



### **Graphing Progress—"How To" Packet**

Tri-Community Elementary School, Pennsylvania Cornell Elementary School, Iowa Durham Elementary School, Oregon

Topic: Response to Intervention in Elementary-Middle Math

**Practice: Screening and Monitoring** 

The *Graphing Progress—"How To" Packet* provides guidelines for using assessment data to create progress monitoring graphs from three states with Rtl frameworks.

Tri-Community Elementary School uses a two-page information sheet developed by the Pennsylvania Training and Technical Assistance Network (PaTTAN). The document provides step-by-step instructions for creating progress monitoring graphs, including setting up the graph, establishing baselines and setting goals, drawing the aimline and plotting student performance, and analyzing data. Directions for determining the line of progress and an example are included. PaTTAN provides additional training materials related to creating graphs for specific skills progress monitoring, including handouts, directions, and sample Excel spreadsheets and graphs, that are available online for download.<sup>1</sup>

<sup>1</sup> PaTTAN. Specific skills progress monitoring focusing on creating graphs. http://www.pattan.net/TrainingMaterials.aspx?pageNumber=2&ContentLocation=/teachlead/ProgressMonitoring.aspx



The Heartland Area Education Agency 11 provides Iowa schools, including Cornell Elementary School, with an e-manual<sup>2</sup> on decision making. This excerpted chapter describes schoolwide and individual progress monitoring decision making, such as how to determine if students are making sufficient progress in interventions. Progress monitoring procedures are explained, such as developing a graph, collecting data, and analyzing trend data. The manual includes examples of schoolwide and individual progress monitoring. Heartland's e-manual on decision making is available online for download.

The third item is an Oregon Response to Intervention Project (OrRTI) training resource, used to support progress monitoring implementation in schools such as Durham Elementary School. This two-page handout provides directions for using aimlines and trendlines for graphing student progress, including definitions and instructions for drawing these lines and a sample progress monitoring chart. OrRTI also provides an Excel workbook mathematics example, including instructions for recording student data and creating a chart.<sup>3</sup>

<sup>2</sup> Heartland Education Agency 11. *E-manual module four: Decision making practices*. http://www.aea11.k12.ia.us/spedresources/Module-four.pdf

<sup>3</sup> Oregon Response to Intervention Project. K-1 missing number progress-monitoring graph. http://oregonrti.org/files/u9/k-1-missing-number-progress-monitoring-graph-2.xls



# Pennsylvania Department of Education Pennsylvania Training and Technical Assistance Network (PaTTAN)

**How to Create A Graph for Progress Monitoring** 



## How to Create A Graph for Progress Monitoring

#### Step 1: Set up the graph

- a) Write the student's name on the graph.
- b) Label the vertical axis with the name of the probe or trial (e.g., words correct per minute).
- c) Label the horizontal axis with the testing session or date.
- d) Give the graph a title.

#### Step 2: Establish baseline

- a) Administer 3 probes or trials.
- b) Select the median (the middle number).
- c) Mark the baseline by placing a dot on the vertical axis.

#### Step 3: Set the goal (target)

- a) Determine the expected rate of progress (e.g., 2 words per week, 85 percent by June).
- b) Mark the target by placing a dot at the intersection.

#### Step 4: Draw the aimline

Using a red colored pencil and a ruler, connect the baseline data point with the target data point.

#### Step 5: Measure and plot student performance

- a) Administer probes or assessments according to predetermined schedule.
- b) Place the data point on the graph.
- c) Connect the data point to the previous point.

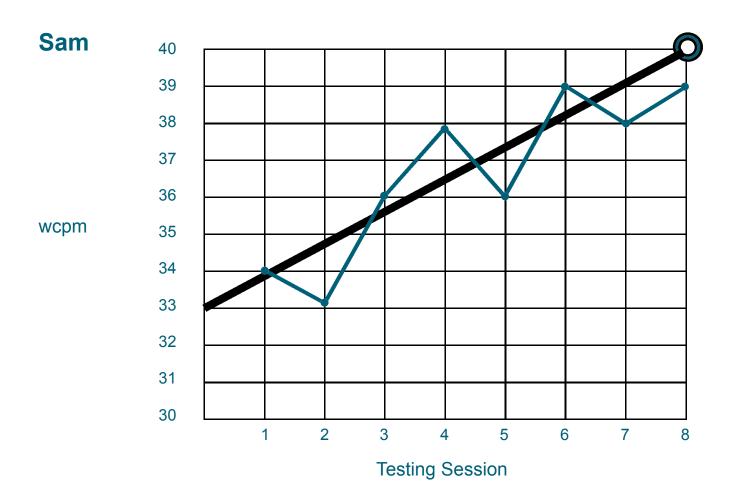
#### Step 6: Analyze student performance

