aimsweb PLUS

Progress Monitoring Guide

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Introduction

aimswebPlus® is an assessment, data management, and reporting system that provides national and local performance and growth norms for the screening and progress monitoring of math and reading skills for all students in Kindergarten through Grade 8. aimswebPlus uses two types of measures: *curriculum-based measures* (CBMs)—brief, timed measures of fluency on essential basic skills—and *standards-based assessments* (SBAs), which are comprehensive measures aligned to current learning standards. By combining these two types of measures, aimswebPlus provides the data that schools need for program planning and evaluation and for tiered assessment (multi-tiered system of supports [MTSS], also known as response to intervention [RTI]). aimswebPlus data provide the information needed to differentiate instruction and determine who will benefit from intensive intervention.

Progress monitoring—the frequent and ongoing collection of information about student performance—is an essential component of a tiered assessment system. By collecting such data, a student's rate of improvement can be compared to expected growth to determine if adequate progress is being made toward end-of-year goals or if changes to instruction are needed to improve student growth.

In this guide, the foundations of progress monitoring are first discussed, followed by sections on identifying which students to progress monitor, selecting the measure(s) to monitor and the appropriate grade level of monitoring materials, and creating a progress monitoring schedule. Next, case studies are presented to illustrate progress monitoring within the aimswebPlus system. Finally, information regarding student growth percentiles and conducting a visual analysis of progress monitoring data are presented in Appendixes A and B, respectively.

Foundations of Progress Monitoring

The Individuals with Disabilities Education Act (IDEA, 2004) and the Every Student Succeeds Act (ESSA, 2015) require schools to evaluate the effects of evidence-based instruction, a task for which RTI is ideally suited. Monitoring each student's response to intervention enables teachers to gauge the effectiveness of the core curriculum and to align resources with student needs. Studies indicate that using progress monitoring to guide instruction improves student achievement, especially for students with low achievement and those with disabilities, when qualified professionals implement the following program features (Black & Wiliam, 1998; Fuchs & Fuchs, 1986; Stecker, Fuchs, & Fuchs, 2005):

- Collect data frequently
- Display and review data graphically
- Create explicit decision rules for when to continue or modify instruction
- Implement data collection and decision rules with integrity
- Provide clear direction for instructional modifications and alternatives

The aimswebPlus system supports accurate and frequent data collection, automatically displays results and trends via graphs, projects growth trends alongside growth expectations, and provides explicit rules for deciding whether a student is on or off track to meet his or her end-of-year goals. Note that the last feature of effective progress monitoring, providing direction on how to modify or replace instructional interventions, is beyond the scope of this guide. Progress monitoring can help to determine if an instructional program is effective, but it cannot identify potential alternatives.

The aimswebPlus approach to frequent progress monitoring relies on curriculum-based measurement, a method that is standardized, valid, reliable, repeatable, simple, efficient, inexpensive, and sensitive to achievement growth over relatively brief intervals (Deno, 1986). Curriculum-based measures (CBMs) assess foundational skills that are the basis for success on higher-order, complex skills. With appropriate instruction, basic skills can rapidly develop and this development will be represented by improved student performance on CBMs. These characteristics make CBMs ideally suited to the frequent assessment that is required for progress monitoring programs (Deno, 1985, 2003). Together, triannual screening and progress monitoring link expectations (i.e., benchmarks) and performance levels (i.e., norms) to individual student goals.

The aimswebPlus standards-based assessments (SBAs) measure the higher-order thinking skills and conceptual knowledge defined in current learning standards. SBAs include reading comprehension, vocabulary knowledge, and math concepts and applications. Although students may have deficits in any one of these domains, frequent progress monitoring on these specific content areas is *not* recommended because complex, higher-order thinking skills develop more slowly than foundational skills and reliable assessment of these complex skills requires more testing time than is reasonable on a weekly basis. As such, the Concepts & Applications and Reading Comprehension measures are not available for weekly progress monitoring.

Real growth—that is, growth that is reliably greater than zero on a standardized assessment—in these domains typically takes several months of intervention to detect. One of the benefits of triannual interim assessment (i.e., benchmarking) is that data can be used to identify growth in these domains without waiting an entire school year for end-of-year assessment results. These triannual, standards-based assessments can also be supplemented with unit quizzes, practice problems, and/or mastery monitoring methods widely available in reading and math intervention systems.

Within an RTI system, student performance is organized into three tiers. Students in Tier 3 typically need intensive intervention to build skills and deepen their understanding of learning standards taught in the core instructional program. Students in Tier 2 may need only small-group instruction and additional practice on core content to get on track. Students in Tier 1 are expected to stay on track with high quality, research-based core instruction.

For students in Tier 3, frequent (i.e., weekly) monitoring of progress is recommended because it can shorten the time needed to make an informed decision about the effectiveness of the chosen intervention. Delaying that decision may put the student at further risk of failure. For students needing less intensive intervention, it is appropriate to monitor progress less frequently than weekly because these students' growth tends to be less rapid; as a result, increased time between assessments is needed to accurately project whether a student is on track to meet end-of-year goals. For these students, increasing assessment frequency will do little to improve the accuracy of the projection or decisions about the effectiveness of the intervention.

Progress monitoring is an important part of a dynamic approach to guiding instruction and interventions for both groups and individuals. Rather than plan and hope, progress monitoring provides an opportunity to plan and evaluate whether curriculum and instructional procedures are increasing the rate of student progress towards explicit goals.

Progress monitoring involves several basic activities, including:

- deciding which students to progress monitor and which CBMs to use,
- selecting the grade level of the CBMs,
- setting a goal and creating a schedule for data collection,
- collecting data (i.e., administering CBMs) and evaluating progress,
- deciding whether progress is adequate and whether the instruction and/or the goal should be modified, and
- deciding if the goal has been reached.

Deciding Which Students and Measures to Monitor

A student's teacher typically makes the decisions about whose progress to monitor, on which measures, and how frequently they should be assessed, with input from reading and/or math specialists or other professionals with knowledge of the student's needs. The decision to progress monitor is not an automatic process based solely on test scores; rather, teachers should utilize aimswebPlus scores and other evidence (e.g., classroom performance) to guide decisions and identify the intensity of the need.

The aimswebPlus system provides several types of scores and reports to aid in this decision process. The benchmark comparison screen (see Figure 1) and the student profile page provide the most useful information for deciding if a student needs intensive intervention and progress monitoring. The benchmark comparison screen displays reading or math composite scores, as well as scores on each measure completed by each student. Performance can be viewed by score, local or national percentiles, or tiers. When a CBM score is at or below the 25th national percentile, a goal setting icon (⊕) is activated next to the CBM score(s) in question (see Goal column in Figure 1).

Figure 1   Benchmark Comparison Screen
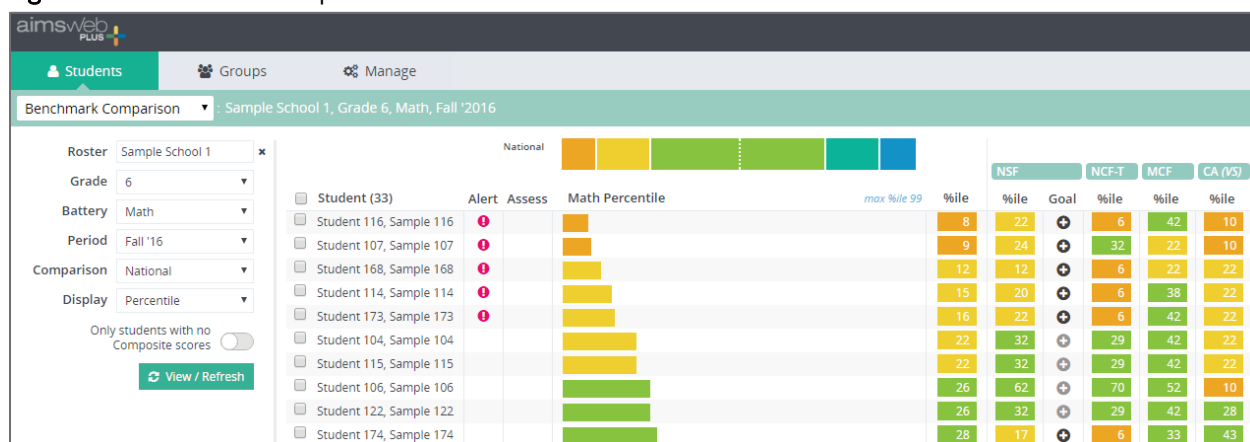
The aimswebPlus system uses tiers and performance levels to guide decisions about whose progress to monitor and how intense the intervention should be. Each method has benefits and limitations, which are described in the following sections. Combining information from each method provides the most accurate assessment of each student's needs.

