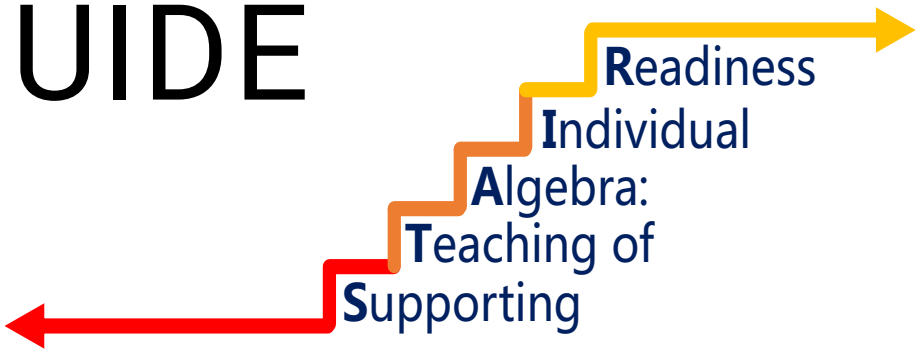
PROJECT STAIR ASSESSMENT WITHIN DATA-BASED INDIVIDUALIZATION GUIDE



Project STAIR is a federally-funded research project that supports middle-school math teachers in implementing data-based individualization (DBI). STAIR coaches work with teachers to help support students who experience difficulty with math to develop algebra readiness skills needed to be successful in high school and beyond. Project STAIR is supported by the Office of Special Education Programs (OSEP) under grant H326M170006. The project is housed at the University of Missouri, Southern Methodist University, and the University of Texas at Austin.

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Project STAIR Assessment within Data-Based Individualization

In this guide, we provide suggestions for assessments while implementing Data-Based Individuation (DBI) to support middle school algebra readiness.

ASSESSMENT WITHIN DBI GUIDE

The intent of this guide is to provide examples and resources for the professional learning (PL) communities, leadership teams, and educators who are assigned students with an identified mathematics (math) learning disability or students who experience significant difficulty in the are of math.

THE MAIN OBJECTIVES INCLUDE

1) Data-Based Individualization (DBI) and Project STAIR (Supporting Teachers of Algebra: Individual Readiness).
2) Key Assessment Types and Uses,
3) Graphing and Decision Making,
4) Aligning Assessments in a DBI Framework,
5) Virtual Assessment Strategies.

Project STAIR

Supporting Teaching of Algebra: Individual Readiness

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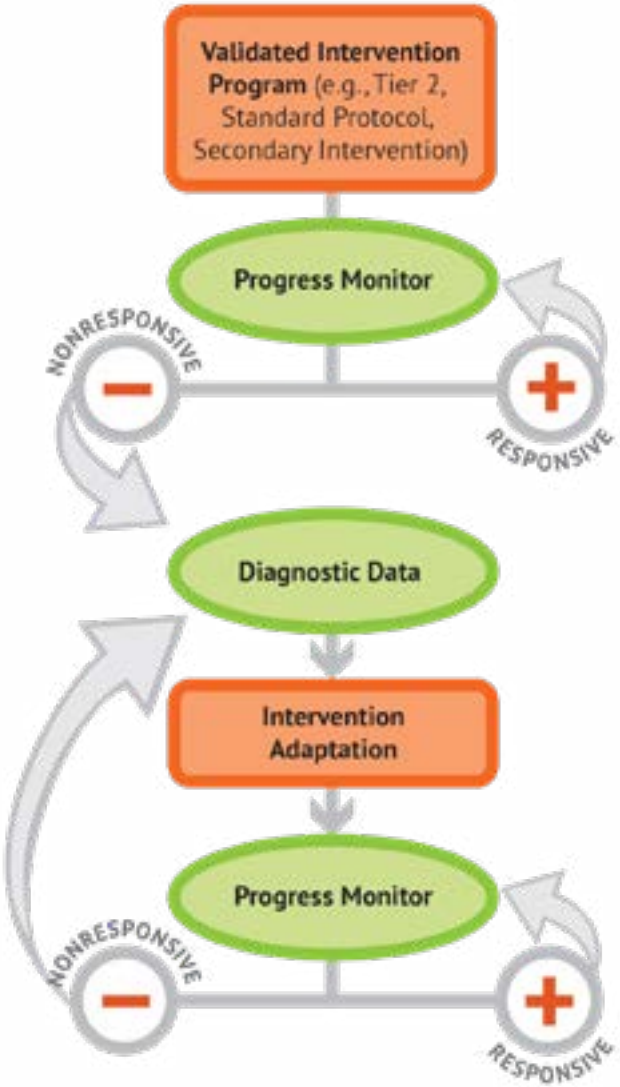
WHAT IS DBI FOR MATH WITH MIDDLE SCHOOL STUDENTS?

