsv: _____	5. Date: ____/____/____ Obsv: _____
2. Date: ____/____/____ Obsv: _____	6. Date: ____/____/____ Obsv: _____
3. Date: ____/____/____ Obsv: _____	7. Date: ____/____/____ Obsv: _____
4. Date: ____/____/____ Obsv: _____	8. Date: ____/____/____ Obsv: _____
	9. Date: ____/____/____ Obsv: _____

Student: _____ Grade: _____

Teacher: School Year:

Progress-Monitoring (Cont.)

10. Date: ____/____/____ Obsv: _____
11. Date: ____/____/____ Obsv: _____
12. Date: ____/____/____ Obsv: _____
13. Date: ____/____/____ Obsv: _____
14. Date: ____/____/____ Obsv: _____
15. Date: ____/____/____ Obsv: _____
16. Date: ____/____/____ Obsv: _____
17. Date: ____/____/____ Obsv: _____
18. Date: ____/____/____ Obsv: _____
19. Date: ____/____/____ Obsv: _____
20. Date: ____/____/____ Obsv: _____
21. Date: ____/____/____ Obsv: _____
22. Date: ____/____/____ Obsv: _____
23. Date: ____/____/____ Obsv: _____
24. Date: ____/____/____ Obsv: _____
25. Date: ____/____/____ Obsv: _____
26. Date: ____/____/____ Obsv: _____
27. Date: ____/____/____ Obsv: _____
28. Date: ____/____/____ Obsv: _____
29. Date: ____/____/____ Obsv: _____

Progress-Monitoring (Cont.)

30. Date: ____/____/____ Obsv: _____
31. Date: ____/____/____ Obsv: _____
32. Date: ____/____/____ Obsv: _____
33. Date: ____/____/____ Obsv: _____
34. Date: ____/____/____ Obsv: _____
35. Date: ____/____/____ Obsv: _____
36. Date: ____/____/____ Obsv: _____
37. Date: ____/____/____ Obsv: _____
38. Date: ____/____/____ Obsv: _____
39. Date: ____/____/____ Obsv: _____
40. Date: ____/____/____ Obsv: _____
41. Date: ____/____/____ Obsv: _____
42. Date: ____/____/____ Obsv: _____
43. Date: ____/____/____ Obsv: _____
44. Date: ____/____/____ Obsv: _____
45. Date: ____/____/____ Obsv: _____
46. Date: ____/____/____ Obsv: _____
47. Date: ____/____/____ Obsv: _____
48. Date: ____/____/____ Obsv: _____
49. Date: ____/____/____ Obsv: _____

How To: Match a Progress-Monitoring Tool to Every Classroom Problem

Whenever teachers put an academic or behavioral intervention in place for a student, they will also want to collect classroom progress-monitoring data to judge whether that intervention is effective (Witt, VanDerHeyden, & Gilbertson, 2004). For teachers, the six most frequent intervention targets are the following:

1. Academics: Acquisition of basic skills
2. Academics: Fluency in basic skills
3. Academics: Complex skills
4. Academics: Survival skills
5. Behaviors
6. Homework

The table below is designed as a' look-up' resource to help instructors quickly to select appropriate monitoring tools to track the success of academic and behavioral interventions. Under each intervention target are listed one or more data sources that can measure the target--along with information about how to make or find examples of recommended measurement tools.

1. Academics: Acquisition of Basic Skills

What to assess: Basic academic skills are those 'building-block' skills that are the foundation for more advanced learning. When students are just acquiring basic skills, they often are expected to learn a finite set of items--such as letter sounds, multiplication math-facts 0-9, Dolch pre-primer sight word list, or 50 vocabulary terms necessary for success in a biology course. At this acquisition stage of learning, the teacher's measurement objective is to monitor which items the student has mastered from the larger set.

How to assess and where to find materials:
Cumulative mastery log. The simplest way for the teacher to track which items the student has learned from a larger pool is to maintain a cumulative mastery log. First, the teacher develops objective guidelines for judging that a student has mastered an item: e.g., "to know a math-fact, the student must answer the fact correctly from a flash-card within 3 seconds and repeat the feat twice in a row during a session". Then the teacher conducts a baseline assessment. That is, the instructor (1) reviews with the student all items in the larger pool (e.g., letters; multiplication math-facts 0-9, etc.) Using the previously developed guidelines for judging mastery, the teacher (2) identifies and (3) records those items that the student already knows at baseline. Then during the intervention, whenever the student masters an additional item, the teacher logs the item and date acquired. Over time, this log becomes a cumulative, date-stamped record of items acquired by the student.

A tutorial on setting up and using a cumulative mastery log is presented elsewhere in this handout (*How To: Use the Cumulative Mastery Log to Record Progress in the Acquisition Stage of Learning)* along with a sample form.

2. Academics: Fluency in Basic Skills

What to assess: When a student has acquired basic academic skills, the next goal is often to build fluency in those skills. Examples of fluency goals are increasing a student's oral reading speed and working toward automatic recall of math-facts. In this fluency stage of learning, the instructor's measurement objective is to continue to monitor accuracy while also tracking increasing speed of performance.

How to assess and where to find materials:
Curriculum-based measurement. A very useful way to assess a student's growing fluency (as well as accuracy) in foundation academic skills is via curriculum-based measurement (CBM) -- a family of quick assessments of basic academic skills. While CBM covers a wide range of different assessments, all are brief; timed; use standard procedures to prepare materials, administer, and score; and include decision rules to help educators to make appropriate instructional decisions (Hosp, Hosp & Howell, 2007). Examples of CBM include oral reading fluency (1-minute passages that the student reads aloud) and math computation (2-minute math-fact worksheets with the student receiving credit for number of digits computed correctly).

3. Academics: Complex Skills

What to assess: Teachers often find that they must evaluate a student on higher-level academic skills that are multi-dimensional and complex (Moskal, 2000). For example, the Common Core ELA Standard for grade 5-speaking and listening (CCSSELA.5.SL.1) sets the expectation that, in collaborative discussions, the student will come prepared, participate, engage in appropriate turn-taking and follow other discussion rules, etc. Similarly, a standard for grade 4 writing (CCSSELA.4.W.1) presents as a goal that the student will write an opinion essay supporting a specific point of view that includes specific elements such as introductory and concluding statements and supporting details. In both examples, a student may show evidence of at least partial fulfillment of some elements within the standard. So teachers need a flexible evaluation format for rating complex academic skills, one that can handle several dimensions simultaneously, while defining for each dimension a sliding-scale, or continuum, for rating success.

How to assess and where to find materials:
Rubrics. Rubrics are well-suited for measuring a student on complex tasks. In a rubric, the teacher defines the categories that make up the important dimensions of a task, develops exemplars representing mastery for each dimension, and creates a rating scale to be used in evaluating a particular student's work for each dimension (Schafer, Swanson, Bene', & Newberry, 2001).

A detailed description of how to create rubrics for classroom use can be found elsewhere in this handout (*How To: Use Rubrics in Student Assessment*) on student assessment.

4. Academics: Survival Skills

What to assess: Academic survival skills are those global 'academic enablers'--such as time management, study skills, homework completion, note-taking--required to support a strong academic performance (DiPerna, 2006).

How to assess and where to find materials:
Academic survival skills checklists. A global academic survival skill (e.g., study skills) can be made measureable by dividing that overarching category into specific, observable component sub-skills (e.g., maintains clear work space for study; creates a study schedule; allocates adequate time each day for study) to create a checklist. Each element of that checklist can then be verified through direct observation, student interview, and/or examination of student work products.

A series of academic survival skills checklists appears elsewhere in this handout (*How To: Use Checklists to Measure Academic Survival Skills*) on student assessment. Teachers can also create their own customized checklists using a free online application, the Academic Survival Skills Checklist Maker: *http://www.interventioncentral.org/teacher-resources/student-academic-success-strategies-checklist-maker*

5. Behaviors

What to assess: Classroom behaviors are specific, observable behaviors that relate to such categories as general conduct (e.g., remaining in seat, calling out), compliance (e.g., following teacher directives); and academic readiness and engagement (e.g., paying attention to the teacher during a lesson, completing independent seatwork, bringing work materials to class).

How to assess and where to find materials:
Behavior report card. A behavior report card is a type of rating scale that the teacher fills out on a regular basis--e.g., daily-- to rate targeted student behaviors (Riley-Tillman, Chafouleas, & Briesch, 2007). Behavior report cards have several advantages: They are quick to complete, can be customized by the teacher to measure any observable behavior, and are an excellent vehicle for communicating classroom behavioral expectations to students and parents.

A sample behavior report card (*RTI Daily Behavior Report: Guidelines for Use*) appears elsewhere in this handout. Teachers can create their own behavior report cards using the Behavior Report Card Maker, a free online application: *http://www.interventioncentral.org/teacher-resources/behavior-rating-scales-report-card-maker*

Frequency count. In a frequency count, the teacher keeps count of the number of times that the student engages in a target behavior (e.g., number of call-outs; episodes of non-compliance with teacher requests) during an observation period. If frequency-count data are collected across multiple observation periods of the same duration, the teacher can directly compare the data across those observations to look for trends of improvement.

A sample observation sheet for collecting frequent-count data (*Student Self-Monitoring: Frequency Count*) appears later in this handout.

6. Homework

What to assess: Homework can be evaluated in a number of ways. Depending on the nature of the student's presenting problem(s), the teacher may use one or more of the data sources below to track homework timeliness, completion, accuracy, and/or quality.

How to assess and where to find materials:
Existing data. If the teacher's focus is on getting homework turned in reliably and on time, that instructor can use existing data, such as gradebook information about homework submission, to monitor this intervention goal.

Quality: Percentage of work attempted/grade . If the teacher is monitoring the quality of the submitted homework, two simple but useful metrics are (1) an estimate of the amount of work attempted (presented as a percentage of the entire assignment) and (2) homework grades.

Quality: Rubric. Because some homework assignments (e.g., term paper; PowerPoint presentation) are complex and must be rated across several dimensions, the teacher may choose the rubric as an evaluation tool.