Performance Levels

aimswebPlus uses five color-coded performance levels, which are based on either national or local norms:

- Well-Below Average (1st–10th percentiles), displayed in orange
- Below Average (11th–25th percentiles), displayed in yellow
- Average (26th–74th percentiles), displayed in green
- Above Average (75th–89th percentiles), displayed in teal
- Well-Above Average (90th–99th percentiles), displayed in blue

Color-coding makes it easier to identify each student's performance level (see Figure 1). Scores in the Below and Well-Below Average ranges are far enough below grade-level expectations to indicate a real achievement gap that could place the student at risk. The aimswebPlus system automatically flags CBM scores that fall in the Below Average and Well-Below Average range by activating the goal setting icon (⊕) next to the CBM score(s) in question. This is the first indication that a student may require progress monitoring. If further analysis confirms a need for intensive intervention, then the teacher can initiate a progress monitoring plan by clicking the goal setting icon.

When using performance levels to determine whose progress should be monitored, it is important to recognize the differences between national and local norms. National norms are based on large samples of students who completed Fall, Winter, and Spring benchmark testing during the 2013–14 school year. This sample was stratified within grade by geographic region, socioeconomic status, sex, race/ethnicity, special education status, and English Language Learner (ELL) status. National percentiles are highly accurate and stable, making them a dependable benchmark against which performance across years can be evaluated. As such, if the goal is to move students toward national benchmarks, use of national norms is recommended.

Local percentile norms are generated based on samples specified by the user, which may consist of all of the students at a particular grade level in the user's state, district, or school. Users can further narrow the focus of local norm groups by applying selection criteria, such as demographics, disability category, or instructional program (see the aimswebPlus system Help file for more information). Local norms are recommended for users who want a fixed percentage of students in the Below Average range. Because local norms adjust for local performance levels, 25% of students will have scores in the Below Average group. Local norms may be particularly useful for school systems in which performance deviates substantially, either lower or higher, from the national norm group. However, local norms should be used with caution if they are based on fewer than 50 students per grade. When sample sizes are small, performance levels are unstable and may fluctuate considerably across seasons and years.

One benefit of using performance levels is that they communicate student need in a familiar manner. For example, teachers and parents easily understand that Below Average indicates a student is behind academically and that he or she would benefit from additional help to get back on track. Another benefit of using performance levels is that they are reported for each measure, enabling educators to quickly identify skill deficits and strengths for each of their students and to prioritize intervention plans. Incorporating areas of strength into intervention plans can improve student motivation, which in turn can lead to better results.

Instructional Tiers

Instructional tiers can also be used to identify students who need frequent progress monitoring. In aimswebPlus, tiers are based on the likelihood of *not* meeting an end-of-year performance target. A performance target is the score that all students should achieve by the end of the school year in order to remain on track for success in subsequent grades. Performance targets are defined by Spring composite score national percentiles, ranging from the 15th to the 70th percentile in increments of 5. The aimswebPlus system enables users, typically a school or district administrator, to define different performance targets at the school and district level for their accounts. A broad range of targets enables schools to select a target that balances educational needs with available resources. For example, a low-performing school may choose a lower target to moderate the percentage of students in Tiers 2 and 3.

Once the Spring performance target is defined, the system generates Fall, Winter, and Spring cut scores. The lower cut score divides Tiers 3 and 2, whereas the upper cut score divides Tiers 2 and 1. Students in Tier 3 have a high probability of not meeting the selected end-of-year performance target (about 50%–90% will *not* meet the target); students in Tier 2 have a moderate probability of not meeting the target (about 25%–65% will *not* meet the target); and students in Tier 1 have a low probability of not meeting the target (about 5%–25% will *not* meet the target).

The advantages of using the aimswebPlus tiers to determine whose progress needs to be monitored include that they (a) provide a direct indication of risk, (b) are criterion-based, and (c) are not affected by the varying performance levels of schools and districts. In short, students in Tier 3 are at greatest risk and likely need intensive intervention to get on track to meet the defined performance target, while Tier 2 students are at moderate risk and may need additional help to achieve the target.

Tiers are derived from composite scores, which typically combine performance from standards-based assessments and curriculum-based measures. For example, the aimswebPlus Grade 3 Reading composite comprises the Vocabulary, Reading Comprehension, and Oral Reading Fluency measures. Because composite scores include both SBAs and CBMs, they provide the broadest and most accurate indicator of overall reading and math performance. Note that students will typically score at about the same level on all measures included in a composite, which means a student with a low score on one of the measures will also have low scores on the other measures. As such, when a composite score falls in Tier 3 (or, Well-Below Average), it is likely that scores on all the measures in the composite will be Below Average or Well-Below Average. When this occurs, the decision to monitor progress is straightforward.

A limitation of using tiers is that it is possible for a student to have a composite score in Tier 3 and one or more measure scores in the Average range. For example, a Well-Below Average Reading composite score and an ORF score in the Average range is indicative of a student who has developed basic reading skills but is struggling with higher-order thinking skills and concepts. When scores vary across measures (i.e., some in the Below Average or Well-Below Average range, and others in the Average or Above Average range), it is important to identify the source of the low performance before determining the best course of action. As a starting point, review the national percentile rank the student achieved on each measure that contributed to the composite, looking for the measure(s) with scores in the Well-Below Average and Below Average ranges. In addition, teachers can use the aimswebPlus Student Skills Plan report to conduct further analysis of the skill area(s) in which the student's performance is deficient.

Note that it is also possible for a student to score in the Well-Below Average range on an individual CBM and have a composite score in the Average range or in Tier 1. This profile indicates that the student is developing a good foundation on conceptual knowledge and standards-based skills, but is not fluent and/or lacks automaticity on basic skills. In this case, intensive intervention probably is not necessary, but the student may benefit from extra practice on these basic skills, and his or her performance in the next benchmark period should be carefully reviewed to ensure that the gap has not increased.

Finally, be aware that a limitation with strictly applying score ranges or tiers is that they do not differentiate between scores *near* the cut score from scores *far* from the cut score. For example, a student whose score is just above the cut score for Tier 1 (i.e., at the low end of the tier) or a student whose score is just above the cut between the Below Average and Average ranges may still need extra help. These students are more likely to drop into a lower tier (e.g., from Tier 1 to Tier 2) in the subsequent benchmark period than a student with a score well above the cut score. Because all scores contain some measurement error, scores near a cut score are within the expected measurement error, which reduces the certainty that the student truly belongs in a particular tier. When prioritizing resource allocation, consider giving highest priority to students with the lowest scores.

Determining Intervention Needs, Kindergarten and Grade 1

A different approach to determining intervention needs is recommended in Kindergarten and Grade 1. aimswebPlus provides several CBMs, each measuring an important and distinct foundational early literacy or early numeracy skill. Some of the skills follow a common progression, such that one precedes another. Because the aimswebPlus system flags all CBM scores in the Below Average and Well-Below Average ranges and because often more than one CBM is flagged for a given student, the first step is to prioritize the area(s) of greatest need based on day-to-day student performance and classroom observations.

Option 1: Prioritized Progress Monitoring

When scores on more than one measure are in the Well-Below Average range, teachers can prioritize progress monitoring to focus intervention resources on the area of greatest need first. Table 1 shows Early Literacy and Early Numeracy CBMs sequenced from easiest (left) to hardest (right), using average Winter number correct scores as a proxy for cognitive complexity. For instance, Kindergarten students can name more letters in 1 minute (LNF) than they can produce letter sounds (LWSF). Each sequence shown in Table 1 roughly approximates the instructional sequence as well (e.g., students are typically taught to recognize letters before they learn how to make letter sounds). Therefore, if a student's LNF and LWSF scores were both Well-Below Average, intervention would initially focus on letter naming and weekly progress monitoring of LNF. First, an LNF progress monitoring schedule would be established with a goal date that precedes the next benchmark period. If the student makes adequate progress toward the LNF goal, then create an LWSF progress monitoring schedule and begin intervening on letter sounds.

Table 1 Sequence of Early Literacy and Early Numeracy CBMs, by Grade and Season

Grade	Battery	Season	CBM
K	Early Literacy	Fall	IS, LNF, LWSF
K	Early Literacy	Winter	IS, LNF, LWSF, PS
K	Early Literacy	Spring	LNF, LWSF, PS, WRF
1	Early Literacy	Fall	LWSF, PS, WRF, ORF
1	Early Literacy	Winter	WRF, ORF
1	Early Literacy	Spring	WRF, ORF
K	Early Numeracy	Fall	NNF, QTF
K	Early Numeracy	Winter	NNF, QTF, QDF
K	Early Numeracy	Spring	NNF, QTF, QDF
1	Early Numeracy	Fall	NCF–P, MFF–1D
1	Early Numeracy	Winter	NCF–P, MFF–1D, MFF–T
1	Early Numeracy	Spring	NCF–P, MFF–1D, MFF–T

Not all skills are acquired in such clear sequence. For example, young learners typically practice naming numbers at about the same time they begin to count objects. However, number recognition advances more rapidly than counting for most learners. As such, it may be better to focus first on number recognition. One intervention technique is to pair rote counting, something young learners pick up quickly (especially when associated with a simple melody), with printed number lists to accelerate number recognition growth. Once the student has demonstrated adequate recognition of single-digit numbers, a scaffolded strategy can be used to help the student count objects in sets by pairing the objects with printed numbers. Note that these examples are provided to give users a general sense of how prioritization can work with aimswebPlus. A full list of strategies is beyond the scope of this guide.