- Using a predetermined decision rule, determine whether the student is making adequate progress:
  - 1. If 4 of the last 6 data points are above the aimline, the student is doing better than expected and it may be necessary to raise the goal.
  - 2. If 4 of the last 6 data points are below the aimline, the student is not making adequate progress.
  - 3. If the data points are along the aimline, the student is progressing right on target.
- b) If a change is indicated (as in 1 or 2 above), draw a vertical line to indicate that an intervention has occurred.

#### Step 7: Continue to measure and record student performance

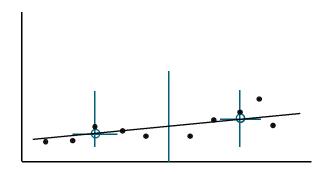






## How to Determine the Line of Progress (Trend)

- 1. Divide the data points in half.
- 2. Draw a short vertical line through the mid-date on each side.
- 3. Draw a short horizontal line through the mid-rate (median) on each side.
- 4. Place a point where the short lines intersect.
- 5. Connect the two points.

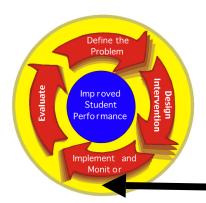




## Iowa Department of Education Iowa Heartland Area Education Agency (AEA) 11

Chapter 7 Intervention Progress Monitoring E-Manual Module Four: Decision-Making Processes, 2007-08





## Chapter 7 Intervention Progress Monitoring Sharon Kurns and Kristi Upah

We are here!

#### **Intervention Progress Monitoring**

## Is the student making sufficient progress given the intervention?

This chapter will answer the following questions:

- Are the supports in place to carry out the measurement strategy?
- O How will data be displayed?
- Are data being collected frequently and regularly?
- o Is the intervention creating the desired outcomes?
- O What changes might need to be made to the intervention?

#### **Progress Monitoring Decisions**

As described in Chapter 6, interventions are planned instructional activities designed to change student performance and rate of success. Not only should the intervention include a written step-by-step plan describing the procedures relevant to resolving the identified problem, but it should also specify a plan for monitoring a student's responsiveness to the intervention over time. The purpose of progress monitoring is to enable decision making about the effectiveness of the intervention and whether any changes are needed. Possible intervention variables that can be altered, or changed, include the pace of instruction, the format of instruction, the sequence in which items are presented, the reinforcement provided in the setting, or the structure of a classroom (see Table 1). The results of interventions help us to identify what works and what does not work.

The lowa Administrative Rules of Special Education provide the following guidance in evaluating interventions:

Systematic progress monitoring is conducted which includes regular and frequent data collection, analysis of individual performance across time, and modification of interventions as frequently as necessary based on systematic progress monitoring data. [41.47(3)d]

The effectiveness of interventions is evaluated through a systematic procedure in which patterns of individual performance are analyzed and summarized. Decisions regarding the effectiveness of interventions focus on comparisons with initial levels of performance. [41.47(3)e]



"The effectiveness of an intervention cannot be determined prior to implementation, therefore it must be monitored, reviewed, and changes made if necessary. Our decisions therefore should be thoughtful, skillful, and based on data."

#### School-Wide Progress Monitoring Decision Making

Once students are screened and those students needing additional supplemental or intensive instruction are assigned to an instructional group, progress monitoring will need to occur. The frequency of progress monitoring in a school-wide system is based on the student's level of need. Students who are successful with core instruction only are monitored through the school-wide screening process, typically three times per year. Students who receive supplemental or strategic instruction are monitored 1-2 times per month, whereas students who receive intensive interventions are monitored at least once per week.