A detailed description of how to create rubrics for classroom use can be found elsewhere in this handout.

References

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How To: Use the Cumulative Mastery Log to Record Progress in the Acquisition Stage of Learning

During academic interventions in which the student is newly learning a fixed set of academic items (e.g., math facts, spelling words, sight words, vocabulary terms), the instructor can conveniently track the impact of the intervention by recording and dating mastered items in a cumulative log.

First, the instructor defines the set of academic items to be taught or reviewed during the intervention (e.g., basic multiplication facts from 1-12; pre-primer sight-word list; vocabulary terms for a biology course). Next, the instructor sets criteria for judging when the student has mastered a particular item from the academic item set. (Example: *"A math fact is considered mastered when the student successfully answers that math-fact flashcard within 3 seconds on three successive occasions during a session and repeats this performance without error at the next session.").*

To collect baseline information, the instructor initially reviews all items from the academic-item set with the student--and records which items the student already knows. Then, throughout the intervention, the instructor logs and dates any additional items that the student masters.

The Cumulative Mastery Log that appears on the following pages structures the task of setting up and using a mastery log to track the cumulative results of an academic intervention.

Example: Mrs. Ostrowski, a 1st-grade teacher, decides to provide additional intervention support for Jonah, a student in her class who needs to work on sight-word recognition using a first-grade word list.

- Definition of mastery. Mrs. Ostrowski defines mastery for sight words as follows:
  "When shown a sight word, the student will correctly read that word aloud within 3 seconds, will read the word correctly at least 3 times in a row with no errors in a single session, and will repeat this performance in the next session."

- Baseline data collection. Before starting an intervention, the teacher inventories and records Jonah's baseline skills by reviewing the 41-item first-grade word list. As seen above, the teacher's definition of mastery of sight-words requires that a word cannot be counted as 'known' until the student reads it correctly multiple times across 2 sessions--so the baseline phase also takes 2 sessions to complete. The teacher finds that Jonah can read 21 of the 41 words correctly at baseline.

- Intervention goal. The teacher sets as an intervention goal that Jonah will master all remaining items –20 sight-words—within three weeks.

- Cumulative progress-monitoring. Mrs. Ostrowski then begins the daily intervention: incremental rehearsal of letters using flashcards (Joseph, 2006). Whenever Jonah is able to name a additional previously unknown word from the sight-word list, the teacher records and dates that item in her cumulative mastery log.

References

Joseph, L.M. (2006). Incremental rehearsal: A flashcard drill technique for increasing retention of reading words. *The Reading Teacher, 59*, 803-807.

Academic Skills: Cumulative Mastery Log

Student: _____ School Yr: _____ Classroom/Course: _____

Academic Item Set: Define the set of academic items to be measured (e.g., basic multiplication facts from 1-12; grade 1 sight-word list; vocabulary terms for biology course):

_____

_____

Criteria for Mastery: Describe the criteria for judging when the student has mastered a particular item from the academic item set. (Example: *"A math fact is considered mastered when the student successfully answers that math-fact flashcard within 3 seconds on three successive occasions during a session and repeats this performance without error at the next session."*):

_____

_____

Baseline Skills Inventory: Prior to beginning the intervention, inventory the student's current level of mastery of the skill being measured. (NOTE: Apply the 'criteria for mastery' guidelines written above when completing the baseline skills inventory.)
Person completing the inventory: _____ Date: _____/_____/_____

Item 1: _____	Item 11: _____	Item 21: _____
Item 2: _____	Item 12: _____	Item 22: _____
Item 3: _____	Item 13: _____	Item 23: _____
Item 4: _____	Item 14: _____	Item 24: _____
Item 5: _____	Item 15: _____	Item 25: _____
Item 6: _____	Item 16: _____	Item 26: _____
Item 7: _____	Item 17: _____	Item 27: _____
Item 8: _____	Item 18: _____	Item 28: _____
Item 9: _____	Item 19: _____	Item 29: _____
Item 10: _____	Item 20: _____	Item 30: _____

Academic Intervention: Cumulative Mastery Log

Student: _____ School Yr: _____ Classroom/Course: _____

Cumulative Mastery Log: During the intervention, log each mastered item below with date of mastery. NOTE: Be sure to use the 'criteria for mastery' defined on the first page of this form when judging whether the student has mastered a particular item.

Item 1: _____ Date: ___/___/___	Item 21: _____ Date: ___/___/___
Item 2: _____ Date: ___/___/___	Item 22: _____ Date: ___/___/___
Item 3: _____ Date: ___/___/___	Item 23: _____ Date: ___/___/___
Item 4: _____ Date: ___/___/___	Item 24: _____ Date: ___/___/___
Item 5: _____ Date: ___/___/___	Item 25: _____ Date: ___/___/___
Item 6: _____ Date: ___/___/___	Item 26: _____ Date: ___/___/___
Item 7: _____ Date: ___/___/___	Item 27: _____ Date: ___/___/___
Item 8: _____ Date: ___/___/___	Item 28: _____ Date: ___/___/___
Item 9: _____ Date: ___/___/___	Item 29: _____ Date: ___/___/___
Item 10: _____ Date: ___/___/___	Item 30: _____ Date: ___/___/___
Item 11: _____ Date: ___/___/___	Item 31: _____ Date: ___/___/___
Item 12: _____ Date: ___/___/___	Item 32: _____ Date: ___/___/___
Item 13: _____ Date: ___/___/___	Item 33: _____ Date: ___/___/___
Item 14: _____ Date: ___/___/___	Item 34: _____ Date: ___/___/___
Item 15: _____ Date: ___/___/___	Item 35: _____ Date: ___/___/___
Item 16: _____ Date: ___/___/___	Item 36: _____ Date: ___/___/___
Item 17: _____ Date: ___/___/___	Item 37: _____ Date: ___/___/___
Item 18: _____ Date: ___/___/___	Item 38: _____ Date: ___/___/___
Item 19: _____ Date: ___/___/___	Item 39: _____ Date: ___/___/___
Item 20: _____ Date: ___/___/___	Item 40: _____ Date: ___/___/___

How To: Use Rubrics in Student Assessment

When a teacher attempts to judge whether a student has attained a particular Common Core State Standard, the instructor must evaluate some aspect of that student's *performance*. Such a performance may be observed directly or in the indirect form of work products or other artifacts. Some types of schoolwork easily lend themselves to a simple quantitative scoring approach: for example, a solution to a math computation problem is either correct ('1') or incorrect ('0'). Many types of academic performance, however, are more complex and require that the student master several domains that in sum create a quality product. A research paper, for example, can be judged of high quality only if the writer shows skill in such dimensions as word choice, organization, selection and summary of sources, and use of the writing-revising process--among others.

Rubrics are a useful classroom method for evaluating complex, multi-dimensional tasks. In education, a widely used type of rubric is the *analytic* rubric (Moskal, 2000). To develop an analytic rubric, the teacher first describes the global performance task to be assessed. The teacher then defines the categories that make up the important dimensions of that task, develops exemplars representing mastery for each dimension, and creates a rating scale to be used in evaluating a particular student's work for each dimension (Schafer, Swanson, Bene', & Newberry, 2001).

Rubrics share similarities with checklists as observational instruments to measure academic performance. A checklist, though, is optimal for binary 'yes/no' situations when the instructor is simply confirming that an element of student performance or work product is either adequate or inadequate--e.g., the student's essay includes a title page/ contains at least 5 paragraphs/ includes 4 research sources. A rubric is the measure of choice when a dimension of academic performance can vary widely in quality from student to student--e.g., the organization of an essay or evidence of preparation for an oral presentation (Allen, 2004).

Rubrics have a number of advantages as a classroom assessment tool (Allen, 2004). They allow teachers to develop objective and consistent scoring criteria for complex student tasks, thus speeding assessment and improving the reliability of the evaluation. Rubrics can also provide clear guidance of work-expectations before the student begins the academic task, potentially eliminating confusion and increasing student self-confidence and motivation. Using a rubric, students can also evaluate their own work, helping them to internalize high standards of excellence and boosting motivation further via immediate performance feedback. As mentioned earlier, rubrics are also criterion-referenced: they set an absolute standard against which all students are to be assessed. In light of the fact that many schools have adopted the expectation that all learners will attain the Common Core State Standards, rubrics are a helpful classroom tool to evaluate on an ongoing basis whether specific students are on track to attain these ambitious learning goals.

Creating a Rubric in 4 Steps. Here are the steps to constructing a teacher-made analytic rubric (Allen, 2004; Moskal, 2000):

1. *Describe the task*. The teacher describes the academic performance task to be evaluated using the rubric. Examples might include an argumentative essay, oral presentation, participation in a discussion group, or conducting and documenting an in-class science experiment. The task description is a straightforward account of what the student is to do (and what product is to be created) but does not include quality indicators. NOTE: The Common Core State Standards contain summaries of academic expectations in English Language Arts and Mathematics tasks that can readily be turned into grade-appropriate rubric task descriptions.

2. *Define the dimensions that make up the task.* Next, the important component elements that make up the academic performance task are defined. This step is similar to a task analysis; the teacher lists the important component dimensions that are to be evaluated. For example, a teacher who wants to create a rubric to evaluate short research papers (task) may decide to divide the global writing task into 4 key dimensions: Word Choice, Details, Revision Process, and Use of Sources.

3. *Develop a rating scale.* The teacher develops a 3-5 level rating scale to evaluate student performance on each of the previously defined dimensions of the rubric. The teacher also devises a plain-English labeling system for the levels: e.g. "Needs work/competent/exemplary"; "Accomplished/average/ developing/beginning".

   As an option, teachers can include point amounts or point ranges to accompany the rating scale. For example, an instructor may create a rating scale like the following: "Proficient (7-9 pts)/Intermediate (4-6 pts)/Beginning (1-3 pts)" In this rating scheme, each qualitative label is tied to a point range, allowing the instructor discretion regarding the number of points that can be awarded for each dimension.