Data-Based Individualization (DBI) for middle school math is a systematic, data-based approach for teachers to individualize instruction to prepare students for the rigors of algebra coursework in late middle school or high school. DBI is a research based process for individualizing and intensifying interventions through the systematic use of assessment data and validated interventions, as shown in Figure 1 (NCII, 2020)

Figure 1.
National Center on Intensive Intervention Data-Based Individualization Framework



Defining DBI

Data-Based Individualization

WHAT ARE THE MAIN ELEMENTS OF DBI?

Data-Based Individualization (DBI) integrates instructional design principles and assessments to create individualized, responsive intervention for students with persistent learning needs. DBI serves as the overarching approach for addressing individual student needs when learning pre-algebraic concepts by providing the context and rationale for the integration of formative assessment data with teachers' decisions about the selection and use of evidence-based instructional practices (Project STAIR, 2020).

DBI has three main characteristics: (1) systematic, (2) relies on data, and (3) helps individualize instruction. Teachers should be systematic in their collection of data and intervention implementation. The second characteristic encourages reliance on data for instructional decision making in classrooms. The aim is to move away from making subjective decisions to objective changes when looking at how students are responding to the intervention and instruction that is in place. The third characteristic of DBI is to individualize instruction for students who are most at risk for struggling before taking Algebra 1 (Project STAIR, 2020).

Key Points about DBI from the National Center of Intensive Intervention

- **DBI is a validated process, and not a single intervention program or strategy.**
- **DBI is an ongoing process in which intervention and assessment are linked and used to adjust a student's academic or behavior program over time.**
- **DBI is not domain-specific, meaning that a student may receive DBI in one domain (e.g., math or reading) or even on one component of that domain (computation or fluency) while receiving core or supplemental instruction in other domains (e.g., number sense). DBI can be implemented in multiple domains at the same time, responding to the learning needs of the student.**
- **For the students with the most intensive needs, it is likely that they will require DBI over a sustained period of time. Decisions about if and when to reduce the intensity and individualization of the intervention must take into account the student's responsiveness, as well as the breadth and nature of skill deficits to be addressed (NCII, 2020).**

For more general information NCII: DBI Framework (NCII, 2020)

Defining DBI

Data-Based Individualization

WHAT EVIDENCE SUPPORTS DBI?

Data-Based Individualization (DBI) is a framework for intensifying intervention in which systematic student-level formative assessment data are used to determine when and how a student's intervention should be modified (NCII, 2013). Research demonstrates that students who have intensive needs benefit from more practice and different instructional approaches to learn new information. In fact, these students require up to 10 to 30 times more practice than their peers do to acquire math skills (Fuchs, Fuchs, Powell, et al., 2008; Gersten et al., 2009). In other words, *standard teaching techniques are simply not enough*. Educators must organize their time to maximize students' learning opportunities, including focused instruction, and engaging, varied practice. Furthermore, they must regularly evaluate their efforts to determine whether the current program is working. Importantly, a review by Stecker, Fuchs, and Fuchs (2005) noted that frequent progress monitoring with Curriculum-Based Measurement (CBM) is not enough, by itself, to improve student achievement. Instead, progress monitoring must be combined with systematic rules for using data to make decisions, analysis of students' skills, and guidance on making appropriate program modifications (Project STAIR, 2020).