In the screening chapter, the process of using screening data to determine the effectiveness of the core instructional program was introduced. To facilitate data-based decision making, it is important that the same methods and tools for monitoring progress are used on a school-wide basis. For example, if there are four second-grade teachers in a building and each uses a different process to monitor progress, teachers cannot make decisions about flexible grouping of students within the grade level. Data also cannot be used to monitor the overall health of the core program. With a continuous progress monitoring system, improvements to the core can be monitored and adjusted.

Roles and responsibilities and support structures are critical for successful progress monitoring on a school-wide basis. It is likely that there will be a fair number of students in the building who will be monitored with some frequency. With groups of students being monitored, teachers need ready access to organized and easy to use assessment

materials. There are many ways that schools structure their progress monitoring systems. For example, a team of teachers might be responsible for collecting data with assistance from paraprofessionals, administrators, specialty teachers, support staff, or other school personnel.

"Roles and responsibilities and support structures are critical for successful progress monitoring on a school-wide basis."

In addition to support for data collection, teachers will need support for data display and analysis. Given the importance of making timely decisions about the effectiveness of an intervention, technology can be very helpful, whether it is a readily-available program (e.g., Microsoft Excel spreadsheets and graphing) or commercially-marketed data warehouses (e.g., AIMSweb, DIBELS Data System). Thus, when choosing technology, it will be important to examine the ease of data entry, graphing, and analysis (e.g., drawing a trendline).

"The frequency of progress monitoring in a school-wide system is based on the student's level of instruction."

A final element of progress monitoring in school-wide systems includes regular and systematic use of the data for making instructional decisions. A literacy team or group of teachers with designated responsibility to review data will ensure that students move flexibly across instructional groups and data guide decisions on a school-wide basis.

## **Individual Progress Monitoring Decision Making**

When an individual intervention plan is written, there is always a measurement strategy identified and baseline collected. Progress monitoring then becomes the frequent and repeated application of this measurement strategy. Support structures need to be in place



for individual decision making in much the same manner as discussed for school-wide implementation.

The frequency of monitoring progress for a student should be based on the severity of the problem and the sensitivity of the data for decision making. Materials need to be easily accessible to the person(s) responsible as well as support for decision making. Consultation from a professional with expertise in data analysis and instructional strategies is an important support for the interventionist. Finally, technology is also a tool to assist with display and analysis.

#### **Progress Monitoring Procedures**

#### Step 1. Implement Measurement Strategy

## Are the supports in place to carry out the measurement strategy?

There are many ways to gather progress monitoring data. The monitoring plan was established as the intervention was designed. The measurement strategy used to monitor progress is the same procedure that was used to collect the baseline. Examples include:

- Checklists
- Curriculum-Based Measurement (CBM)
- Frequency count
- Goal-Attainment Scaling
- Mastery Monitoring
- Observation procedures (e.g., momentary time-sampling, partial-interval recording, whole-interval recording)
- Percentage
- Permanent products
- Portfolios
- Rating scales
- Rubrics
- Time (duration or latency)

Examples of additional supports needed to implement the measurement strategy include:

easily accessible materials, clear procedures that can be administered reliably, time built into the school day to collect data, technology to graph and draw trend lines, and time to meet with other teachers to analyze data.

#### Step 2. Develop a Graph

#### How will data be displayed?

Data can be placed in a chart or a table, but a graph is the only visual tool that supports decision making. Graphing is an effective means of summarizing and evaluating the progress monitoring data. Graphs provide a visual summary of the student's performance. The graph can impact the inferences made about the intervention effectiveness and student progress providing a measure of professional accountability. For clarity of communication, a standard format should be used for graphs:

- The title should provide a concise description of the nature and purpose of the intervention.
- Scale captions should establish the identity and meaning of the behavior and measurement procedure.
- The X and Y scales and their scale units should represent the appropriate type and range of scales.
- Different intervention phases should be labeled on the graph.
- All relevant data should be shown in an appropriate form.

#### Step 3. Collect Data

## Are data being collected frequently and regularly?

Support should be in place to make sure data are being collected as planned. It will be important for decision making to have data collected as designed in the data collection plan.



#### Step 4. Analyze Trend Data

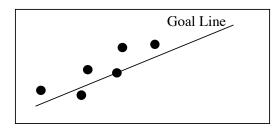
### Is the intervention creating the desired outcomes?