4. *Provide descriptions of each dimension.* The teacher writes objective descriptions of student performance on each dimension that match the levels of the rating scale.

   A rubric for short research papers, for example, includes the dimension Word Choice. The teacher adopts a 3-level rating scale: 'Exemplary', 'Competent', and 'Needs Work'. At the high end of the scale, under 'Exemplary', the teacher describes Word Choice performance as: *The essay uses precise language throughout in descriptions and the presentation of ideas. It employs domain-specific vocabulary in most or all instances where appropriate.* In contrast, the same teacher describes Word Choice performance at the low end of the scale under 'Needs Work' as: *The essay uses general or vague language in descriptions and the presentation of ideas. It seldom or never employs examples of domain-specific vocabulary.*

Rubric Example: Student Discussion Group. A teacher is interested in assessing students' attainment of the Common Core ELA Speaking and Listening Standard for Grade 5 (CCSSELA.5.SL.1), which outlines expectations for participation in discussion groups. Using this Standard as a starting point, the teacher creates the following analytic rubric with a 3-item scale:

Analytic Rubric: 'Student Discussion Group' Example			
Task: The student will take part in weekly in-class collaborative peer discussions of assigned readings, contributing ideas and responding appropriately to the ideas of others (from CCSSELA.5.SL.1).			
Dimensions	Needs Work (1-3 pts)	Competent (4-6 pts)	Exemplary (7-9 pts)
Preparation	Has not completed the assigned readings and/or does not bring notes of the readings to the discussion..	Has completed the assigned reading(s) and brings notes of the readings to the discussion.	Has completed the assigned reading(s), brings notes of the readings to the discussion, and gives evidence of having done additional reading/research in the discussion topic.
Compliance With Discussion Rules/Roles	Fails to follow the rules set up for the discussion activity and/or does not adequately carry out the responsibilities of an assigned discussion role.	Follows the rules set up for the discussion activity. When assigned a role in discussion, adequately carries out the responsibilities of that role.	Follows the rules set up for the discussion activity. When needed, reminds others to adhere to discussion rules. When assigned a formal role

			(e.g., discussion leader), fully carries out the responsibilities of that role.
Contribution to Discussion	Does not actively sustain his or her part in the discussion. May pose questions of limited relevance to the discussion topic. May not respond appropriately to the comments of others.	Poses questions relevant to the discussion topic and responds appropriately to the comments of others. Remarks display a willingness to acknowledge the contributions of others in the discussion group,	Participates fully in the discussion. Poses questions relevant to the discussion topic and responds appropriately to the comments of others. Remarks display a good grasp of the topic and a willingness to acknowledge the contributions of others in the discussion group,

Rubrics: Additional Considerations. When developing and using rubrics for student assessment, teachers should keep these additional considerations in mind:

1. *Combine rubrics with quantitative academic information*. When feasible, consider pairing rubrics with quantitative data to have a more complete picture of academic performance. For example, a teacher working with a reluctant writer develops a rubric to track improvements in the quality of written expression. In addition, though, the instructor charts the word-count for each essay, with the goal of encouraging the student to write longer compositions.

2. *When using rubrics, ignore the curve.* Traditionally in schools, teachers have often graded on a curve, that is, they have plotted the range of student grade outcomes along a normal curve and awarded only a relative handful of high grades. Rubrics, however, do not fit on a curve, as they are a version of criterion-referenced performance goals that include clear, observable definitions of 'mastery' (Schafer, Swanson, Bene', & Newberry, 2001). It is possible, in fact highly desirable, that most or all students in a class might attain rubric ratings in the 'acceptable' or 'exceptional' range, because they are competing against specific, observable, attainable standards rather than against each other (Allen, 2004).

References

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Schafer, W. D., Swanson, G., Bene', N., & Newberry, G. (2001). Effects of teacher knowledge of rubrics on student achievement in four content areas. *Applied Measurement in Education, 12*(2), 151-170.

How To: Use Checklists to Measure Academic Survival Skills

Students who hope to achieve success on the ambitious Common Core State Standards must first cultivate a set of general 'academic survival skills' that they can apply to any coursework (DiPerna, 2006). Examples of academic survival skills include the student's ability to study effectively, be organized, and manage time well.

When academic survival skills are described in global terms, though, it can be difficult to define them. For example, two teachers may have different understandings about what the term 'study skills' means. A solution is to complete a 'task analysis' of a given global academic-survival skill, dividing that larger skill into a checklist of component sub-skills (Kazdin, 1989). (Review the set of academic survival skills checklists appearing later in this article for examples of what these component-skills checklists look like.)

With a checklist in hand that breaks a global academic survival skill into components, a teacher can judge whether a student possesses those essential building-block strategies that make up a larger global 'survival skills' term. Teachers have access to good sources of information to verify what academic survival skills a student possesses, including direct observation; interviews (of the student, past teacher, or parent); and student work products.

TIP: Teachers can access a *free* web application to create customized student-skill checklists. The *Academic Survival Skills Checklist Maker* provides a starter set of strategies to address homework, note-taking, organization, study, test-taking, and time management. Teachers can use the application to create and print customized checklists and can also save their checklists online. This application is available at: http://www.interventioncentral.org/tools/academic-survival-skills-checklist-maker

Schools can find a number of valuable uses for 'academic survival skills' checklists, including the following:

1. *Consistent expectations among teachers.* Teachers at a grade level, on an instructional team, or within an instructional department can work together to develop checklists for essential global academic-survival skills. As teachers collaborate to create these checklists, they reach agreement on the essential skills that students need for academic success and can then consistently promote those skills across their classrooms.

2. *Proactive student skills training.* One excellent use of these checklists is as a classwide student training tool. At the start of the school year, teachers can create checklists for those academic survival skills in which students are weak (e.g., study skills, time management) and use them as tools to train students in specific strategies to remediate these deficiencies. Several instructors working with the same group of students can even pool their efforts so that each teacher might be required to teach a checklist in only a single survival-skill area.

3. *Student skills self-check*. Teachers can use academic survival-skills checklists to promote student responsibility. Students are provided with master copies of checklists and encouraged to develop their own customized checklists by selecting and editing those strategies likely to work best for them. Instructors can then hold students accountable to consult and use these individualized checklists to expand their repertoire of strategies for managing their own learning.

4. *Monitoring progress of academic survival-skills interventions*. Often, intervention plans developed for middle and high school students include strategies to address academic survival-skill targets such as homework completion

or organization. Checklists are a good way for teachers to measure the student's baseline use of academic survival skills in a targeted area prior to the start of the intervention. Checklists can also be used to calculate a student outcome goal that will signify a successful intervention and to measure (e.g., weekly) the student's progress in using an expanded range of academic survival-skills during the intervention period.

For example, a teacher may develop a checklist (like that appearing in Table 1) outlining 11 sub-skills that define her expectations for 'study skills'. Through interview, direct observation, and examination of student work products, the teacher ascertains that the student reliably used 7 of the 11 skills during baseline. She sets the outcome goal that--at the conclusion of a 5-week intervention period--the student will reliably use all 11 of those study sub-skills. Once per week during the intervention, the teacher meets with the student to review the checklist, record which additional study skills-if any--the student is now using, and chart this growth on a simple visual graph.

5. *Parent conferences.* When teachers meet with parents to discuss student academic concerns, academic survival-skills checklists can serve as a vehicle to define expected student competencies and also to decide what specific school and home supports will most benefit the student. In addition, parents often appreciate receiving copies of these checklists to review with their child at home.

When students struggle with global academic survival skills such as study, organization, or time management, those deficits can seem so all-encompassing as to inspire a sense of helplessness. In contrast, targeted and prescriptive checklists (such as those described here) that outline practical strategies to enhance school survival skills can serve as a tool to focus and empower teachers, parents, and students to accomplish the shared goal of turning every student into a effective, self-managing learner.

References

DiPerna, J. C. (2006). Academic enablers and student achievement: Implications for assessment and intervention services in the schools. Psychology *in the Schools, 43*, 7-17.

Kazdin, A. E. (1989). Behavior modification in applied settings (4th ed.). Pacific Gove, CA: Brooks/Cole.

SAMPLE ACADEMIC SURVIVAL SKILLS CHECKLIST: STUDY SKILLS

This form includes (1) your selected Academic Survival Skill Checklist items, (2) a column to verify whether the student possesses each survival skill (Y/N), and (3) a column to list the information used to verify each skill (Observation/Interview/Work Product).

Academic Survival-Skill Checklist	Student Displays Skill? (Y/N)	Data Source? (Observation/Interview /Work Product)
❑ MAINTAIN A STUDY SCHEDULE. Maintain a regular (e.g., daily) study schedule with sufficient time set aside to review course content and information.		
❑ AVOID DISTRACTERS. When studying, avoid distracters (e.g., cell phone, television, Internet) that can erode study time and divert attention.		
❑ CREATE AN ORGANIZED STUDY SPACE. Prepare the study environment by organizing a space and setting out all necessary work materials before beginning study.		
❑ SET STUDY GOALS. Prior to a study session, define one or more specific study goals to accomplish (e.g., to review information for an upcoming quiz; to locate key information to include in an essay).		
❑ MAKE A STUDY AGENDA. If studying multiple subjects in one session, create a study agenda for that session with a listing of the key information to be reviewed for each subject and the time allocated for that review.		
❑ DO THE TOUGH STUDY WORK FIRST. Tackle the most difficult or challenging study objectives first during study sessions, when energy levels and ability to concentrate are at their peak.		
❑ VARY ACTIVITIES. Mix up study activities during a study session (e.g., alternating between reading and writing) to maintain engagement and interest.		
❑ CHUNK A LARGE STUDY TASK INTO SMALLER UNITS. If studying a large amount of material in a single session, 'chunk' the material into smaller units and take short breaks between each unit to maintain focus.		
❑ TEACH CHALLENGING CONTENT. When studying complex or challenging material,		

assume the role of instructor and attempt to explain or describe the material to a real or imagined listener. Teaching study material is an efficient way to verify understanding.		
❑ HIGHLIGHT QUESTIONS. When reviewing notes or completing course readings, use highlighters, margin notes, sticky notes, or other notation methods to flag questions, unknown vocabulary terms, or areas of confusion for later review with teacher or tutor.		
❑ SEEK HELP WHEN NEEED. Approach the teacher or tutor for help as needed to answer questions or clear up areas of confusion identified during study sessions.		
❑ AVOID CRAM SESSIONS. Stay away from all-night cram sessions before major tests. Cram sessions are ineffective because they are inefficient and often leave students exhausted and unable to perform their best on exams. Instead, distribute study and test-review time across multiple days and consider allocating an upward limit of about 1 hour per study session to maintain focus and energy.		