DBI is often implemented within a Multi-Tiered Systems of Support (MTSS) framework, such as RTI, to support students for whom core instruction (i.e., Tier 1) and secondary intervention (i.e., Tier 2) have been insufficient to facilitate adequate academic or social behavior progress. DBI supplements Tier 1 and 2 supports depending on student need and may be applied to a specific skill area. That is, a student may develop proficiency in aspects of measurement and geometry through core instruction and achieve grade-level computational fluency with secondary intervention but require DBI to improve specific algebra-readiness skills. Alternatively, a student with global math difficulties may require DBI in all areas (Project STAIR, 2020).

WHY IMPLEMENT DBI?

Some students do not respond to research-based interventions. DBI provides the framework to individualized instruction. It is important to have a process an educator can follow when making meaningful instructional decisions for the students who need additional intervention or support. Research in DBI has shown that when teachers use the DBI framework correctly, student achievement can improve (Powell et al., 2021). It is a critical for teachers to have this process in their toolbox for effective math instruction (Project STAIR, 2020).

Defining DBI

Data-Based Individualization

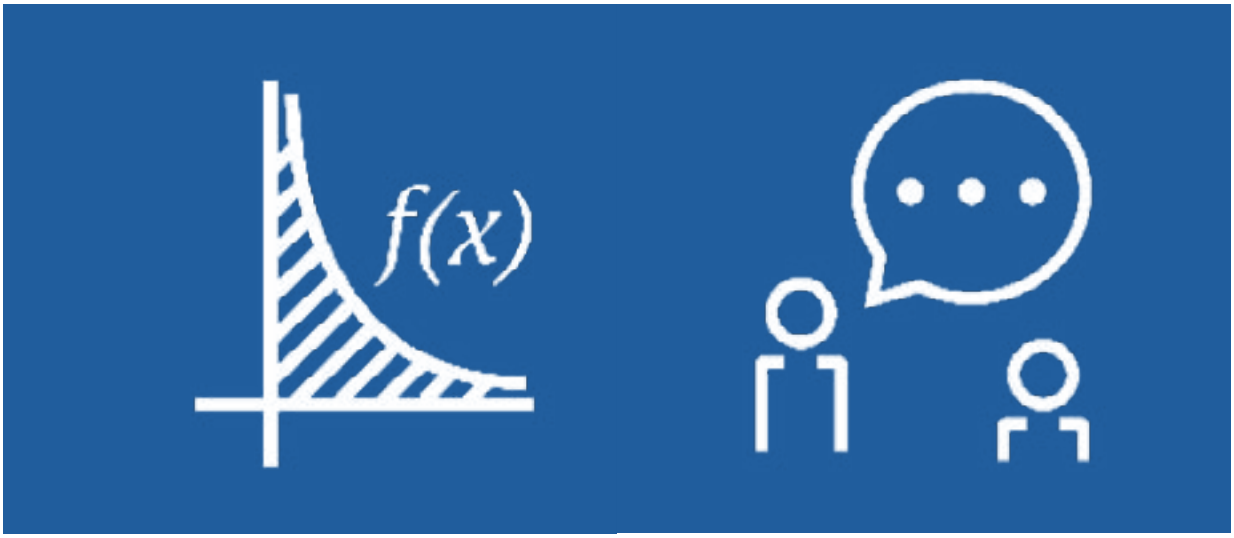
WHO SHOULD RECEIVE DBI IN MIDDLE SCHOOL MATH?

The DBI process should be implemented when a student is not responding adequately to an evidence-based program or instruction implemented with fidelity. DBI is intended for students who require intensive individualized instruction. These are students for whom core instruction or supplemental intervention is not sufficient and has not worked in the past. It can also be implemented with students who have been identified as needing Tier 3 instruction as part of an RTI model or students who are on IEPs (Project STAIR, 2020).

WHAT IS PROJECT STAIR?

Project STAIR targets middle school students, in order to provide early intervention for students with difficulties who may be struggling to reach proficiency in pre-algebraic knowledge and skills. By supporting middle-school students' understanding of and proficiency with these concepts, the goal of Project STAIR is to prepare students with math difficulties to be ready for Algebra 1 in high school. To reach this goal, the research team designed Project STAIR, a four-year model demonstration project (OSEP) that will contribute empirical evidence to the research and practitioner literature on the effectiveness of a system of instructional practices for supporting middle-school students with math difficulties' readiness for algebra (Project STAIR Overview, 2020).