Once the intervention has begun and progress monitoring data are collection, decisions about how well the plan is working will need to be made. Formative evaluation means making decisions about the effects of the intervention frequently. The decision-making plan established as the intervention was designed should be followed to make ongoing decisions. The progress monitoring data are examined in relation to the goal line.

#### **Four-Point Decision Rule**

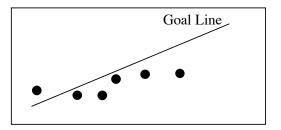
Many decision-making plans use the four-point decision rule. This rule is used for formative evaluation as follows.

 If the last four consecutive data points are at or above the goal line, then whether or not to raise the goal, or in some cases, how to program for maintenance and generalization should be considered. Discontinuing or fading the intervention also can be discussed.

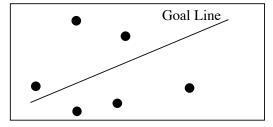


- If four consecutive data points fall below the goal line, then the interventionist might need alter, or change, certain instructional variables, such as
  - the pace of instruction,
  - the materials being presented or perhaps how they are being taught,
  - the number of opportunities to respond or have instruction,

 or the reinforcements in place, so the performance improves.



3. If the data are highly variable, you need to decide how to motivate the child to more consistently perform the desired behaviors, so that you can then evaluate the intervention effect against the goal line.



It is important to remember that the four-point decision rule is a guideline, and additional data can also be used. For example, if monitoring oral reading fluency data, it will be important to also examine accuracy data to further determine the impact of a decoding intervention. In addition, some published curricula include within-unit check points or tests. For example, even though the student is meeting the within-unit check points but making slow progress (according to the progress monitoring data), the intervention is still working. Thus, a student's performance on these types of tests should be examined along with the regular progress monitoring data.

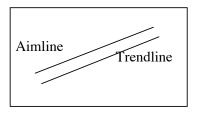
#### **Trend Analysis**

Other decisions plans utilized for formative evaluation involve trend analysis. By analyzing trends, decisions about the overall movement of

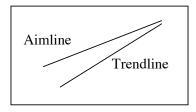


the behavior can be made, with less time spent on worrying about a single low point of performance. Trend analysis can be done whenever progress data are generally consolidated (8 to 11 data points are usually necessary to analyze trend.). To analyze trend, an aimline is created based on the goal or expectations. The team then compares the trendline (the student's actual progress) against the aimline (the student's expected progress). Decisions are made as follows:

 The trendline is parallel to the aimline, indicating that the student made consistent growth. Continue intervention as planned.



2. The trendline is steeper than the aimline, indicating the student's progress has exceeded the team's expectations. Look for ways to maintain or generalize the skill and fade the intervention when appropriate.



3. The trendline is flatter than the aimline, indicating slower progress than anticipated. A change is needed. Analyze performance data and implementation data to determine the change that is needed.



#### **Visual Analysis**

Another effective formative evaluation method is to visually analyze the performance data during the intervention implementation and compare these data to the baseline data collected prior to the intervention. There are four <u>visual analysis</u> criteria that may be applied and will assist in decision making:

Change in Mean — Is the average rate of performance higher (or lower) during the intervention than during baseline?

Change in Level — Is there a discontinuity of performance (in the desired direction) from the end of baseline to the start of the intervention?

Change in Trend — Does the trend in performance increase (or decrease) over time?

Latency of Change — Is there a change in performance (in the desired direction) after the first week of intervention implementation?

Again, formative evaluation occurs <u>throughout</u> the implementation of the intervention. The purpose of evaluating the intervention during implementation is to determine the likely success of the intervention so that it can be modified or changed if needed to increase the likelihood the goal will be met.

#### Step 5. Consider alterable variables

### What changes might need to be made to the intervention?

Sometimes the progress monitoring data will indicate that a change is needed (e.g., trendline is flatter than the aimline). Alterable variables are those instructional activities that can be changed, or altered, to increase the intensity of the intervention (see Table 1). Examples include:

- Opportunities to learn- increase number or intensity
- Program Efficacy- effect or appropriate choice of materials



- Program Implementation- how you are doing with delivery
- Grouping for Instruction- setting or placement
- Coordination of Instruction- strategic planning

## **Unacceptable Practices in Progress Monitoring**

The following are examples of unacceptable practices that may occur in the process of evaluating interventions.