Option 2: Simultaneous Progress Monitoring
With the simultaneous progress monitoring approach, progress monitoring and intervention begin simultaneously on every skill that falls in the Well-Below Average range. This is appropriate if there is sufficient time allocated to intervene on multiple skills (e.g., NCF–P and MFF–1D). As the intervention proceeds, progress in each area should be compared to determine whether the student is progressing adequately and relatively equally on each skill. If growth on any skill is substantially below the aimline, consider refocusing the intervention on that skill.

Determining Intervention Needs, Grades 2 Through 8
Overall, it is recommended that aimswebPlus tiers and performance levels be used to determine which students need intensive or supplemental intervention. Intensive intervention and weekly progress monitoring (PM) is recommended for students in Tier 3 or in the Well-Below Average range on the Reading or Math composite, as well as for students in the Well-Below Average or Below Average range on any one Reading or Math CBM. Tables 2 and 3 (Reading and Math, respectively) list scenarios in which a composite score, a CBM, or both are Well-Below Average and the recommended next steps. These tables also indicate the likelihood of each scenario, based on the aimswebPlus national norms database.

Table 2 Common At-Risk Score Profiles and Recommendations for Next Steps, Reading

Subject	Grades	Composite	CBM performance	Frequency	Next steps
Reading	2–3	Tier 3 or Well-Below Avg	Well-Below Avg to Below Avg	10%	Implement intensive reading intervention and weekly PM with ORF.
Reading	2–3	Tier 3 or Well-Below Avg	Avg or higher	1%	Evaluate performance on individual reading measures and review the Student Skills Plan report; provide additional reading support to build vocabulary and improve reading comprehension strategies.
Reading	2–3	Tier 1 or Avg	Well-Below Avg	1%	Reassess ORF below grade level; consider providing additional practice with oral reading and grade-level word identification.
Reading	2–3	Tier 2 or Below Avg	Below Avg	6%	Supplement core instruction; reevaluate at the next benchmark.
Reading	4–8	Tier 3 or Well-Below Avg	Well-Below Avg to Below Avg	7–8%	Implement intensive reading intervention and weekly PM with SRF.
Reading	4–8	Tier 3 or Well-Below Avg	Avg or higher	1–2%	Evaluate performance on individual reading measures and review the Student Skills Plan report; provide additional reading support to build vocabulary and improve reading comprehension strategies.
Reading	4–8	Tier 1 or Avg	Well-Below Avg	1–3%	Reassess SRF below grade level; consider providing additional reading practice on main idea, using texts at or below grade level.
Reading	4–8	Tier 2 or Below Avg	Below Avg	4–6%	Supplement core instruction; reevaluate at the next benchmark.

Table 3 Common At-Risk Score Profiles and Recommendations for Next Steps, Math

Subject	Grades	Composite	CBM performance	Frequency	Next steps
Math	2–8	Tier 3 or Well-Below Avg	Well-Below Avg to Below Avg	8–10%	Implement intensive math intervention and weekly PM with NSF.
Math	2–8	Tier 3 or Well-Below Avg	Avg or higher	1–2%	Evaluate performance on individual math measures and review the Student Skills Plan report; provide additional math support to build conceptual knowledge and problem solving strategies.
Math	2–8	Tier 1 or Avg	Well-Below Avg	1%	Reassess NSF below grade level; consider providing additional practice on number sense and computational skills.
Math	2–8	Tier 2 or Below Avg	Below Avg	5–7%	Supplement core instruction; reevaluate at the next benchmark.

Use With Learning Disability Qualification

The reauthorization of IDEA in 2004 included provisions for using an RTI-based approach as part of evaluating for specific learning disabilities (34 CFR 300.309; IDEA, 2004), often referred to as the dual-discrepancy model. With this model, a student may qualify as having a specific learning disability if the following conditions are met:

- The student does not achieve adequately to meet grade-level standards when provided with learning experiences and instruction appropriate for the child's grade level.
- The student does not make sufficient progress to meet grade-level standards when given scientific, research-based interventions in one or more of the eight learning areas.

Detailed guidance, which varies across states, is left to local education agencies. However, in some states, guidance may simply restate the dual-discrepancy model (i.e., IDEA provision 34 CFR 300.309). In the absence of explicit performance standards for each of these conditions, follow the guidelines provided below when using the aimswebPlus system.

aimswebPlus provides results for five learning areas: basic reading skills, reading fluency, reading comprehension, math computation, and math problem solving. Performance in the Well-Below Average range (1st–10th national percentile) on any reading or math measure indicates a significant performance deficit. Insufficient growth is indicated by a Fall-to-Winter, Winter-to-Spring, or Fall-to-Spring rate of improvement (ROI) on the corresponding SBA or CBM that is below the national average for that grade, season, and measure. The national norms tables available in the aimswebPlus platform (see Figure 2) provide median ROIs for all required measures and can be used to determine if progress is adequate.

Figure 2 Oral Reading Fluency National Norms Table, Grade 2

Grade	%ile	Fall Score	Winter Score	F ➜ W ROI	Spring Score	W ➜ S ROI	F ➜ S ROI
2	90-99 Well Above Average	117-400	137-400	1.25	157-400	0.63	1.06
	75-89 Above Average	97-116	115-136	0.88	132-156	0.64	0.92
	26-74 Average	46-96	61-114	1.08	77-131	1.08	1.05
	11-25 Below Average	21-45	39-60	1.29	52-76	1.04	1.05
	1-10 Well Below Average	0-20	0-38	0.64	0-51	0.84	0.65
	Mean	70.5	88.0	-	104.7	-	-
	SD	36.10	39.26	-	41.30	-	-
	N	2580	2776	-	2968	-	-

As previously stated, to be effective for weekly progress monitoring, measures must be brief, reliable, and sensitive to growth over relatively short intervals of time. To be sensitive to growth, the skills assessed must develop fairly rapidly and lend themselves to brief administration. Complex skills—those that involve reasoning and analysis—develop more slowly. For example, math word problems require reading, analyzing the knowns and unknowns, identifying a strategy, and solving the problem, which often involves computation. As such, the aimswebPlus standards-based measures of Concepts & Applications and Reading Comprehension are assessed during triannual interim assessment (i.e., benchmarking) and are not available for weekly progress monitoring.

Selecting the Grade Level of Monitoring Materials

After the decision has been made to monitor a student's progress and the measures to use have been selected, the next step is to determine the grade level of materials to use. Students at risk, especially those in Tier 3, are usually performing below grade level. As noted by Shapiro (2008, p. 148), "A student who is functioning below enrolled grade level will demonstrate little progress over time if monitored at levels that exceed his or her instructional level" and should consequently "be measured at his or her highest instructional level". In other words, monitoring progress using on-grade level materials may be inappropriate because those forms may be too difficult for a student functioning below grade level and may not reflect the content and skills most suited to the student's learning needs.

Determining the grade level for a progress monitoring goal should begin by analyzing the student's performance level on the composite and on the individual aimswebPlus measures. As previously described, frequent progress monitoring is recommended for students with composite scores in the Well-Below Average range and CBM scores in the Below Average and Well-Below Average ranges. The composite scores provide the broadest coverage of reading and math skills and are the most predictive of long-term risk. The CBM scores indicate possible deficits on basic skills and fluency.

The aimswebPlus system has five performance levels (i.e., Well-Below Average through Well-Above Average) that characterize the level of need. When using these performance levels to analyze student needs, please keep in mind the following:

- Below Average indicates that the student is struggling with some or many on-grade level concepts and skills and probably requires remediation using on-grade content.
- Well-Below Average indicates that the student has a significant performance deficit and will likely require remediation on content and skills introduced one to two grades *below* grade level.

For students in the Well-Below Average range on a composite or a CBM, survey level assessment is recommended to identify the appropriate grade level for progress monitoring. Survey level assessment (SLA) refers to a process of establishing the grade level at which to progress monitor a student. More specifically, SLA is a stepwise procedure in which the student is administered below grade-level CBM content in successive order, beginning with one grade level below, then two grade levels below and so on until the student's performance is *above* the 25th national percentile. The grade at which this occurs can be considered the student's instructional level and the grade level to use when creating a progress monitoring schedule.