The long-term goal of this model demonstration project is to contribute empirical evidence on the effectiveness of a professional development system of instructional and assessment practices for supporting the algebra-readiness of middle school students (Project STAIR Overview, 2020).



Defining DBI

Data-Based Individualization

HOW DO PROJECT STAIR AND DBI FIT TOGETHER?

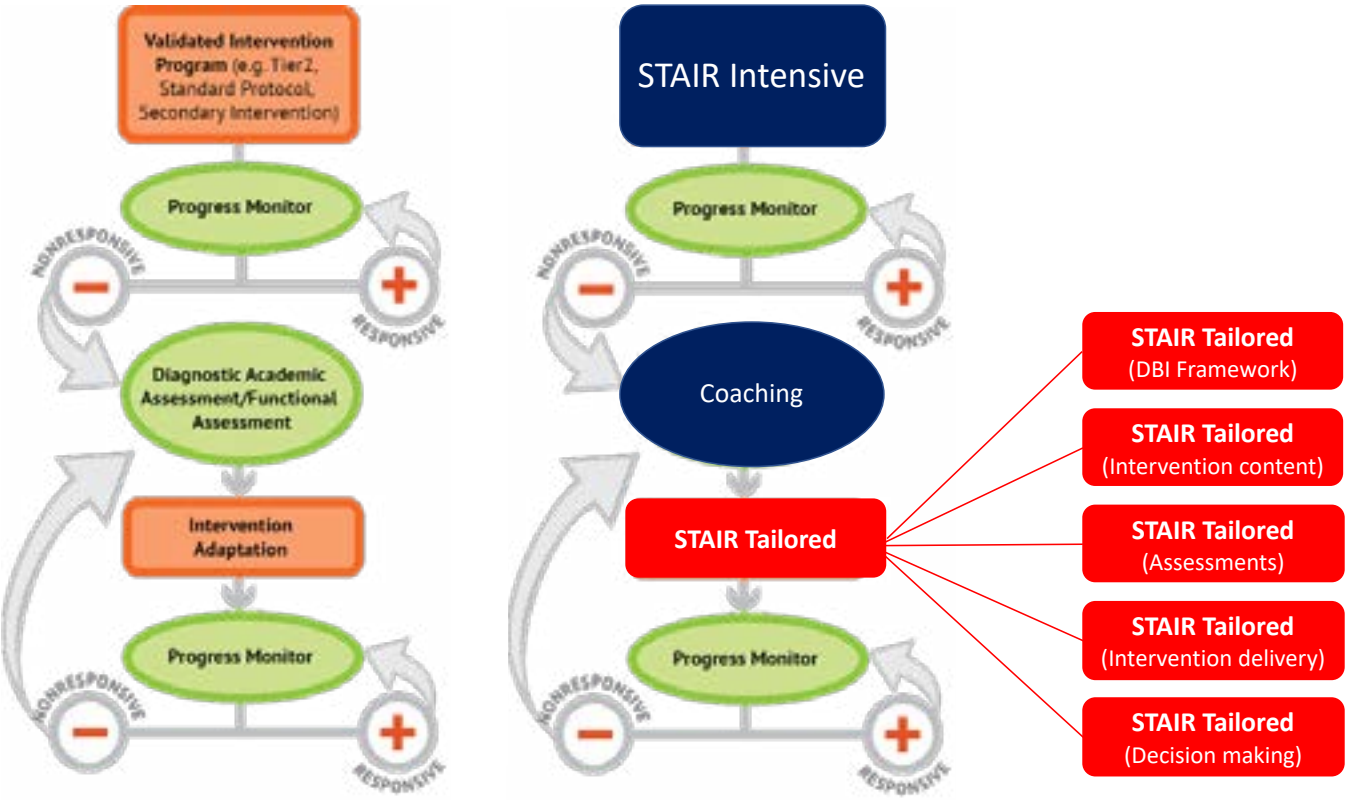


Figure 2.
(Project STAIR & NCII Webinar Series, 2020)

Professional Learning Tip

For more on DBI, Instruction and Coaching within Project STAIR check out our other guides!