RTI Daily Behavior Report: Guidelines for Use

The RTI Daily Behavior Report (RTI-DBR) is a brief form that educators can use to rate student classroom conduct and work-related behaviors on a daily basis.
Daily Behavior Reports in general have several advantages that make them idea for use in monitoring student interventions (Chafouleas, Riley-Tillman, & Sugai, 2007): They are familiar and acceptable to most school staff, are a convenient assessment tool for busy teachers, and can be used both to better understand students' behavioral needs and to track student progress during a classroom intervention.

Directions. When finished working with the student each day, the educator responsible for completing the RTI-DBR completes each rating item on the form. There are sufficient rating columns on one form to rate a student each day for an entire instructional week. The rater can also write daily comments on the back of the form.
An additional option is for the educator to send a copy of the completed rating form home each week for the student's parent to review, sign, and return.

Tips to Increase the Reliability of Daily Behavior Reports. Daily Behavior Reports can be good sources of teacher information about student behaviors. When an educator's ratings on Behavior Reports are based solely on subjective impression, however, it is possible that the rater will apply inconsistent standards each day when rating student behaviors (Chafouleas, Riley-Tillman, & Sugai, 2007). This inconsistency in assessment can reduce the usefulness of Daily Behavior Report information. An approach that educators can follow to keep their ratings on the RTI-DBR consistent and objective over time is to come up with specific, objective criteria for rating each behavioral goal. In particular, the rater will want to:

- Keep in mind student developmental considerations. For example, consider this RTI-DBR item: *The student was respectful to the teacher and other adults and complied with their requests in a timely manner*. The definition of a student being " respectful to the teacher and other adults" may mean "without throwing a tantrum" for a kindergarten student but mean "without defiant talking-back" for a student in middle school.

- Tie RTI-DBR ratings to classroom behavioral norms. For each behavioral goal, the teacher may want to think of what the typical classroom norm is for this behavior and assign to the classroom norm a specific number rating. The teacher may decide, for instance, that the target student will earn a rating of 7 ('Usually/Always') each day that the student's compliance with adult requests closely matches that of an 'average' child in the classroom.

Reference

Chafouleas, S., Riley-Tillman, T. C., & Sugai, G. (2007). *School-based behavioral assessment: Informing intervention and instruction.* Guilford Press: New York.

Student Daily Behavior Report

Student Name:_____ Grade: _____

Person Completing This Report Card: _____

Directions: At the end of the school day or class period, rate the student on the behaviors below. Write your ratings into the appropriate box on the right of the page and record the *date* of each rating. You may also write daily comments about the student's behavior on the back of this sheet.

Student Behaviors	MON __/__/__	TUES __/__/__	WED __/__/__	THURS __/__/__	FRI __/__/__
The student got along with classmates and used socially appropriate behaviors. 1 2 3 | 4 5 6 | 7 8 9 Never/Seldom Sometimes Most/All of the Time					
The student was respectful to the teacher and other adults and complied with their requests in a timely manner. 1 2 3 | 4 5 6 | 7 8 9 Never/Seldom Sometimes Most/All of the Time					
The student paid attention to teacher instructions and classroom lessons and focused on his/her work assignments. 1 2 3 | 4 5 6 | 7 8 9 Never/Seldom Sometimes Most/All of the Time					
The student completed and turned in classwork and homework assignments. 0-19% 20-39% 40-59% 60-79% 80-100%					
(Optional Behavior) _____ _____ 1 2 3 | 4 5 6 | 7 8 9 Never/Seldom Sometimes Most/All of the Time					

Parent Sign-Off (Optional): I have reviewed this Behavior Report Card and discussed it with my child.

Parent Signature: _____ Date: _____

Daily Behavior Report: Optional Comments

Monday--Date: _____

Comments: _____

_____

_____

Tuesday-- Date: _____

Comments: _____

_____

_____

Wednesday-- Date: _____

Comments: _____

_____

_____

Thursday-- Date: _____

Comments: _____

_____

_____

Friday-- Date: _____

Comments: _____

_____

_____

Student Daily Behavior Report: Progress-Monitoring Chart

Directions: Plot daily teacher DBRC ratings and summarize notable teacher comments on the progress-monitoring charts below.

Student Name:

Start Date: Wk 1: ___ / ___ / ___ Wk 2: ___ / ___ / ___ Wk 3: ___ / ___ / ___ Wk 4: ___ / ___ / ___

The student got along with classmates and used socially appropriate behaviors.

		M T W Th F	M T W Th F	M T W Th F	M T W Th F	
Usually/Always	9	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	Usually/Always
	8	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
	7	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
Sometimes	6	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	Sometimes
	5	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
	4	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
Never/Seldom	3	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	Never/Seldom
	2	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
	1	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
		M T W Th F	M T W Th F	M T W Th F	M T W Th F	

The student was respectful to the teacher and other adults and complied with their requests in a timely manner.

		M T W Th F	M T W Th F	M T W Th F	M T W Th F	
Usually/Always	9	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	Usually/Always
	8	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
	7	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
Sometimes	6	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	Sometimes
	5	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
	4	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
Never/Seldom	3	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	Never/Seldom
	2	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
	1	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
		M T W Th F	M T W Th F	M T W Th F	M T W Th F	

The student paid attention to teacher instructions and classroom lessons and focused on his/her work assignments.

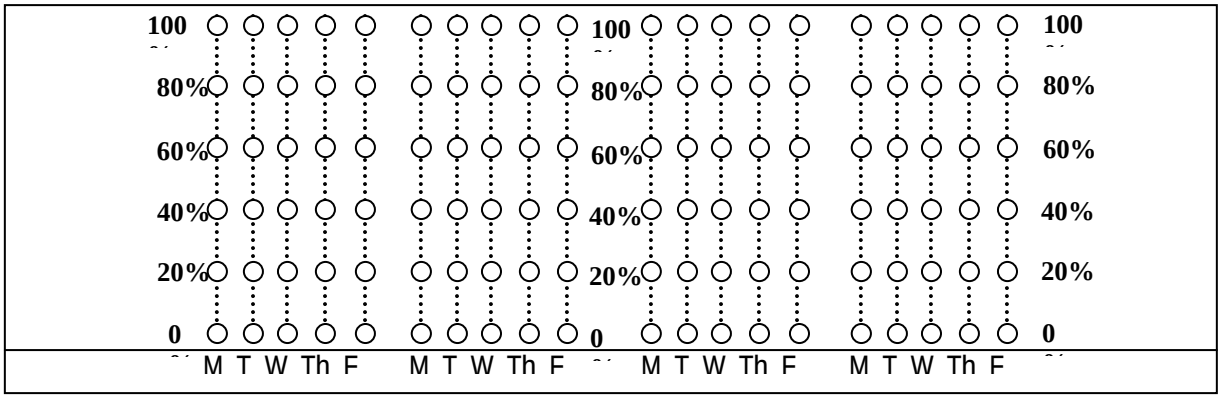
		M T W Th F	M T W Th F	M T W Th F	M T W Th F	
Usually/Always	9	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	Usually/Always
	8	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
	7	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
Sometimes	6	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	Sometimes
	5	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
	4	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
Never/Seldom	3	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	Never/Seldom
	2	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
	1	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	○ ○ ○ ○ ○	
		M T W Th F	M T W Th F	M T W Th F	M T W Th F	

Student Name:

Start Date: Wk 1: ___ / ___ / ___ Wk 2: ___ / ___ / ___ Wk 3: ___ / ___ / ___ Wk 4: ___ / ___ / ___

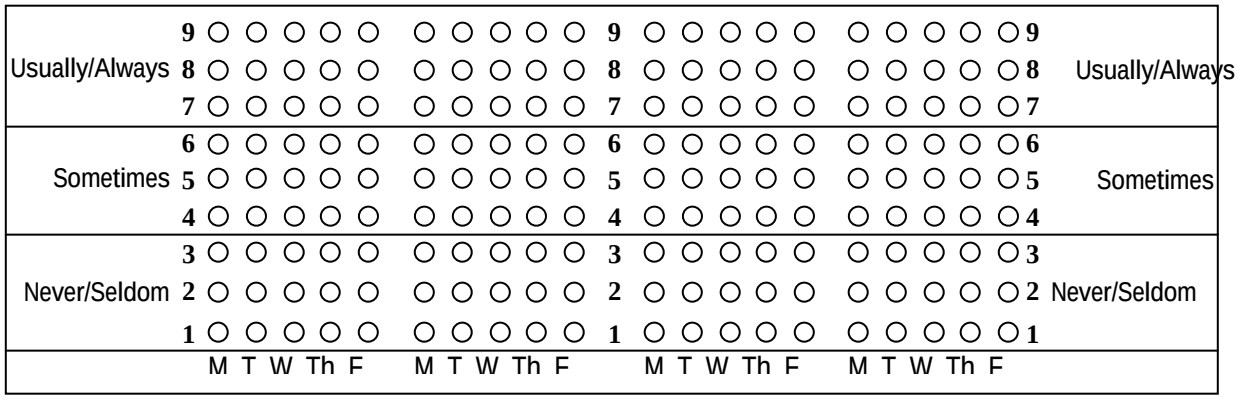
M T W Th F M T W Th F M T W Th F M T W Th F

The student completed and turned the following percentage of classwork and homework assignments.