In the aimswebPlus system, follow these steps to select and administer a CBM via the SLA screen (see Figure 3):

- Click the New button in the top right corner of the screen.
- In the Assess pop-up window that appears, select the measure using the Measure drop-down menu and the grade using the Grade drop-down menu. A form will be automatically assigned.
- For measures assessed via digital record form (DRF), click the Assess button to launch the DRF.
- For measures assessed online, click the Assign button. The page will reload and display information about the form assigned, including a ticket icon in the Score column. Click the ticket icon to obtain the TestNav username and password for the student.

Figure 3 Survey Level Assessment Screen

As experience with aimswebPlus increases, teachers and interventionists will develop expertise in interpreting performance patterns and identifying how those patterns relate to student needs. When that level of expertise is developed, it may be appropriate to forego a stepwise approach and go directly to the optimal grade level for progress monitoring.

Creating a Progress Monitoring Schedule

Creating a progress monitoring schedule consists of three basic components: a baseline score, a goal date, and a goal score. The baseline score is the first score included in the monitoring schedule. For most students who are monitored on-grade level, the benchmark score is used as the baseline. For students who are monitored off-grade level, the baseline score is obtained through the survey level assessment process (see previous section). The goal date is the date at which the progress monitoring schedule expires, and the goal score is the desired level of performance the student should achieve by the goal date. Typically, progress monitoring schedules are paired with a scientifically validated intervention plan.

The following steps describe a systematic process for creating an aimswebPlus progress monitoring schedule, as well as important considerations and recommendations to keep in mind.

Step 1: Select a Baseline Score

First, select a baseline score from the list of available scores (see Figure 4). This list includes all of the student's scores for a given CBM measure at a given grade level, including benchmark and progress monitoring scores. This list also shows the date of each score, the corresponding national percentile, and the total raw score. Select the baseline score at or just prior to the start of the intervention (i.e., the additional instructional support provided to the student to get her or him back on track).

Figure 4 Progress Monitoring Screen, Baseline Scores

Baseline		2.33 Current ROI
Date	**Nat'l %ile**	**Score**
○ 11/9/2016	24	44
○ 11/2/2016	23	42
○ 10/25/2016	21	39
● 10/18/2016	19	37

Step 2: Select a Goal Date

Next, select a goal date. The goal date can be set up to 1 year from the baseline date and should allow enough time to adequately assess the effectiveness of an intervention. It is recommended that users set goal dates at least 16 weeks after the start of the intervention. Because the aimswebPlus system uses growth norms to aid in goal setting and these growth norms are based on within-year growth (i.e., Fall to Spring), it is recommended that users set the goal date within the same school year as the baseline score.

It is common practice to begin interventions shortly after Fall benchmark testing and to define a Spring goal date. The goal date can be selected in the system by moving the slider or by clicking the − and + symbols (see Figure 5) in the Target Week & Monitor Frequency section. The default progress monitoring frequency is weekly testing. For less intensive interventions, choose a monthly testing schedule from the drop-down menu. As the slider moves, the goal date automatically adjusts.

Figure 5 Progress Monitoring Screen, Target Week & Monitor Frequency

| Target Week & Monitor Frequency |
|---|
| Week of − 12/20/2016 📅 + (10 weeks) Weekly ▼ |
| ← '16-17 '17-18 → |
| 2017   2018 |
| OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP |

Step 3: Set a Goal Score

Lastly, set a goal score. Select the goal score by moving the slider or by clicking the − and + symbols (see Figure 6) in the Goal Score section. Each click of the − or + symbol adjusts the goal score by 1 raw score point.

Figure 6 Progress Monitoring Screen, Goal Score
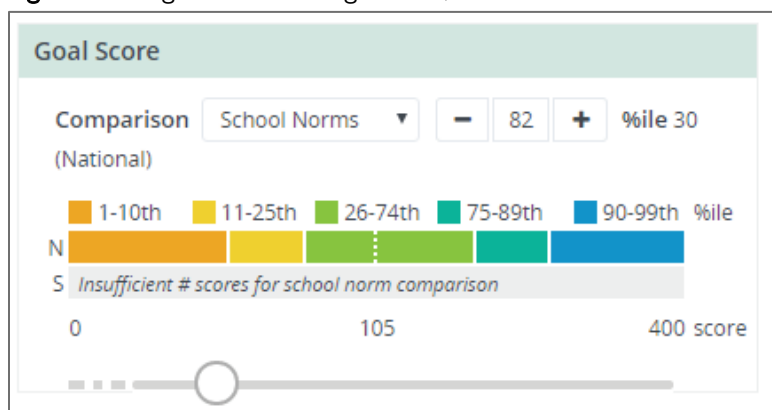
As the slider moves, the system provides feedback about the appropriateness of the goal. Four feedback levels, based on student growth percentiles (SGPs), are used to define the ambitiousness of the goal.

These feedback levels are defined as follows:

- **Insufficient** (SGP = 49 and below): The ROI is below the national average and will not sufficiently close the gap between a student's current score and the goal score.
- **Closes the Gap** (SGP = 50–85): The ROI is above the national average and will improve the student's score and corresponding percentile rank; however, it may not reflect the potential growth rate that can be achieved with a high quality, intensive intervention.
- **Ambitious** (SGP = 86–97): The ROI is well above the national average and will substantially improve the student's score and corresponding percentile rank.
- **Extremely Ambitious** (SGP = 98 and above): The ROI is greater than 97% of those in the national sample of students with a similar initial score level; such an ROI is rarely achieved in typical classroom settings.

Because feedback changes at each cut point between levels, the change can happen quickly. Click the − or + symbol to find the precise score that corresponds to each transition.

New users should define a goal at the bottom of the Ambitious range. This range begins at an SGP of 86 and is just above the top end of the Closes the Gap range. An SGP of 86 represents a growth rate achieved by just 15% of the national sample, which is why it is considered ambitious. However, it is reasonable to expect significantly higher than average growth when implementing effective, intensive intervention.

For very experienced users or when using an external criterion based on the raw score or national or local percentiles, simply select the criterion score and save the goal. If the criterion corresponds to the Insufficient or the Extremely Ambitious range, consider adjusting the goal. For more information about student growth percentiles, see Appendix A of this guide.

Goal Setting With Individual Education Plans

For students on Individual Education Plans (IEPs), it is customary to set a goal date about 1 year from the date of the baseline score. aimswebPlus can accommodate progress monitoring schedules that extend into the next school year. However, it is important to note that the slider in the Goal Score section

(see Figure 6) uses end-of-year Spring norms at the grade level selected for monitoring materials. For example, if a progress monitoring schedule using Grade 6 NSF forms extends from one school year to the next, the percentile shown in the Goal Score section is based on Grade 6 Spring norms.

In some situations, it may be more appropriate to divide the goal into parts. This may occur when a student is well-below grade level and the goal is to move the student to on-grade level performance. Even with effective intensive intervention, such a goal may be too ambitious to be accomplished in a single school year. Subdividing long-term goals benefits the teacher and the student. Generally, these students need to begin with below grade-level materials; as such, it is most useful to establish an interim goal on the current content for a given school year and then a subsequent goal when the new school year begins. This allows users to benefit from the use of goal feedback derived from national growth norms.

Evaluating Progress

aimswebPlus generates graphical displays of progress monitoring results, which can be accessed via the individual student reports within the system. These progress monitoring charts enable teachers to evaluate each student's progress on the measures being monitored and to determine whether progress is adequate, whether instruction and/or the goal should be modified, and if the goal has been met.

With each administration of a progress monitoring form, the student's total score is plotted on the progress monitoring chart for that measure. Each measure's total score is calculated the same way for benchmark and progress monitoring forms, making it easy to compare performance across the year. For example, the Oral Reading Fluency total score is equal to the number of words read correctly in 1 minute. Number Comparison Fluency–Triads and Mental Computation Fluency employ a correction for guessing when calculating each measure's total score: number correct minus one-half the number incorrect. Together, these measures' scores combine into a Number Sense Fluency (NSF) total score, which is the simple sum of the NCF–T and MCF corrected scores.

Figure 7 shows a sample progress monitoring chart for Oral Reading Fluency. The vertical axis represents performance (i.e., total raw score) and the horizontal axis represents time (i.e., test dates). Each score is plotted with a black dot and adjacent scores are connected by line segments. The goal score is depicted by the vertical bar on the right side of the graph, with its height corresponding to the goal score value and its horizontal position set at the goal date. The black line is called the aimline. It connects the baseline score to the goal score and provides a visual reference point for comparing progress toward the goal.

The projection line is one of three colors, depending on a student's progress toward the goal score: green (projected to meet or exceed goal), gray (projected to be near goal), or pink (projected to not meet goal). Derived from a least-squares regression model, the projection line is the *line of best fit* for all of the data points, indicating the average rate of growth across all available data points. This line extends from the baseline score to the goal date, approximating the student's performance at the goal date if the trend continues. Note that the projection line is included in the chart after the third progress monitoring score is plotted, including the baseline score. When a clear curvature in the trend is apparent, the linear growth projection should be interpreted with caution.