Progress monitoring data are not collected or are collected on an irregular basis thus resulting in too few data points. This could lead one to make inappropriate decisions about progress or lack of progress. The intervention plan should reflect the frequency of data collection and all efforts should be made to implement as planned.

The progress monitoring data are not evaluated during the intervention implementation, but only at the end of the intervention. This would indicate that the decision-making rule(s) were not followed and necessary changes were not made in a timely manner. This could result in an intervention being used for too long, whether it be effective or ineffective.

Changes are not made to the intervention when the progress monitoring data indicate the intervention is not effective. If the data indicate that an intervention is not effective, there are three likely causes: a) the intervention is not being implemented as designed; b) the intervention needs to be intensified for the student; or c) the intervention is not the correct match (it is the wrong intervention).

Stating that the intervention was not effective despite knowing that the intervention was not

<u>implemented as planned</u>. Intervention integrity will be discussed at length in the next chapter.

Stating intervention outcomes that are not supported by the actual progress monitoring data. This practice contradicts the intention of "data-based decision making." Decision rules should guide future actions and the outcomes that guide those actions.

School-wide Progress Monitoring Example
At Midwest Elementary School groups of student received of supplemental and intensive instruction in the area of reading.

#### **Step 1. Implement Measurement Strategy**

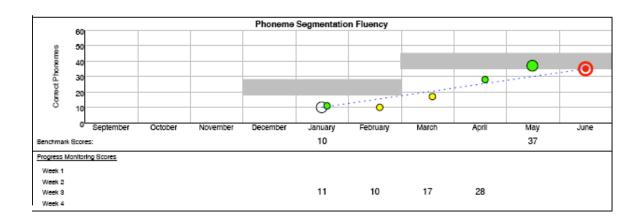
As a result of school-wide screening, validation, and problem analysis, five students in Mrs. Ross's kindergarten class at Midwest Elementary receive supplemental instruction. They received direct phonemic awareness instruction in a small group, in addition to core instruction 30 minutes per day. The measurement strategy laid out a plan for data to be collected once per month by the kindergarten teacher during center time. Phoneme segmentation skills will be measured using DIBELS Phoneme Segmentation Fluency (PSF). The number of phonemes segmented correctly in one minute will be recorded.

The literacy coach in the building downloaded the progress monitoring booklet for phoneme segmentation from the DIBELS website and made copies for all kindergarten students for whom phoneme segmentation fluency was identified as a measurement strategy. The literacy coach contacted a trainer from the local intermediate unit to provide a DIBELS administration and scoring refresher training for the entire kindergarten staff including several associate.

Step 2. Develop a Graph



Midwest Elementary uses the DIBELS website to display progress monitoring data. The kindergarten teacher can access the graph on all five students at any time. Below is an example of a PSF graph with monthly monitoring.



#### Step 3. Collect Data

The five students are receiving a supplemental intervention in the area of phoneme segmentation. Data collection once per month was determined to be frequent enough. Data are collected on the first Friday of the month during center time.

#### Step 4. Analyze Trend Data

Progress monitoring booklets are turned in to the literacy coach at the end of each week. Each week when progress monitoring books are turned into the literacy coach, she enters new scores onto the DIBELS website progress monitoring section of the data system. Kindergarten teachers meet weekly to discuss progress and need for instructional changes. The literacy coach assists with data interpretation. A trendline is drawn for each student and actual slope Is compared to desired slope. The intervention began in January and four of the five students met benchmark by April.

#### Step 5. Consider Alterable Variables

As previously stated, all but one of the five students met benchmark. Those four students will return to core instruction alone, but will be monitored using DIBELS Nonsense Word Fluency probes to make sure that core instruction is sufficient. The performance of the student who did not meet benchmark was analyzed by comparing the slope of his trendline to the goal or aimline. The elements of the intervention that were effective were determined and steps were taken to intensify the intervention through additional opportunities to learn (e.g., extending the time for instruction and increasing practice).

## Individual Progress Monitoring Example

Robbie is a fifth grade student receiving an intervention in reading fluency.