[Optional Behavior]: _____

_____



Summary of Significant Teacher Comments:

Date: ____ Comment:

_____

Date: ____ Comment:

_____

Date: ____ Comment:

_____

Date: ____ Comment:

_____

Student Name: _____ Grade/Classroom: _____

Student Self-Monitoring: Frequency Count

A frequency count is a recording of the number of times that a you engaged in a behavior during a specific time-period (e. g., during a class period). Frequency counts can be used to track behaviors that you want to increase or decrease.

How to Use This Frequency-Count Form. With this frequency count form, you record each occurrence of the behavior with a tally-mark ('/'). At the end of the time-period, you add up the tally-marks to get a total sum of behaviors for that observation session.

How to Set Up the Frequency-Count Form: Follow these steps to prepare the frequency-count form:

- *Define the Target Frequency-Count Behavior.* In the space below, describe the behavior that you will measure using a frequency count. (Here are some examples: "leaving my seat without teacher permission", "completing a math problem", "requesting teacher help", "talking with other students about off-task topics"):

  Target Behavior to Measure: _____

- *Choose a Schedule for Conducting the Frequency Count.* Decide when you will use the frequency-count form to track the target behavior:

  I plan to conduct the frequency count at the following time(s) and/or during the following activitie(s):

  _____.

1	Tally Box: Write a mark ('/') in this box each time the target behavior occurs:		Total Behaviors for Session
Date: ___/___/___		>	

2	Tally Box: Write a mark ('/') in this box each time the target behavior occurs:		Total Behaviors for Session
Date: ___/___/___		>	

3	Tally Box: Write a mark ('/') in this box each time the target behavior occurs:		Total Behaviors for Session
Date: ___/___/___		>	

4	Tally Box: Write a mark ('/') in this box each time the target behavior occurs:		Total Behaviors for Session
Date: ___/___/___		>	

5	Tally Box: Write a mark ('/') in this box each time the target behavior occurs:		Total Behaviors for Session
Date: ___/___/___		>	

How To: Set Off-Level Academic Goals for Reading Fluency

Students with *significant* deficits in reading fluency can present particular challenges as teachers attempt to match them to appropriate academic interventions. Often, these more intensive interventions are 'off-level'; that is, they target academic skills that are well below the student's grade placement.

If that student has significant academic delays , it might be a mistake, however, to measure the student using only assessments from the student's grade of record. The problem with monitoring the progress of an off-level student using only assessments from the current grade level is that these assessments could prove so difficult that they fail to show the true gains that the student is making on the off-level intervention. For students with significant academic delays, then, the school must follow sensible and consistent guidelines for matching those students to appropriate supplemental off-level interventions, for setting performance goals, and for measuring their academic progress that will both benefit the student and accurately reflect actual student growth.

The remainder of this article describes how the formulation of academic goals in reading fluency for students who receive 'off-level' supplemental interventions will always contain the four universal goal-setting elements described above—but includes special instructions for estimating typical peer performance and expected weekly progress for this group.

Below is a 6-step process adapted from Shapiro (2008) for finding the optimal 'off-level' grade for monitoring a student with substantial reading fluency delays, for setting progress-monitoring goals for that student, and for adjusting periodically the student's intervention and monitoring to reflect growth in student skills:

1. Obtain Research-Derived Academic Screening Norms With Percentile Cut-Points. The process of finding a student's appropriate off-level placement in academic intervention begins with the school selecting a set of research-derived academic screening norms. These norms should include values for fall, winter, and spring of each grade and should be broken down into percentile cut-offs (e.g., norms at the 10th percentile, 25th percentile, 50th percentile, etc.). Commercially available screening packages such as AIMSweb (http://www.aimsweb.com) provide such norms. Or schools can go to other sources to obtain research norms with percentile cut-points for reading fluency (e.g., Tindal & Hasbrouck, 2005; EasyCBM, 2010) and additional academic areas (e.g., EasyCBM, 2010).

   Case Example: Mrs. Chandler is a 4th-grade teacher in a school whose district has adopted AIMSweb literacy screening tools. The district selected AIMSweb in part because the product includes national norms spanning elementary and middle-school grades that are divided into percentile cut-offs at each grade level.

2. Determine Cut-Points on Research Norms That Indicate Optimal Instructional Placement. Research norms with percentile cut-offs are essential for deciding a student's appropriate instructional match for supplemental intervention. When reviewing its research-derived screening norms, the school sets percentile cut-offs that designate appropriate instructional placement and mastery at each grade level. Shapiro (2008) recommends that, when consulting research norms at any grade level:

   - the 25th percentile serve as the cut-point for determining that a student has the *minimum* academic skills needed to experience success in that material. (Please note, though, that norms from other popular academic screening tools –e.g., easyCBM.com—set the 20th percentile as the minimum-skills cut-point.)

- the 50th percentile should serve as the cut-point for defining that the student has attained 'mastery' on the grade-level academic skill.

Case Example: Using the AIMSweb norms, Mrs. Chandler's school decides that when assessed on literacy screening tools at any grade level, a student will be considered as falling within the instructional range if he or she performs within the 25th to 49th percentile and as having achieved mastery if he or she performs at or above the 50th percentile.

3. Find the Target Student's Optimal 'Off-Level' Instructional Match Through a 'Survey-Level' Assessment. The school must next find the struggling student's appropriate 'instructional match'—the level of task difficulty that will allow the student to experience sufficient success on off-level interventions while also ensuring a monitoring plan that can accurately track the student's true growth on that intervention. The process used to find the student's instructional match is called a 'survey-level' assessment.

   The school administers to the target student a series of standardized curriculum-based measures (CBMs) in the area of academic concern. These CBMs start at the level of the student's current grade placement and work downward, testing the student at successively earlier grade levels.

   For each grade-level CBM administered, the teacher scores that 'off-level' CBM and compares the student results to research norms.

   - If the student performs *at or above* the 25th percentile with materials drawn from a particular 'off-level' grade, the teacher judges that the student is likely to experience a good match using intervention and assessment materials at this grade level—and the Survey Level Assessment ends here.

   - However, if the student performs *below* the 25th percentile, it is judged that material at that lower, 'off-level' grade is too challenging for use in monitoring the student's progress on intervention. The teacher instead continues to administer CBMs from successively earlier grade levels, stopping only at the grade-level at which the student performs at or above the 25th percentile according to the research norms.

   Case Example: In January, Mrs. Chandler reviews her classwide reading fluency screening results. She notes that a student who has recently transferred to her classroom, Randy, performed at 35 Words Read Correct (WRC) on the 1-minute AIMSweb Grade 4 fluency probes.

   Mrs. Chandler consults AIMSweb reading-fluency research norms and finds that a reasonable minimum reading rate for students by winter of grade 4 (25th percentile) is 89 WRC. Because Randy's reading fluency rate is so far below the grade-level norms (a gap of 54 WRC), his teacher decides to conduct a Survey Level Assessment to find the student's optimal grade level placement for supplemental reading instruction.

   - *On Grade 3-level probes, Randy attains a median score of 48 WRC. The AIMSweb winter norm (25th percentile) for a 3rd grade student is 69 WRC. The student is still in the 'frustration' range and the Survey Level Assessment continues.*

   - *On Grade 2-level probes, Randy attains a median score of 64 WRC. The AIMSweb winter norm (25th percentile) for a 2nd grade student is 53 WRC. Because Randy's Grade 2 WRC score exceeds the 25th percentile cut-point, the student is now in the 'instructional' range and the Survey Level Assessment ends.*

4. Determine an 'Off-Level' Progress-Monitoring Goal Based on Norms. To set an intervention progress-monitoring goal, the teacher looks up and uses the academic performance norm for the 50th percentile at the student's off-level 'instructional' grade level previously determined through the Survey Level Assessment.

   Case Example: To find the progress-monitoring goal for Randy, his teacher Mrs. Chandler looks up the benchmark Words Read Correct (WRC) for the 50th percentile on the winter screening norms at Grade 2 (Randy's off-level 'instructional' grade level)—which is 79 WRC. This becomes the progress-monitoring goal for the student.

5. Translate the Student's Long-Term Progress-Monitoring Goal into Weekly Increments. The teacher's final task before beginning to monitor the student's progress on intervention is to translate the student's ultimate intervention goal into 'ambitious but realistic' weekly increments. A useful method (Shapiro, 2008) for determining weekly growth rates is to start with research-derived growth norms and to then use a 'multiplier' to make the expected rate of weekly growth more ambitious.

   The teacher first looks up the average rate of weekly student growth supplied in the research norms.

   - If available, a good rule of thumb is to use the growth norms for the 50th percentile at the 'off-level' grade at which the student is receiving intervention and being monitored.

   - If a screening tool's academic-performance norms do not also include growth norms, schools can compute the 'typical' rate of weekly progress for any grade-level by (1) subtracting the fall screening results (50th percentile) for the off-level grade from the spring screening results (50th percentile) and (2) dividing the difference by 32--representing the typical 32 weeks that separate fall and spring screenings in most schools. The resulting quotient represents 'average' expected rate of student progress per instructional week on that academic screening measure at that grade level.

     The teacher then multiplies this grade norm for weekly growth by a multiplier whose value falls between 1.5 and 2.0 (Shapiro, 2008). Because the original weekly growth rate represents only a typical rate of academic improvement, this multiplier is used to boost the target student's weekly growth estimate to a point at which learning is accelerated and the gap separating that student from peers will likely close if the intervention is successful.

   Case Example: Randy, the 4th-grade student, is to be monitored on intervention at grade 2. Mrs. Chandler finds—using AIMSweb norms—that a typical student in Grade 2 (at the 50th percentile) has a rate of improvement of 1.1 Words Read Correct (WRC) per week. Based on her own judgment, Mrs. Chandler selects 1.8 as her multiplier—although any figure between 1.5 and 2.0 would be acceptable. She multiplies the 1.1 WRC figure by 1.8 to obtain an ambitious weekly growth goal for Randy of about 2.0 additional WRCs.