Figure 7 Sample Progress Monitoring Score Graph, Oral Reading Fluency
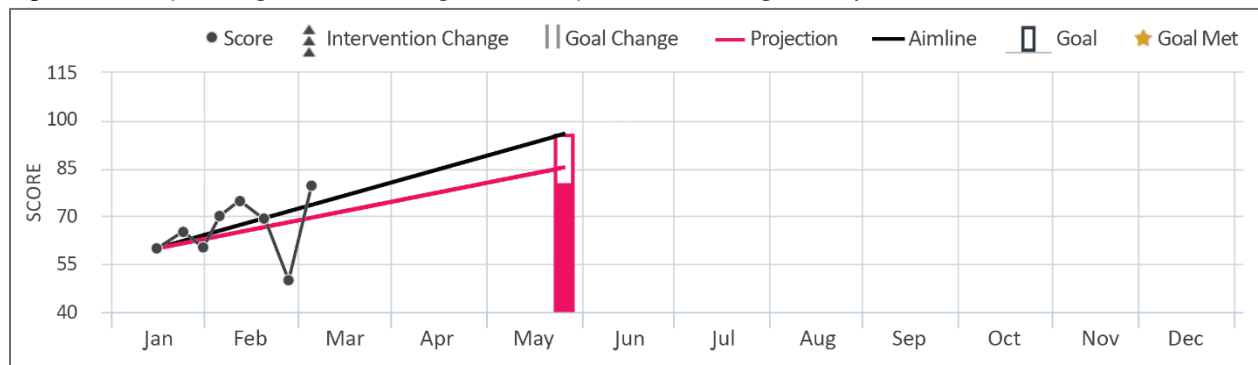
In addition, the aimswebPlus system uses information about the student's data points (e.g., amount, variability, time span) to construct a confidence interval for the score projected at the goal date. This statistically based feedback facilitates decisions about adequate growth and is recommended when the trend is linear and there are no severe outliers.

A confidence interval is a range of scores that has a certain probability of including a student's true score—in this case, the student's actual performance level at the goal date. Centered on the projected score, the confidence interval's size (i.e., how far it extends above and below the projected score) is a function of the amount of error in the projection line. Confidence intervals are smaller when the student's scores are tightly clustered around the projection line (i.e., little random variability), when the duration of progress monitoring is long, and when there are many data points.

aimswebPlus uses the 75% confidence interval as the basis for providing feedback about a student's likely outcome. This level of probability was selected because it provides the appropriate balance for the types of decisions being made. Though it is important to be confident when making decisions to change an intervention or raise a goal, there is a cost to waiting until the confidence level is too high, particularly when it means continuing with an ineffective intervention longer than necessary.

Using the relationship between the confidence interval and the goal score, aimswebPlus automatically generates one of the following statements:

- **Above Target. Projected to meet or exceed the goal.** Generated when the lower end of the confidence interval is above the goal score.
- **Below Target. Projected to not meet the goal.** Generated when the upper end of the confidence interval is below the goal score.
- **Near Target. Projected score at goal date: Between** *CI Lower End* **and** *CI Upper End.* Generated when the goal score is within the confidence interval.
- **Goal Met.** Generated when three or more scores exceed the goal score.
- **Goal Not Met.** Generated when the goal is not met by the goal date.
- **Indeterminate.** Generated when conditions generating a confidence interval have not been met.

The Above Target statement is an indication that the intervention is having the desired effect on learning and progress monitoring should continue. In some circumstances (e.g., if the original goal was less than Ambitious), this may indicate that the goal should be raised. The Below Target statement indicates that the intervention is not having the desired effect on student learning and an intervention change should be

considered. If an Extremely Ambitious goal had been set and sufficient time had elapsed (e.g., at least 8 weeks), this may be a signal that the goal should be lowered. The Near Target statement occurs when the projected score lies near the goal score or when there is a lot of uncertainty in the projected score (i.e., the confidence interval is very wide). If the confidence interval is mostly below the goal, it is likely that the student will not meet the goal, although one cannot state with confidence that this outcome will occur. Comparing the projection line with the aimline provides the same information via visual representation. (*Note.* The report does not display the confidence interval.)

As progress monitoring continues and additional data points are collected, the projected score typically becomes more accurate, thereby increasing the validity of decisions about whether the student is on track to meet the goal. The length of time required for an accurate decision varies from student to student, depending on the number and variability of available scores, the linear or curved nature of the trend, and how much lower or higher the projection line is than the aimline.

To support this claim, a large data simulation study was conducted to examine some factors that influence the duration and number of administrations needed to make highly accurate predictions about goal attainment, as well as to evaluate the accuracy of predicting the true slope from the observed slope. The principal finding suggests that an average of approximately 14 weekly administrations would be needed to obtain highly accurate predictions (Christ, Zopluoglu, Long, & Monaghen, 2012); however, this outcome represents an upper limit of the duration required and does not take into account actual goals. aimswebPlus researchers evaluated a large sample of actual progress monitoring data and found that 10 to 12 weekly administrations are sufficient to produce highly accurate predictions of goal attainment. Investigation into this topic is ongoing, with additional feedback and data being collected to better understand the relationship between duration of progress monitoring and accuracy of predictions.

Historically, multiple methods have been used to interpret the trend of a student's progress monitoring scores and to support decisions regarding whether a student is advancing at the desired rate and whether changes need to be made to the intervention and/or the goal. These methods of time-series analyses include visually analyzing the pattern of data points, counting consecutive score points relative to the aimline, and comparing the projection line to the aimline. Note that each method has advantages and disadvantages. For a discussion of the visual analysis of progress monitoring data, see Appendix B of this guide.

Case Studies

Four sample case studies are provided here, illustrating how to use aimswebPlus for progress monitoring. The case studies include use of both on- and off-grade materials from each content area.

Case Study 1: Early Numeracy, Kindergarten, On-Grade

Natalie Katz is a Kindergarten student whose progress is being monitored on Quantity Total Fluency (QTF). Her progress monitoring plan was established just after the Fall benchmark assessment. Her Early Numeracy composite score was in the Below Average range, with a national percentile of 24. Natalie performed well on Number Naming Fluency, naming 32 numbers correctly without errors, which placed her at the 59th national percentile. Her performance was Below Average on Concepts & Applications, with a score of 8 and a national percentile of 23.

Natalie's QTF benchmark score of 7 was also in the Below Average range, corresponding to the 12th national percentile. After 6 weeks of monitoring, the system indicated that at her current growth rate, Natalie was projected to be below the goal score of 15 at 20 weeks (see Figure 8). As a result, her teacher decided to increase the intensity of the intervention and to alter the approach. The new intervention was a success: Natalie's QTF scores steadily increased, and by the 12th week she was projected to meet her goal (see Figure 9).

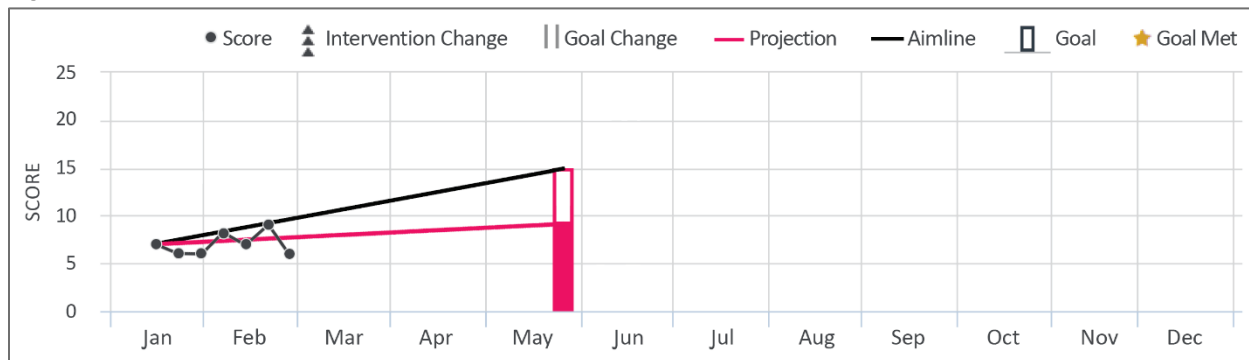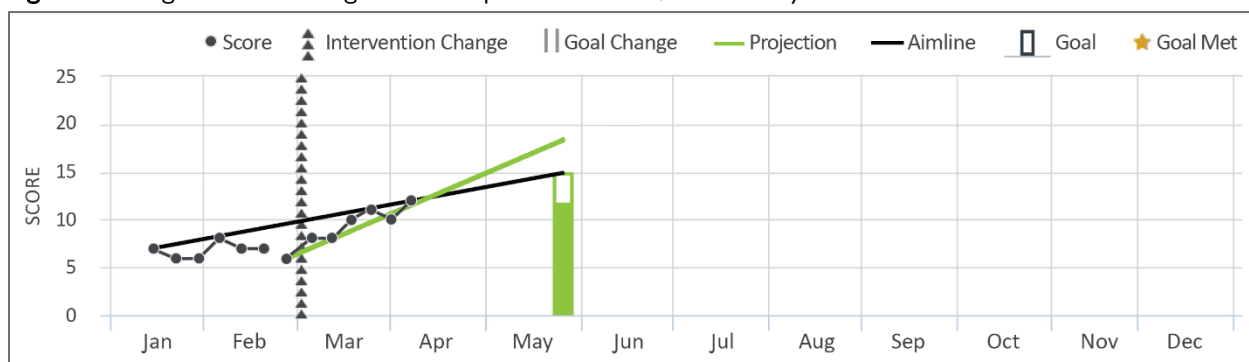**Figure 8** Progress Monitoring Score Graph at Week 6, Case Study 1