ASSESSMENTS WITHIN A DBI FRAMEWORK

Utilizing formative assessment data has been considered by many to be a key aspect of effective instructions. Ongoing assessment and evaluations of students' progress in math can help teachers measure the pulse and rhythm of their students' growth in math and also help them fine-tune instruction to meet the needs of their students. For students, specifically those experiencing math difficulties or disabilities, formative assessment data provides feedback regarding their performance or effort.

Within the DBI process, essential sources of data come from administering three different types of assessments: universal screening, progress monitoring, and diagnostic assessment. Each assessment and the information gathered from them serve a different purpose in the DBI process.

The purpose of universal screening is to identify students who may be at risk for poor academic outcomes, including students who require intensive intervention. Progress monitoring is administered for teachers to monitor students' progress toward their goal and make timely and on-going decisions about students' response to the current intervention. Last, diagnostic assessments are administered to identify students' persistent misconceptions and errors. In Project STAIR, data from universal screener such as STAR (Renaissance Learning, 2011) was used to establish students' present level of performance and select students for whom DBI was appropriate. For progress monitoring, Algebra Readiness Progress Monitoring (ARPM; Ketterlin-Geller et al., 2015) tools was used for repeated measurements of students' math performance on three key algebraic readiness constructs. Last, Diagnosis Online Math Achievement (DOMA; Let's Go Learn, Inc., 2019) was used to identify students' level of mastery in algebra-readiness topics, and help pinpoint possible sources of misconceptions and errors.

UNIVERSAL SCREENING

WHAT IS UNIVERSAL SCREENING?

Universal screening assessment is a type of assessment that is characterized by providing quick, low-cost, repeatable testing of age-appropriate critical skills. Universal screening is administered to identify students who may be at risk for poor learning outcomes and who need additional assessment (i.e., progress monitoring) and support. Universal screening data provide information on the effectiveness of the core instruction and curriculum. Universal screening is considered as a key feature of early intervention and important first step for identification of students at-risk for learning difficulties or learning disabilities.

For Project STAIR, teachers look for students who (1) had an IEP goal in math, (2) who were among the teachers' lowest performing students on a school-administered universal screener, and/or (3) had intensive instructional needs in math.

Key Assessment Types and Uses

EVIDENCE FOR UNIVERSAL SCREENING

There have been a number of other articles and sources discussing the use of universal screeners (Glover et al., 2007; Fuchs et al., 2011; Catts et al, 2009). For example, IES practice guide (2009) introduces recommendations to systematically use universal screening to screen all students to determine which students have math difficulties and require research-based interventions. This recommendation is based on a series of high-quality correlational studies with replicated findings that show the ability of measures to predict performance in math one year after administration (and in some cases two years).

HOW TO SELECT UNIVERSAL SCREENING MEASURES?

Schools should evaluate and select screening measures that are efficient and technically rigorous in (1) Classification Accuracy, (2) Technical Standards (i.e., reliability, validity), and (3) Usability Features.

The basic function of a screening measure is to identify who may need supplemental instruction to reach the curricular expectations. Therefore, these tests must meet empirical psychometric qualities of reliability and validity (e.g., content validity, predictive validity, etc.)

KEY TERMS

- Classification accuracy refers to the rates of true positive (correctly classifying a student at risk and true negative (correctly classifying students as not at risk) classification.
- Predictive validity is an index of how well a score on a screening measure earlier in the year predicts a student's later math achievement. In general, research recommend that schools and districts employ measures with predictive validity coefficients of at least .60 within a school year.
- Reliability is an index of the consistency and precision of a measure. Research recommends measures with reliability coefficients of .80 or higher.
- Efficiency is how quickly the universal screening measure can be administered, scored, and analyzed for all the students. Research recommends that a screening measure require no more than 20 minutes to administer, which enables collecting a substantial amount of information in a reasonable time frame.