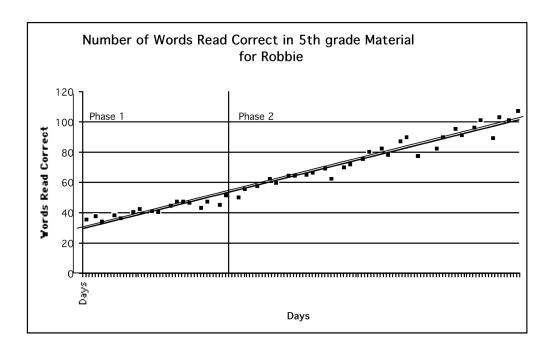
Step 1. Implement Measurement Strategy



The measurement strategy selected is CBM oral reading fluency. A goal was set to reach 100 words per minute by the end of fifth grade. Mrs. Smith, Title One teacher, will provide instruction. She will also collect the progress monitoring data. She downloaded a 5th grade progress monitoring student booklet from the DIBELS website. She also downloaded and printed a set of reading probes. She developed a schedule to collect data two times per week during 5th grade silent reading time.

#### Step 2. Develop a Graph

The school psychologist helped Mrs. Smith set up a graph using a spreadsheet he developed in Excel. The number of words read correctly in one minute was calculated. Each time she collected data, she wrote the score on the student booklet and then entered the score on the spreadsheet. See the graph that follows:



#### Step 3. Collect Data

Mrs. Smith collected data twice weekly as planned.

#### Step 4. Analyze Trend Data

The four-point decision rule was utilized. Data were collected two times per week. At the end of the 8<sup>th</sup> week four data points fell below the line. At this time, the answer was "no," the intervention was not creating the desired outcome. A change was needed. The phase line indicates when the

change was made. During phase two of the intervention, there were not four consecutive days when the data were above or below the goal line. For phase two, the answer was "yes," the intervention was creating the desired outcome. The plan continued to be implemented.

#### Step 5. Consider Alterable Variables

Robbie's last three data points were above his goal line. He met his goal. The answer to the question is "yes," the intervention created the desired outcome. The team will now need to



determine a new goal for Robbie and determine the resources needed for continued progress. not enough — it needs to be used to make instructional decisions.

#### **Summary Considerations**

Progress monitoring involves frequent and repeated measurement of the target behavior. The data are then used when determining whether or not the intervention is **working** for this particular child's problem. Simply collecting the data for the sake of collecting data, however, is

The procedures in this chapter addressed the questions that need to be answered to sufficiently monitor student performance. Student progress monitoring data is only part of the puzzle. Not only must student performance be monitored, but a system needs to be in place to determine if the intervention is being carried out as planned.

Step or Element	Fully Acceptable Practice	Partially Acceptable Practice	Unacceptable Practice
Step 1. Implement measurement Strategy	The measurement strategy developed as part of the intervention plan is used. Assessment materials are organized, persons responsible designated, and time for data collection is arranged.	A different measurement strategy is used than the one developed as part of the intervention plan. Materials, time, personnel are all organized and available.	A measurement strategy is not implemented. Formative assessment data is haphazardly collected with no organization of material, time, or personnel.
Step 2. Develop a graph	Standard graphing conventions are used including a title, the X and Y units represent the appropriate type and range of scales.  Different intervention phases are labeled.  All relevant data are shown in an appropriate form.	The graph is missing standard components, but still contains an appropriate type and range of scale for data. All relevant data are shown in an appropriate form.	The graph is missing standard components and data are not displayed in an appropriate type or range of scale
Step 3. Collect data regularly and frequently	Data are collected frequently and regularly: Screening 3 times per year, supplemental 1-2 times per month, intensive 1x per week at a minimum. Data are collected regularly except for school holiday/breaks	Data are collected regularly but not as frequently as needed. (See fully acceptable column for recommended frequency.)	Data collection is intermittent and irregular at a frequency
Step 4. Analyze trend data	A data analysis method is selected and utilized. (Data points below the line, trend analysis, visual analysis)	A data analysis method is selected but used inconsistently.	No data analysis method is utilized.
Step 5. Consider alterable variables	Data analysis results are utilized to consider instructional changes to the intervention.	Data analysis results are considered, but intervention changes are not consistent with the data	Data analysis results are not utilized for instructional decision making.