Figure 9 Progress Monitoring Score Graph at Week 12, Case Study 1

Case Study 2: Early Literacy, Grade 1, Off-Grade

Mason Day is a first-grade student with limited English language proficiency. He was administered Oral Reading Fluency (ORF), Letter Word Sounds Fluency (LWSF), and Auditory Vocabulary (AV) during Fall benchmarking. His scores were:

- ORF: 1st percentile (discontinued due to inability to correctly read any words)
- LWSF: 2nd percentile (21 points, 8 errors)
- AV: 8th percentile (20 points, 5 errors)

Mason's Early Literacy composite score was at the 6th percentile, which placed him in Tier 3. This indicates a high risk of not meeting the end-of-year performance target of the 25th national percentile.

The aimswebPlus system automatically alerted the user to consider progress monitoring Mason on LWSF and ORF because his scores were below the 25th national percentile. Note that AV is *not* available for progress monitoring. Teachers use this measure's information as an indicator of students' understanding of spoken words, language development, and possible vocabulary deficits.

Mason was unable to accurately read any of the highly decodable words in the progressive oral reading passages and he missed 8 of the 29 letter sounds attempted. For comparison, the average Grade 1 student during Fall benchmarking accurately says about 45 letter sounds with fewer than three errors and accurately reads 25 to 30 words per minute on ORF, with two to three errors. Because Mason is not ready to decode printed words and is struggling with letter sounds, his teacher decided to further evaluate his foundational reading skills.

The aimswebPlus measures that focus on prereading foundational skills are at the Kindergarten level and are considered off-grade level in this case. For off-grade level progress monitoring, aimswebPlus provides the survey level assessment option (see the Selecting the Grade Level of Monitoring Materials section of this guide for more information, including how-to steps). Mason's teacher selected Letter Naming Fluency (LNF) and Phoneme Segmentation (PS) as a starting point. Because these measures are only available in Kindergarten and all forms are of equal difficulty, it is not necessary to establish a grade level.

Mason's scores are shown in Figure 10. The table reports Mason's total score and corresponding national percentile. The national percentile is based on Kindergarten Spring norms, which is the nearest off-grade level percentile available for each measure. Because both scores are below the 25th percentile, his teacher should consider setting up a progress monitoring schedule for both LNF and PS.

Figure 10 Survey Level Assessment Scores, Case Study 2

Measure ▲	Grade	Date	Score		Nat'l %ile	Monitor
LNF	K	9/19/2016	38		18	⊕
PS	K	9/19/2016	24		12	⊕

By default, Mason's scores earned via survey level assessment are treated as his baseline scores. For LNF, his teacher set a target week, selected a goal score, and saved Mason's progress monitoring schedule. Once saved, Mason's teacher can view his progress monitoring score graph via the Individual Monitoring screen in the aimswebPlus system. This graph displays the baseline score, the aimline, the projection line, the goal score, and indicates progress toward the goal (see Figure 11).

As Mason is administered weekly progress monitoring forms, his scores will be included in the graph and his projection line will adjust accordingly. Note that the projection line is displayed in gray after three forms have been administered (including baseline). After at least four forms have been administered and 6 weeks have elapsed, the projection line is color-coded to indicate progress toward the goal as follows: green (projected to meet or exceed goal), gray (projected to be near goal), or pink (projected to not meet goal).

Figure 11 Progress Monitoring Score Graph at Week 7, Case Study 2
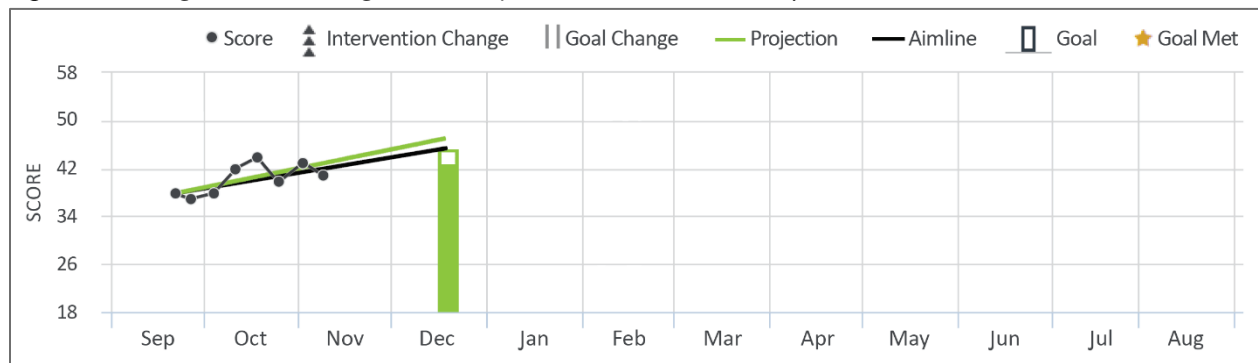
Case Study 3: Oral Reading Fluency, Grade 3, On-Grade

Sana Kaneko is a third-grade student who transferred to a new school in February. Although Winter benchmark testing had been completed, her teacher wanted to determine Sana's reading and math skills, and identify any areas in these subjects that required remediation. Sana completed the reading and math benchmark measures at the end of February.

Sana performed in the Average range on Concepts & Applications and Above Average on Number Sense Fluency. Her reading composite score of 367 placed her at the 26th national percentile, which is at the low end of the Average range. On Oral Reading Fluency, she read 70 words correctly per minute, with 10 errors, placing her at the 15th national percentile. On Vocabulary, her growth scale value score of 175 placed her at the 43rd national percentile. Finally, Sana's Reading Comprehension growth scale value score of 157 placed her at the 30th national percentile.

The school principal had established a school-wide Spring target of the 40th national percentile. With this target, Sana's score was in Tier 2. Based on this information, she is at moderate risk for not reaching the target. Given her overall risk level and Below Average performance on ORF, Sana's teacher placed her on strategic monthly monitoring on this measure.

Case Study 4: Number Sense Fluency, Grade 6, Off-Grade

Javier Ortiz is a sixth-grade student who has been struggling with math since third grade. His school recently adopted a multi-tiered system of supports (MTSS) approach for identifying students with learning disabilities and are in their first year of using aimswebPlus.

Javier's struggles in math were reflected in his Fall benchmark math scores (each score in parentheses):

- Math Composite: 4th national percentile (179)
- Concepts & Applications: 11th national percentile (178)
- Number Sense Fluency: 4th national percentile (1)
  - Mental Computation Fluency: 10th national percentile (1)
  - Number Comparison Fluency–Triads: 4th national percentile (0)

Note that the math composite score is the sum of CA and NSF scores. Because the composite comprises all available information from aimswebPlus about the student's math ability, it is the most reliable and accurate predictor of a student's expected performance on the end-of-year state math test. However,

because CA is untimed and is designed to provide diagnostic information about areas of strength and weakness, it is not practical or meaningful to monitor CA progress on a weekly basis.

On the other hand, NSF comprises two brief CBMs that measure critical foundational skills that are highly predictive of overall math performance. These measures have correlation coefficients with state math tests generally in the 0.70s and 0.80s, and are more sensitive to skill development than CA. NSF combines scores from MCF, which measures a student's ability to solve one- and two-step mental computation problems, and NCF–T, which measures a student's ability to compare numbers within and across number systems. Although friendly numbers (e.g., round) were used to make the mental math easier to compute, the numbers and operations reflect on-grade level content.

Success on the number and operation concepts and skills introduced in Grade 6 depends on a student's successful mastery of prerequisite skills introduced in earlier grades. As such, it is important to consider the content of the math CBM when selecting the appropriate grade level of the forms to use for progress monitoring. Most students in the Well-Below Average range on the aimswebPlus math composite have likely *not* mastered critical prerequisites introduced from one to three grades below grade level. Therefore, off-grade progress monitoring is often recommended for students in this category.