Key Assessment Types and Uses

Select screening measures based on the content they cover, with an emphasis on critical instructional objectives for each grade. For example, four components of number sense/number competence deemed most important for early primary grades: (a) magnitude comparison (Booth & Siegler, 2006), (b) strategic counting (Geary, 2004), (c) the ability to solve simple word problems (Jordan et al., 2009), and (d) retrieval of basic arithmetic facts (Jordan, Hanrich, & Kaplan, 2003).

- The National Council of Teachers of Mathematics (2006) released a set of focal points for each grade level designed to focus instruction on critical concepts for students to master within a specific grade.
- The National Mathematics Advisory Panel (2008) detailed a route to preparing all students to be successful in algebra. For example, screening measures used in the lower and upper elementary grades should have items designed to assess student's understanding of whole and rational number concepts as well as computational proficiency.

ADDITIONAL RESOURCES

The National Center on Intensive Intervention (NCII) have developed and introduced six tools charts (i.e., screening, progress monitoring, intervention) on academic in their website (https://charts.intensiveintervention.org/ascreening). Academic screening tools chart provides ratings on the technical rigor of the tools: (1) Classification Accuracy, (2) Technical Standards, and (3) Usability Features. It also provides user a list of tools by subject and grade level they are interested in viewing.

KEY TAKE-AWAY

The tools charts include a large amount of information and the "best" tool is not going to be the same for everyone. Users should review all the elements of the chart before making decisions, such as the level and area of support the student need (i.e., reading - oral reading fluency, vocabulary, reading comprehension), age and grade of the student, and the purpose of the tool.

Key Assessment Types and Uses

USING UNIVERSAL SCREENING DATA TO SELECT STUDENTS

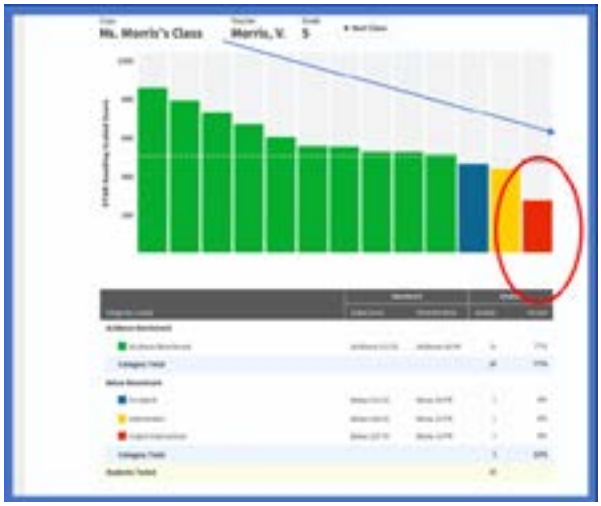
Universal screening results should be used to answer the following questions.

- Which (if any) students may need supplemental instruction to reach the curricular expectations?
- What degree of intensity of intervention is needed?

[Applied Example] Using STAR data to select students for DBI

- This is a score report from the STAR assessment by Renaissance Learning. This shows that as the scale score goes down, the student's risk status goes up. The above questions can be answered based on the STAR assessment screening data.

DECISION MAKING FROM UNIVERSAL SCREENING RESULTS



Which (if any) students are at-risk or under-performing?

-> The students in the yellow (i.e., below 25th percentile and above 10th percentile) and red (i.e., below 10th percentile). are those who are at risk or underperforming.

-> The students in the blue (i.e., below 40th percentile and above 25th percentile) are not at-risk or underperforming but are "on watch".

-> The students in the yellow and red need interventions.

Which students need interventions?

-> The students in the yellow and red need interventions.

What degree of intensity of intervention is needed?