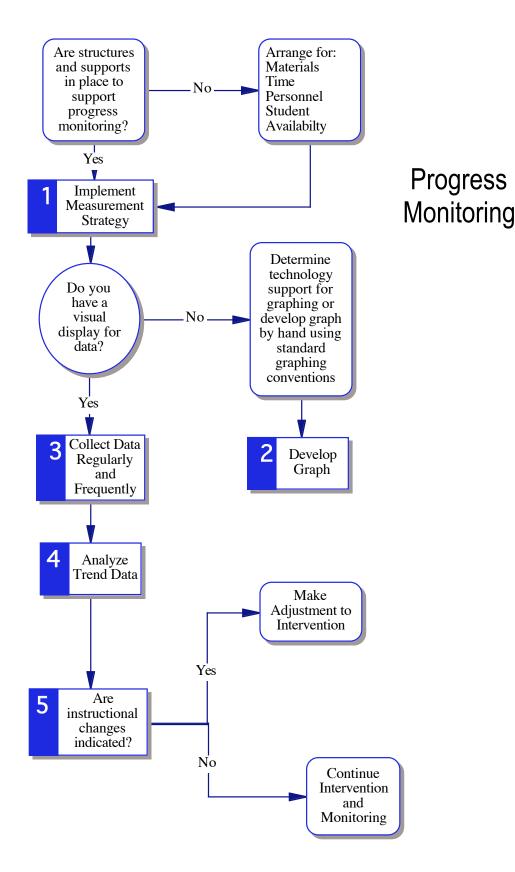


Table 1. Alterable Components

Opportunities to Learn	Program Efficacy	Program Implementation	Grouping for Instruction	Coordination of Instruction
Develop plan to increase attendance	Preteach components of core program	Model lesson delivery	Check to see that students are appropriately placed	Clarify instructional priorities
Ensure instruction is provided daily	Use materials that are extensions of the core	Monitor implementation frequently	Reduce number of students in the group	Establish concurrent reading periods/ sessions
Increase number of opportunities for learners to respond	Supplement program with appropriate materials	Provide coaching and ongoing support	Provide individual instruction	Provide complementary reading instruction across reading periods/sessions
Increase teacher- directed instruction	Replace current core program	Provide additional staff development	Change instructor	Establish a communication system across instructors
Add another instructional period	Implement specially designed program			

Adapted from: Simmons, Kame'enui, Good, Harn, Cole, & Braun (2000). Building, implementing, and sustaining a beginning reading model: School by school and lessons learned. *Oregon School Study Council Bulletin, 43*(3), 1-30.





<sup>\*</sup>Excerpted from Heartland Area Education Agency (AEA) 11, Special Education Procedures, Module Four: Decision-Making Processes, 2007-08 (Improving Children's Educational Results through Data-Based Decision-Making).



## Oregon Department of Education Oregon Response to Intervention (OrRTI)

# Making the Most of Your Progress Monitoring Data: Aimlines and Trendlines Assessment Handouts



#### Making the Most of Your Progress Monitoring Data: Aimlines & Trendlines

#### **Definitions:**

**Aimline:** This line shows the trajectory needed for the student to reach the benchmark by the end of the year.

**Trendline:** This line shows the student's current trajectory based on several recent data points.

**Mid-date:** Of three data points, the data point in the middle according to date (mark with a vertical line.)

**Mid-rate:** Of three data points, the data point in the middle according to score (mark with a horizontal line.)

**Intervention Change Line:** Vertical line drawn *after* the last data point of the previous intervention.

#### **Guidelines:**

#### **Drawing an Aimline:**

- 1. Plot the student's score from the screening.
- 2. Using a ruler, draw a line connecting the screening score to the end of year benchmark (bull's eye).

#### Drawing a Trendline:

- 1. Start with at least seven data points.
- 2. Divide data points into three sections using vertical lines. The two outer sections should have three data points each.
- 3. In the first and third sections, calculate the mid-date (draw a vertical line) & mid-rate (draw a horizontal line).
- 4. Mark the points on the graph where the two values intersect.
- 5. Connect the points to draw the trendline.

Redrawing the Aimline: Every time an intervention is changed, the aimline should be redrawn. This means that the slope will be steeper, and the intervention will need to be more intense for the student to reach the end of year benchmark.

- 1. Using the last three data points, find the intersection of the mid-date & mid-rate.
- 2. Draw a new aimline from this point to the end of year benchmark.

(Tip: Erasing the old aimline or color-coding changes helps to avoid confusion.)