Tables 4 and 5 show the topics assessed in NCF–T and MCF, respectively. Note that the Grade 6 forms emphasize mental mathematics with fractions. Javier was unable to correctly answer any of the NCF–T items and only one MCF item, which indicates that he lacks a basic understanding of fractions. Because of this skill deficit, Javier's teacher decided to start with Grade 4 using the SLA process. Javier's scores were:

- NCF–T: 6 (28th national percentile, relative to Grade 4 norms)
- MCF: 7 (31st national percentile, relative to Grade 4 norms)
- NSF: 13 (26th national percentile, relative to Grade 4 norms)

These scores are at the low end of the Average range, suggesting that Javier's instructional level is Grade 4. However, analysis of his performance by topic area via the Student Skills Plan report revealed that Javier did not answer any of NCF–T's 4-digit comparison or fractions items correctly. Moreover, he incorrectly answered all of the 4- and 5- digit addition and subtraction items, as well as the items involving division of a 3-digit multiple of 10 by a 1-digit number.

Based on this information, Javier's teacher opted to administer a Grade 3 NSF form. His scores were:

- NCF–T: 15 (58th national percentile, relative to Grade 3 norms)
- MCF: 9 (57th national percentile, relative to Grade 3 norms)
- NSF: 24 (59th national percentile, relative to Grade 3 norms)

After examining the Grade 3 results, including performance by topic area, Javier's teacher determined that he needed to develop his understanding of base ten with 3- and 4-digit numbers and to improve his addition, subtraction, and basic multiplication skills. Therefore, she decided to set a goal using the Grade 3 progress monitoring forms.

Table 4 Number Comparison Fluency–Triads Item Counts, by Skill Area and Grade

Skill area	Grade						
	2	3	4	5	6	7	8
2-digit comparisons	17	5	--	--	--	--	
3-digit comparisons	23	23	10	--	--	--	--
4-digit comparisons	--	12	20	15	--	--	--
5-digit comparisons	--	--	--	5	--	--	--
Fractions	--	--	10	15	24	16	14
Fractions and decimals	--	--	--	--	8	8	4
Decimals	--	--	--	5	8	8	4
Negatives	--	--	--	--	--	8	7
Scientific notation	--	--	--	--	--	--	7
Squared numbers	--	--	--	--	--	--	4
Item total	40	40	40	40	40	40	40

Table 5 Mental Computation Fluency Item Counts, by Skill Area and Grade

Skill area	Grade						
	2	3	4	5	6	7	8
Add and subtract multiples of 10 and 100	36	--	--	--	--	--	--
Add and subtract 2- and 3-digit numbers	6	--	--	--	--	--	--
Add and subtract 3- and 4-digit numbers	--	26	--	--	--	--	--
Multiply 1-digit with 2- or 3-digit multiples of 10	--	16	--	--	--	--	--
Multiply 1-digit with 2- or 3-digit multiples of 10 or 100	--	--	9	--	--	--	--
Divide 3-digit multiples of 10 by 1-digit numbers	--	--	6	--	--	--	--
Add and subtract 4- and 5-digit numbers	--	--	27	16	--	--	--
Multiply and divide multiples of 10	--	--	--	8	9	--	--
Add and subtract fractions with like denominators	--	--	--	6	3	--	--
Order of operations	--	--	--	6	12	12	--
Add and subtract fractions with unlike denominators	--	--	--	6	10	10	10
Multiply decimals (tenths) by whole numbers or decimals (tenths)	--	--	--	--	8	5	4
Divide whole numbers by fractions	--	--	--	--	--	4	6
Solve for y in 1- or 2-step equations	--	--	--	--	--	11	16
Add and subtract negative numbers	--	--	--	--	--	--	6
Item total	42	42	42	42	42	42	42

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Appendix A

Student Growth Percentiles

Performance-level percentiles and performance benchmarks are useful for defining meaningful performance goals for individual students. However, before deciding on a goal for a given student, it is desirable to evaluate the *reasonableness* of that goal. One way to determine this is to compare the rate of improvement (ROI) needed to reach the goal with the ROIs of students who are starting out at about the same level of performance. If the goal ROI for the student is high and rarely observed amongst his or her peers, recognize that this goal will likely be very challenging. Similarly, a goal ROI that is commonly achieved may be insufficient for a student receiving instructional intervention.

In aimswebPlus, a student's ROI is the average increase in his or her raw score per week. The aimswebPlus system calculates a student's goal ROI (i.e., the rate of improvement needed to reach the goal) as follows:

$$ROI = \frac{(Goal\ Score - Initial\ Score)}{Weeks\ Elapsed}$$

The *initial score* is the score at the start of the progress-monitoring period; often, this is the score from the Fall or Winter benchmark testing. The *goal score* is the expected score at the end of the instructional period, which is typically 1 academic year (or 36 weeks). The *weeks elapsed* is the number of weeks between the dates of measurement.

To illustrate, take a Grade 4 student who obtained a Number Sense Fluency score of 10 during Fall screening. The student's teacher defined a Spring screening goal score of 28. Therefore, the goal ROI is:

$$ROI = \frac{(28 - 10)}{36} \rightarrow \frac{18}{36} \rightarrow 0.50$$

This student would need to gain 0.5 points per week on the NSF measure to reach the goal score of 28 by Spring benchmark testing.

aimswebPlus' student growth percentiles (SGPs) convey the reasonableness of ROIs by comparing them to seasonal and annual growth rates of students with a similar initial score in the national sample. As such, SGPs indicate whether growth is About Average, Above Average, or Below Average as compared to their similarly performing peers.

In the above example, based on aimswebPlus national ROI growth norms, an ROI of 0.5 points per week for a Grade 4 student is Above Average and corresponds to the 75th percentile when compared with other students whose Fall screening scores were at a similar level. Growth rates in this range are labeled Closes the Gap because they exceed the average growth rate and, if achieved, will move the student from the 18th percentile in Fall screening to the 42nd percentile in Spring screening.

SGPs compare each student's growth rate to students with a similar level of initial performance (e.g., Fall screening score) because aimswebPlus researchers and others (Silberglitt & Hintze, 2007) have observed that the average rate of growth is often related to the initial level of performance. In general, students with very low initial performance levels tend to have lower ROIs, unless they are receiving supplemental

instruction. Students with very high initial scores also tend to have relatively low ROIs, partly because of regression effects and partly because their ability to demonstrate their skill may be limited by the score range of the measure. By constructing separate SGPs for various levels of initial performance, the SGPs adjust for any ROI differences caused by the initial performance level. (For details regarding ROI norms development, see the *aimsweb ROI Growth Norms Guide* available at www.aimsweb.com.)

A key element to the success of a multi-tiered system of supports program is setting meaningful goals. An important contribution of CBM progress monitoring is the articulation of performance goals that are measurable, meaningful, and manageable. Within CBM progress monitoring, goals are measurable because they are expressed in terms of the raw total score on each measure. The total score is directly observable and easy to attain. For most aimswebPlus CBMs, the total score is equal to the number of items correctly answered.

However, by themselves, raw scores have limited meaning. Without other criteria or lots of prior experience, it is difficult to ascertain if a given raw score goal will be appropriately challenging for the student and if it represents a level of achievement that closes the gap, putting the student back on track for success. For these reasons, the aimswebPlus goal slider tool (see Figure 6) was designed to assist the teacher in establishing meaningful goals. This goal slider provides three ways to interpret the meaningfulness of the goal:

- Raw total score (e.g., words read per minute for ORF) and corresponding national percentile for the grade and season of the goal date
- Color-coded horizontal scale using the corresponding national or local percentile
- Feedback about the ambitiousness of goals, based on the national student growth percentiles (i.e., Insufficient, Closes the Gap, Ambitious, Extremely Ambitious)

After a meaningful goal has been established, all of the student's progress monitoring scores are automatically loaded into his or her progress monitoring chart, making the charting process easy to manage in the aimswebPlus system.

Appendix B

Visual Analysis

Visual analysis should be a part of every progress monitoring data review. Although subjective, a visual analysis is relatively easy to conduct and enables the user to account for unusual characteristics in the pattern of scores that may interfere with interpreting the projection line. However, it is important to note that visual analysis does *not* give a numerical answer to the question of whether a student is likely to reach his or her goal.

An outlier—an individual score that is highly discrepant from the general trend—can be easily identified on visual inspection. Outliers can significantly affect the projection line, especially when they occur near the beginning or the end of the progress monitoring period. If the user determines that an outlying score likely is not a valid indicator of the student's true ability at that point in time (e.g., the student was ill or distracted, a procedural flaw in administration or scoring occurred), then making a mental adjustment of the projection line is appropriate.