   Randy's ultimate 'graduation goal' that would allow him to advance beyond grade 2 as his supplemental intervention level is 79 WRC (the 50th percentile norm for grade 2). During the Survey Level Assessment, Randy was found to read 64 WRC at the 2nd grade level. There is a 15-WRC gap to be closed to get Randy to his goal. At a growth rate of 2 additional WRC per week during the intervention, Randy should close the gap within about 8 instructional weeks.

6. Advance the Student to Higher Grade Levels for Intervention & Progress-Monitoring. The teacher monitors the student's growth in the target academic skill at least once per week (twice per week is ideal). When, according to the research norms for his or her off-level grade, the student's performance exceeds the 50th percentile, this triggers a teacher reassessment of the student's academic skills at the *next higher grade*, again using the research-based norms. If the student performs at or above the 25th percentile on probes from that next grade level, the teacher can move the student up with confidence and begin to monitor at the higher grade level. The process repeats until the student eventually closes the gap with peers and is being monitored at grade of placement.

   Case Example: His teacher, Ms. Chandler, notes that after 7 weeks of intervention, Randy is now reading 82 Words Read Correct (WRC)—exceeding the 79 WRC for the 50th percentile of students in Grade 2 (winter norms). So Mrs. Chandler assesses Randy on AIMSweb reading fluency probes for Grade 3 and finds that he reads on average 72 WRC —exceeding the 3rd grade 25th percentile cut-off of 69 WRC. Therefore, Randy is advanced to Grade 3 progress-monitoring and his intervention materials are adjusted accordingly.

Recommendations for using this approach: Research norms for student performance and academic growth are the 'gold standard' in off-level goal-setting, as they provide fixed, external standards for proficiency that are not influenced by variable levels of student skill in local classrooms. When setting academic goals for struggling students, schools should use research norms whenever they are available. In particular, research norms should be used for high-stakes RTI cases that may be referred at some point to the Special Education Eligibility Team.

References

EasyCBM: (2010). *Interpreting the EasyCBM progress monitoring test results*. Retrieved from http://www.easycbm.com/static/files/pdfs/info/ProgMonScoreInterpretation.pdf

Hasbrouck, J. & Tindal, G. (2005).*Oral reading fluency: 90 years of measurement* [Technical report #33]. Eugene, OR: University of Oregon.

Shapiro, E. S. (2008). Best practices in setting progress-monitoring monitoring goals for academic skill improvement. In A. Thomas & J. Grimes (Eds.), *Best practices in school psychology V* (pp. 141-157). Bethesda, MD: National Association of School Psychologists.

Curriculum-Based Measurement: Reading

CBM-Oral Reading Fluency assesses general reading performance, as well as reading speed. In an oral reading fluency assessment, the student reads aloud from a passage for 1 minute. The reading sample is scored for words read correctly (WRC) and errors.

Grade	Percentile	Winter Oral Reading Fluency Norms (AIMSweb, 2007)	Weekly Growth Rates (AIMSweb, 2007)
2	50th%	79	1.1
	25th%	53	1.1
	10th%	25	0.8
3	50th%	98	0.9
	25th%	69	0.9
	10th%	42	0.6
4	50th%	114	0.8
	25th%	89	0.8
	10th%	62	0.7

Source: AimsWeb National Norms Table. (2007).

The Intervention Central Guide to: Setting Up and Interpreting Time-Series Charts

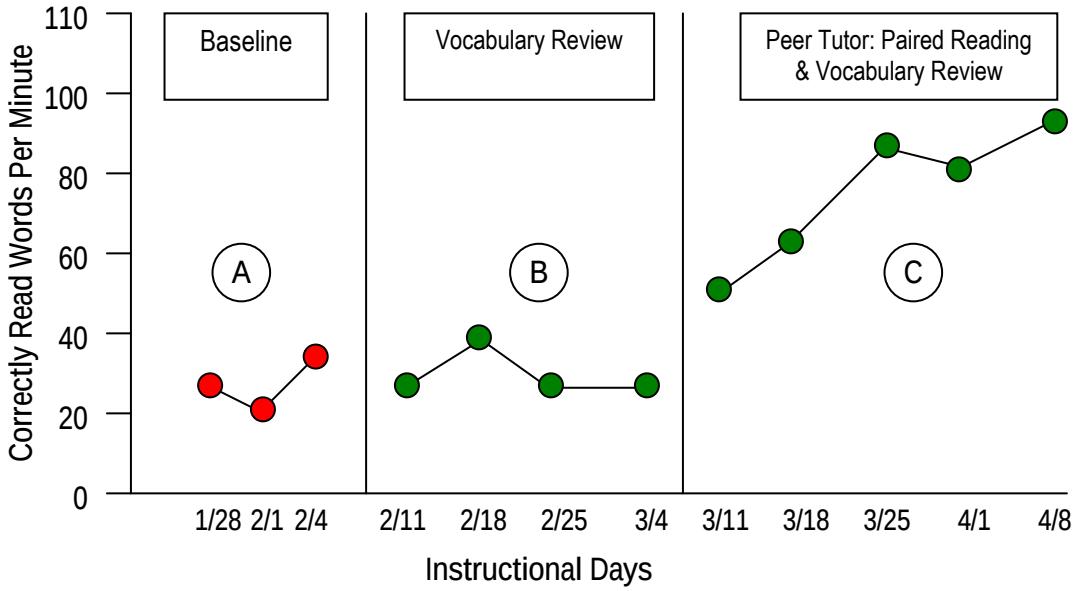
Response to Intervention requires that schools collect data on student progress over time to demonstrate whether an academic or behavioral intervention is working. It is much easier to see the student's overall rate of progress when data are converted to a visual display. The *time-series chart* is the type of visual display most commonly used to graph student progress. This brief tutorial will provide guidelines for setting up a time-series chart and interpreting plotted data (Hayes, 1981; Kazdin,1982).

Components of the time-series chart

Time-series charts are structured in a standardized manner to help viewers to better understand the data that they display. Some of the charting conventions described below (labeling of the chart axes, separation of data phases) are standard elements of time-series charts. Other conventions, such as use of aimlines, are most commonly used when charting Curriculum-Based Measurement data.

- *Labels of Vertical ('Y') and Horizontal ('X') Axes*. The vertical axis of the chart is labeled with the 'behavior' that is being measured. In the chart displayed in Figure 1, the behavior to be plotted is 'Correctly Read Words Per Minute'. The horizontal axis of the chart displays the timespan during which progress-monitoring took place. Our sample chart shows that the student was monitored from the dates of January 28 through April 8.

Figure 1: Sample Time-Series Chart With Curriculum-Based Measurement (CBM) Data



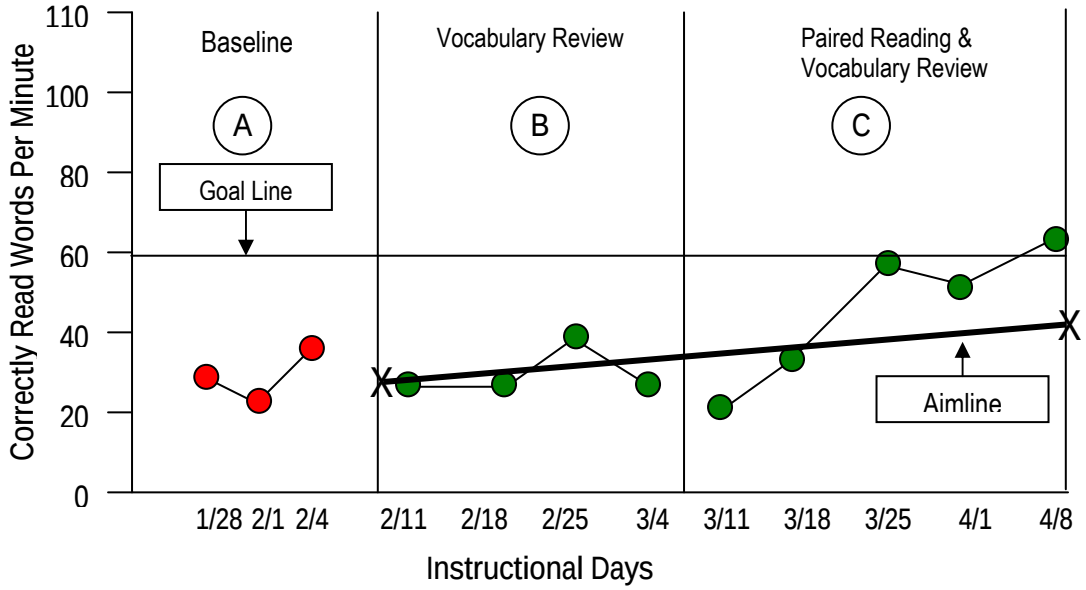
- *Phase Changes*. The chart is divided into *phases*, with each phase representing a time period in which data are collected under similar conditions. Phases are visually separated on the chart with vertical lines. Each phase is also typically labeled to indicate the intervention condition in effect during that phase (e.g., 'Baseline: Teacher whole-group math instruction'). Data collected within a phase are plotted as a series of connected data points. However, there is always a break in the plotted data between phases to indicate that the conditions under which

data were collected differed in each phase. In Figure 1, sections A, B, and C of the chart represent different phases.

- *Baseline Data*. RTI Teams will often collect *baseline* data to determine a student's starting point before an intervention is begun. Baseline data provides a snapshot of the student's level of academic or behavioral functioning before an individualized intervention is put into place. Phase A of the chart in Figure 1 shows an example of baseline data points. It is generally recommended that a minimum of 3-5 data points be collected during the baseline phase. If a visual inspection reveals that the overall trend of the baseline data is relatively flat or moving in the direction opposite that desired by school staff, the RTI Team concludes the baseline phase and implements the intervention. However, if the baseline phase shows a strong *positive* trend (moves strongly in the desired direction), the team should delay putting the intervention in place and continue to monitor student progress, since the instructional or behavioral strategies being used during the baseline phase are clearly benefiting the child.