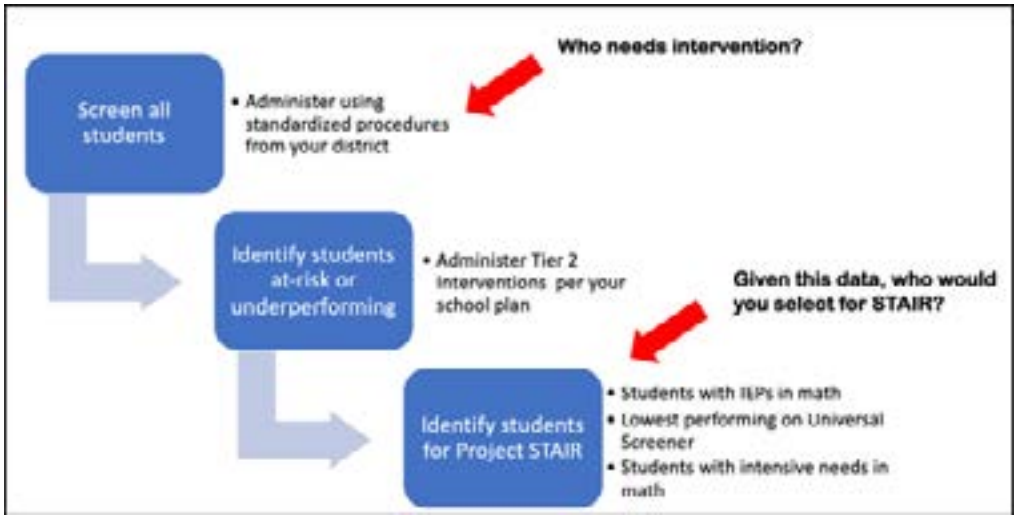
-> The students in the yellow need "intervention."
-> The students in the red need "urgent intervention."

Key Assessment Types and Uses

There are three steps of decision-making process from screening data to select students for Project STAIR.

- The first step involves screening all students by administering universal screener using standardized procedures from your school district.
- The second step involves identifying students at-risk or underperforming using the screening data. To identify students for Project STAIR, teacher used students' school administered STAR Math scores to identify students who scored in the 10th percentile or below. In addition, teachers were encouraged to consider other student factors that might indicate the student would benefit from intensive academic intervention. Other student factors included (1) whether the student had an IEP in the area of math, (2) had historically received failing grades in math classes, or (3) the teacher's professional judgment and formative assessment data.

Screening Decision Making Process



Screening Decision Making Form

Teacher name:_____

Who are the students who are at risk or underperforming based on your STAR screening data?

How did you determine this?

Which students are eligible for Project STAIR? Please complete the questions below for each student.

Name_____

- Period taught_____
- Class name_____
- Does the student have an IEP goal in math? _____
- Are they among the lowest performing on STAR? _____
- Does the student have intensive needs in math? _____

Key Assessment Types and Uses

PROGRESS MONITORING

WHAT IS PROGRESS MONITORING?

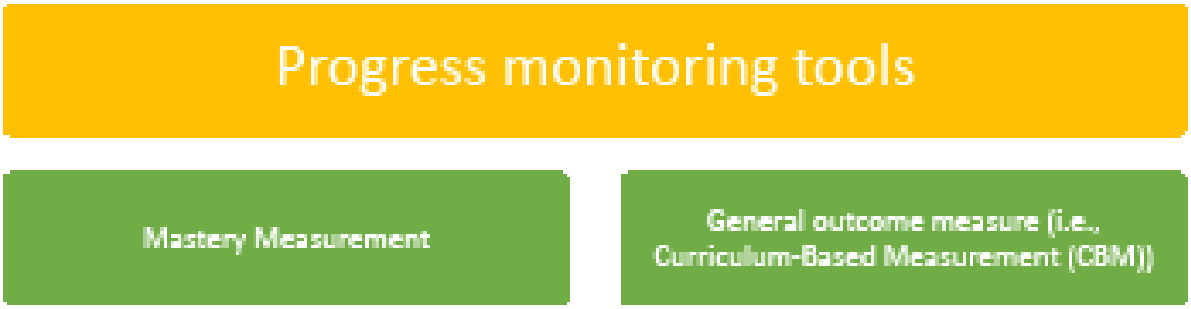
The purpose of progress monitoring is to monitor students' response to primary, secondary, tertiary instruction and identify students who are not demonstrating or making adequate progress so that instructional changes can be made. Progress monitoring assessment is a valid and efficient tool for gauging the effectiveness of instruction, determining whether instructional modifications are necessary, and providing important information for eventual classification and placement decisions.