Figures B1 and B2 illustrate the effect of a low-scoring outlier on the projection line. In Figure B1, the Week 6 outlier lowers the projection line, suggesting that the student will not meet his or her goal at the present rate of growth. When the outlier is removed, the projection line steepens, indicating that the student is likely to meet the goal at the present growth rate (Figure B2).

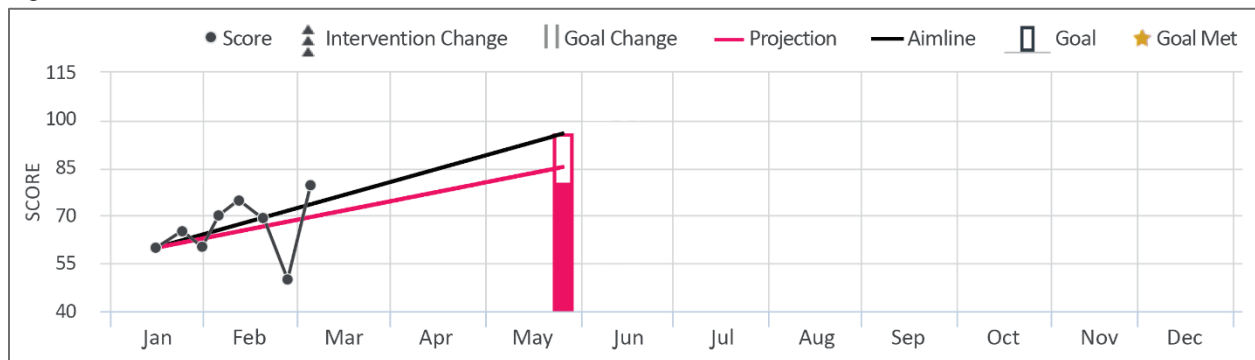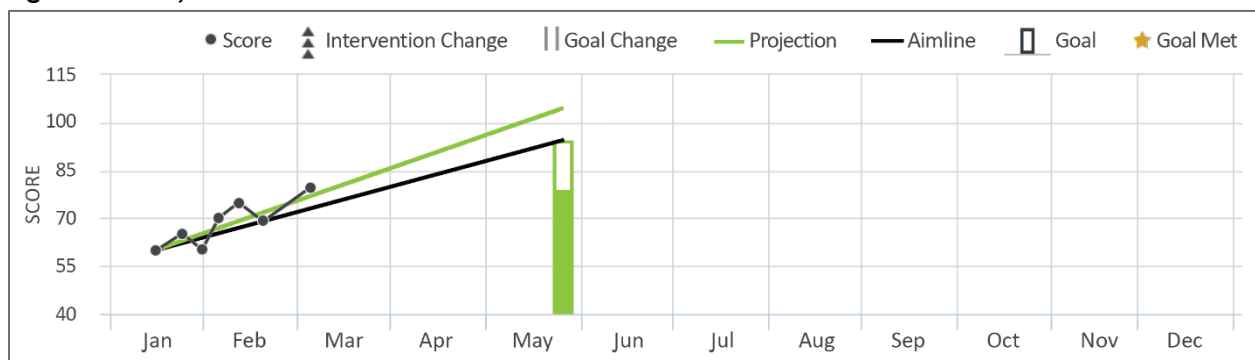**Figure B1** Projection Line With Outlier

Figure B2 Projection Line With Outlier Removed

Similarly, a nonlinear pattern of score growth can make the projection line a less accurate description of the student's progress and a predictor of future performance. Figure B3 illustrates a curved pattern of score growth, with the linear projection line superimposed. Although the curved shape of the growth trend often is not as clear cut as illustrated here, the user should take apparent nonlinearity into account when interpreting the results of other data analysis methods, including rules of thumb, projection lines, and confidence intervals.

Figure B3 Projection Line With Nonlinear Pattern of Score Growth
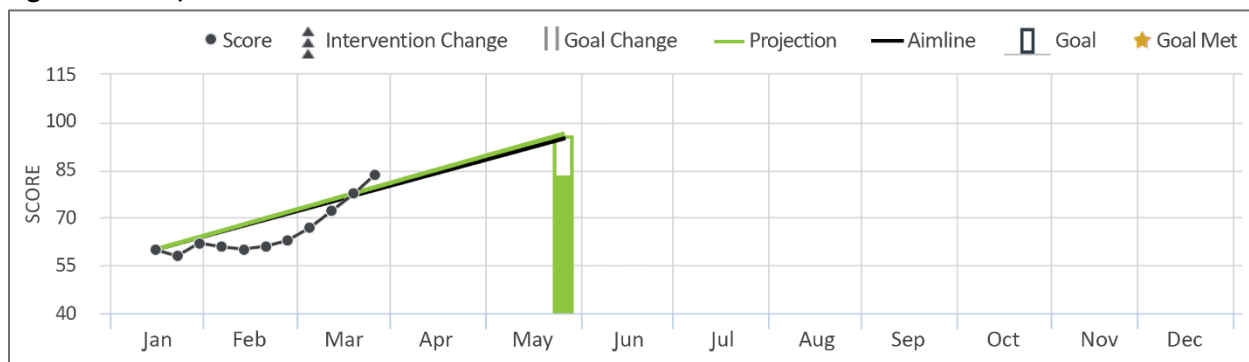
Visual analysis is also useful for identifying the amount of random variability of scores around the trend. Be aware that some students show a more consistent set of scores than others do, meaning their scores stay closer to the growth trend. Conversely, other students perform erratically, which could be the result of gaps in skill development, variable levels of motivation, and/or inconsistent measurement conditions.

When a large amount of "scatter" is apparent in the scores, discerning the trend can be difficult. The more variable the scores are, the less accurate the prediction of future performance can be. Figures B4 and B5 illustrate two sets of scores, one with little scatter (Figure B4) and the other with a large amount of scatter (Figure B5). Both show a linear growth pattern; however, it is more difficult to discern the pattern when more scatter is apparent in the scores, as shown in Figure B5.

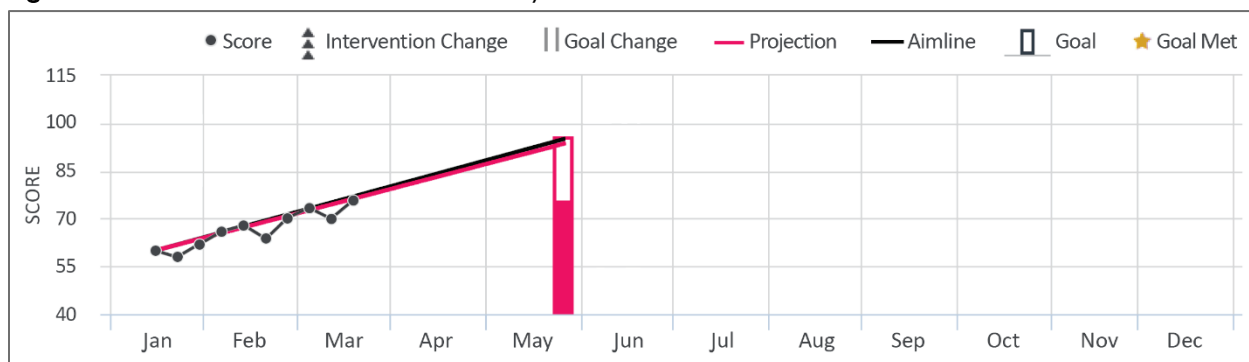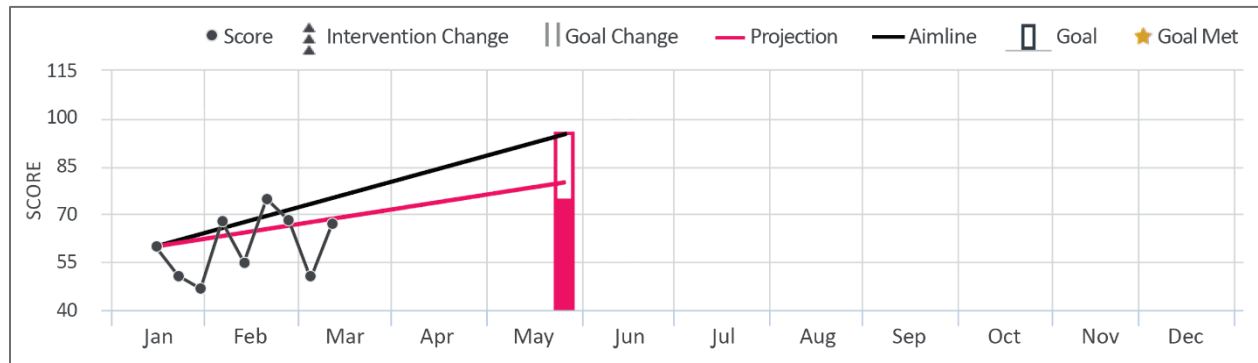**Figure B4** Score Pattern With Low Variability

Figure B5 Score Pattern With High Variability

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