- *Progress-Monitoring Data*. Once an individualized academic or behavioral intervention has been put into place for a student student, the RTI Team then monitors the intervention frequently (e.g., weekly) to track that student's *response* to the intervention. Sections B and C of the chart in Figure 1 display progress-monitoring data collected during two intervention phases.

Figure 2: CBM Time-Series Chart with Goal Line and Aim Line



- *Plotting Goal Line and Aimline.* When charting student progress, it is helpful to include visual indicators that show the *goal* that the student is striving to reach as well as the *expected rate of progress* that the student is predicted to make.

  The *goal line* is drawn on the chart as a vertical line that represents a successful level of performance. In Figure 2, the goal line for correctly read words is set at 59 words per minute, the typical skill level in the classroom of the student being monitored. The *aimline* is a sloping line that shows the rate at which the student is predicted to make progress if the intervention is successful. The aimline in Figure 2

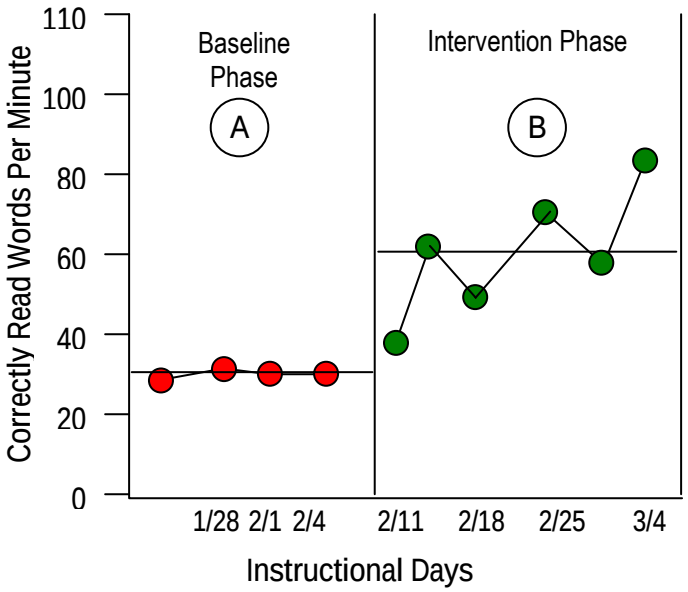
shows an expected increase of about 1.5 words per week in reading fluency. By plotting both goal line and aimline on the progress-monitoring chart, the RTI Team can visually compare the student's actual performance on a given day to his or her expected rate of progress (aimline) and eventual goal for improvement (goal line).

Visual interpretation of time-series data

When data points are plotted on a time-series chart, the observer can use techniques of visual analysis to uncover meaningful patterns in the data. Trend, variability, and level of data points can all yield significant clues to help in data interpretation.

- *Trend.* Trend is the slope of increase or decrease visible in charted data. A strong trend in the desired direction during an intervention phase would indicate that the intervention is having the predicted positive impact. The data series in section B of Figure 3 shows a much stronger upward trend than that in section A.

Figure 3: Level, Trend, and Variability of Data



- *Variability.* The amount of variability, or fluctuation, of data in each phase can have an impact on progress monitoring. When data in a series show little variability, RTI Teams may need to collect only a small amount of data to show a clear trend. When there is considerable variability, though, RTI Teams may be required to collect more data to discern the underlying trend. The data series charted in Phase B of Figure 3 shows much more variability than the series in Phase A.

- *Level.* The level of a data series is the average, or mean, of the data within that series. For example, in a data series with four values (45,58, 62, 47) , the level (mean) is 53. The level can be a useful method for summarizing the average for each data phase, particularly when there is a considerable amount of variability in the data. On a time-series chart, the level of a data series is usually plotted as a horizontal line corresponding to the mean of the phase. In Figure 3, the level of Phase B (60 correctly read words per minute) is considerably greater than that of Phase A (34 correctly read words per minute).

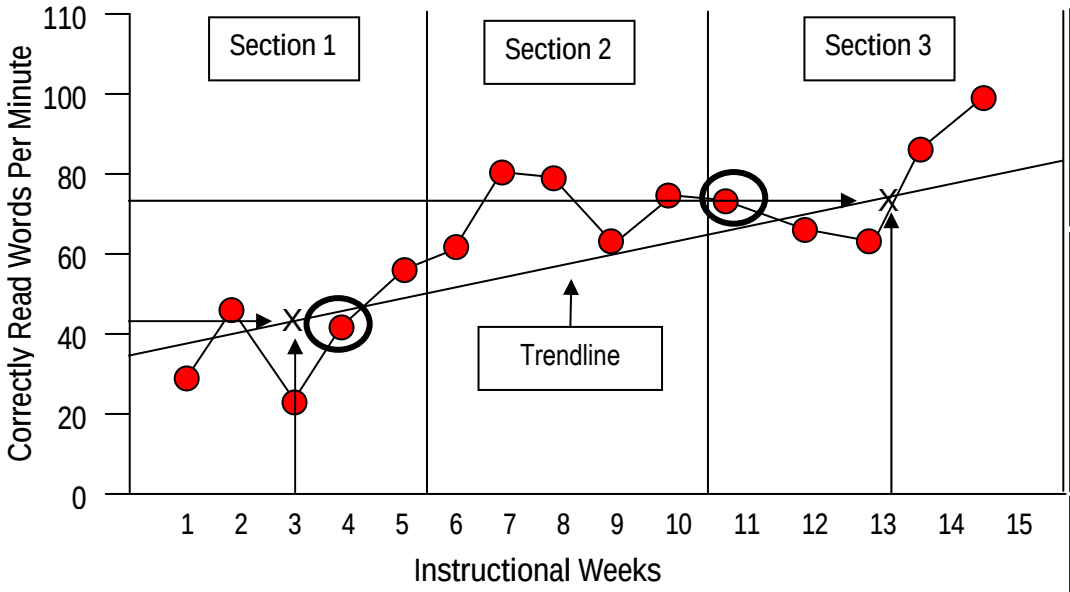
Plotting trendlines to determine the underlying 'trend' of charted data

Data points plotted on a time-series chart often have considerable fluctuation, or variability, making it difficult to 'see' the underlying trend of the data with any precision. Trendlines are straight lines superimposed on charted data to show a simplified 'best estimate' of the student's actual rate of progress. This section presents an easy method for plotting a trendline by hand.

Plotting trendlines with the Tukey method. To plot the trendline using the Tukey method, the observer first counts up the data-points on the graph and draws two vertical lines that divide the data-points evenly into 3 groupings. (If the number of data-points does not exactly divide into 3 parts, the groupings should be approximately equal. For example, if the chart contains 11 data-points, they can be divided into groups of 4, 3, and 4 data-points.)

Next, the observer concentrates on the first and third sections of the graph, ignoring the middle section. In each of the two selected sections, the observer finds the median point on the X (horizontal) and Y (vertical) axes and marks an "X" on the graph at the place where those points intersect. To locate the median time (e.g., instructional week) on the horizontal axis of a section, the observer looks at the span of weeks in which data was collected. For example, if data-points appear for weeks 1- 5 in the first section, the observer considers the middle, or median, point to be week 3.

Figure 5: Plotting a trendline with the Tukey Method



Step 1: Divide the data series into 3 equal sections by drawing 2 vertical lines. (If the points divide unevenly, group them approximately.)

Step 2: In Section 1 and Section 3, find the median data point and median instructional week. In each section, mark the point on the graph where the two values intersect with an 'X'.

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

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

To locate the median number of observed behaviors on the vertical axis, the observer examines the data-points in the graph-section, selecting the median or middle, value from among the range of points. For example, if data-points for weeks 1- 5 in the first section are 30, 49, 23, 41, and 59, the median (middle) value is 41. When the observer has found and marked the point of intersect of median X and Y values in both the first and third sections, a line is then drawn through the two points, extending from the left to the right margins of the graph. By drawing a line through the 2 X's plotted on the graph, the observer creates a trendline that provides a reasonably accurate visual summary of progress.

References

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Kazdin, A.E. (1982). Single-case research designs: Methods for clinical and applied settings. New York: Oxford Press.

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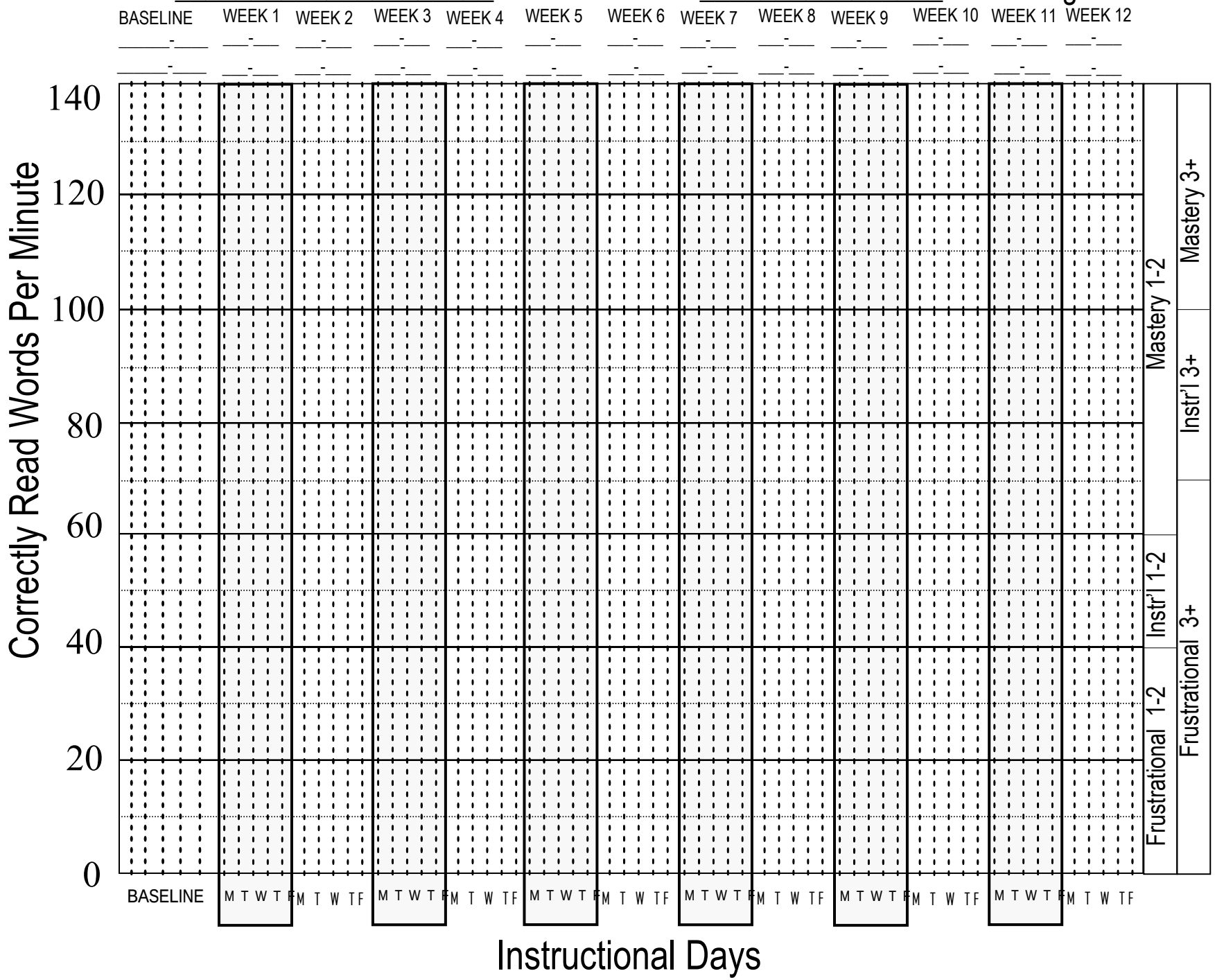

(Grade Norms from Shapiro, E. S. (1996). *Academic skills problems: Direct assessment and intervention* (2nd ed.). New York: Guilford

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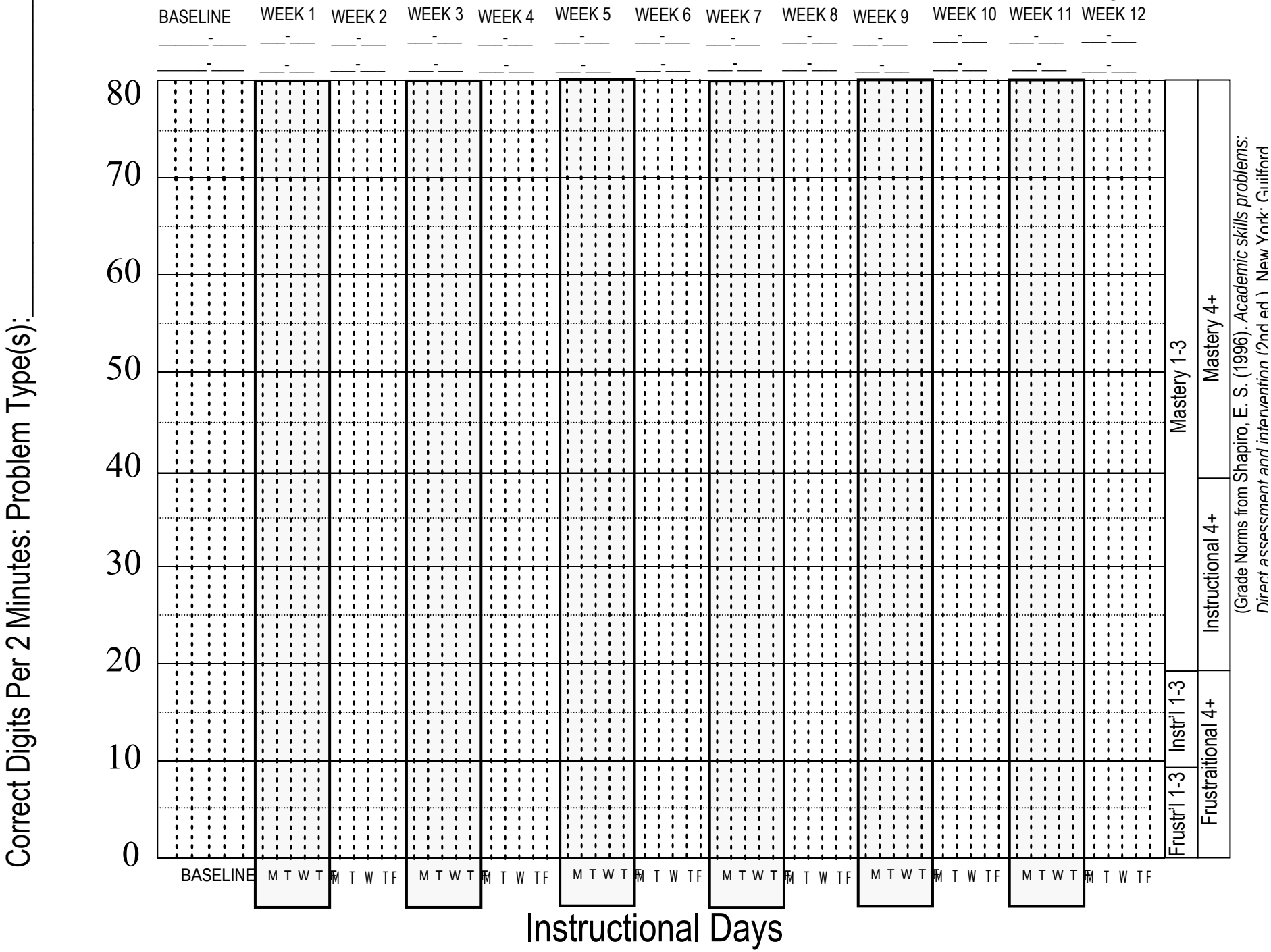

(Grade Norms from Shapiro, E. S. (1996). *Academic skills problems: Direct assessment and intervention* (2nd ed.). New York: Guilford

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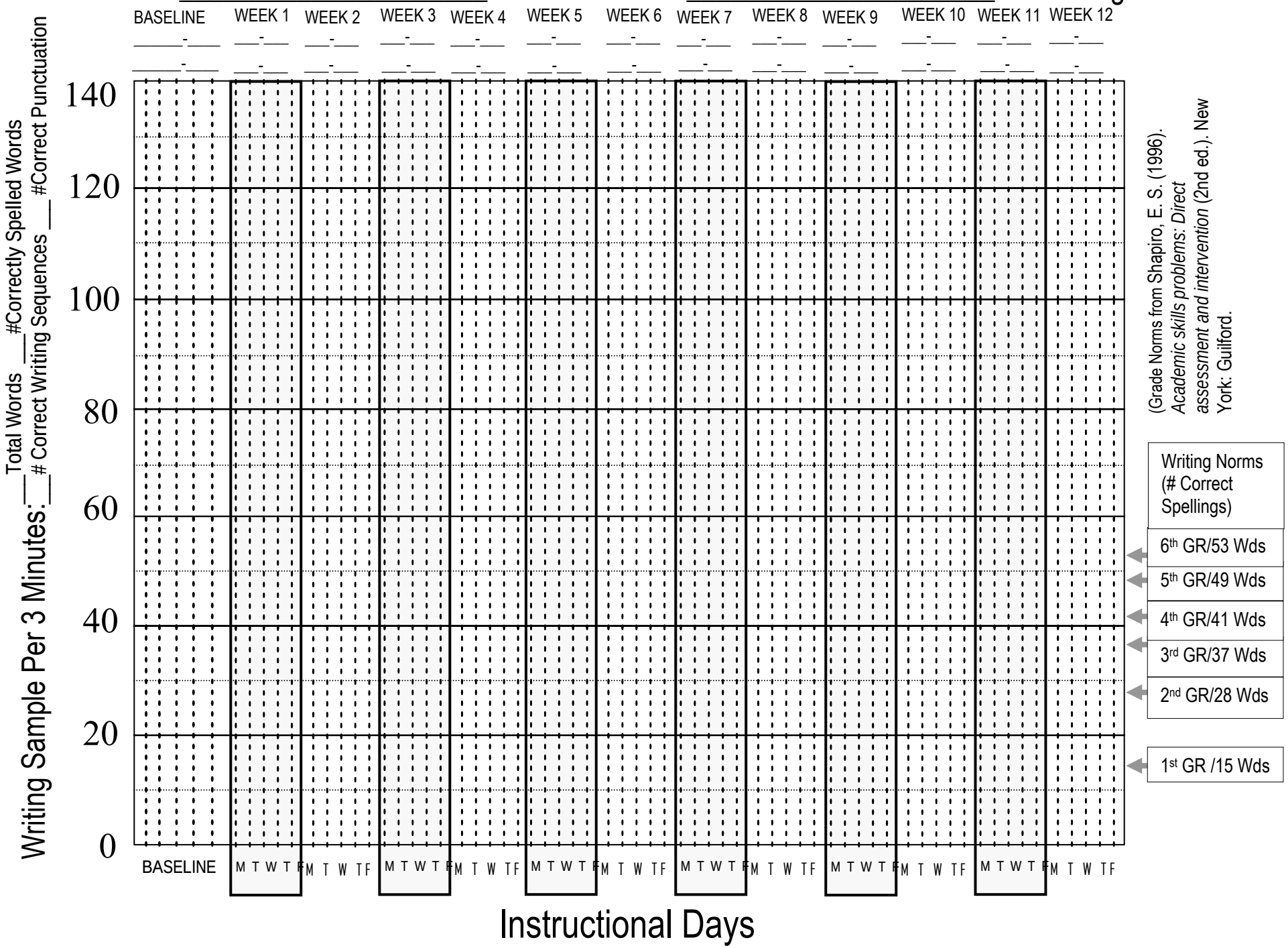

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