Allows practitioners to…

- Estimate rates of improvement
- Identify students who are not demonstrating adequate progress
- Compare the efficacy of different forms of instruction in order to design more effective, individualized instruction

There are two types of progress monitoring: mastery measurement (MM) and general outcome measurement (GOM), often referred to as Curriculum-Based Measurement (CBM).

- General outcome measurement (GOM) is one of the common formative assessment which describe individual student's growth and development over time and reflect overall competence in the annual curriculum. GOM includes Curriculum-Based Measurements (CBMs). GOM usually refers to CBMs.



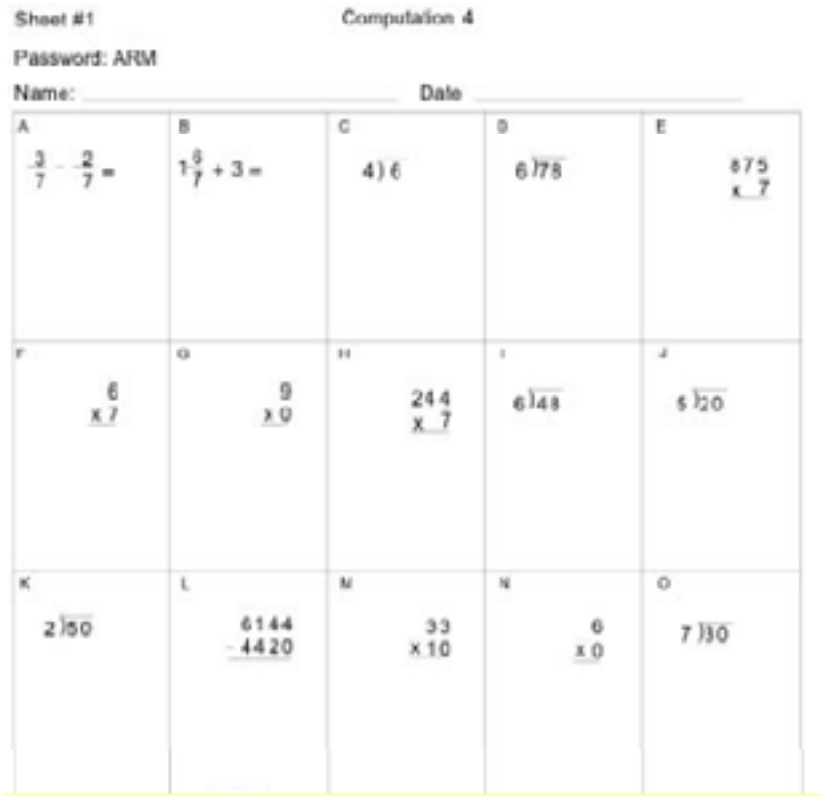
Key Assessment Types and Uses

CBM (e.g., DIBELS, AIMSweb) is a simple, reliable, and valid set of measurement procedures that teachers could use to frequently and repeatedly measure the growth of their students in the basic skills of reading, math, spelling, and written expressions. CBM research has demonstrated that CBMs can be reliable and valid (e.g., Deno, 1985; Germann & Tindal, 1985; Marston, 1988; Shinn, 1989).

One characteristic of CBM is repeated measurement on single task by using global indicator for learning that teachers can use to monitor the effects of their instruction in basic skill outcomes.

Figure 3 illustrates a CBM to monitor progress in math. Each CBM assessment contains problems representative of computational fluency that will be covered during the year. Numerals within problems are chosen at random, depending on the specifications of the problem types. In addition, problem types are placed randomly on the page.

Figure 3. Math CBM



Key Assessment Types and Uses

For Project STAIR, Algebra Readiness Progress Monitoring Measures (ARPM) were used as the progress monitoring tool.

- ARPM consists of three measures: (1) Quantity Discrimination (QD), (2) Number Properties (NP), (3) Proportional Reasoning (PR), which serve as a global indicator of algebra readiness, rather than being directly connect to teacher's specific unit content. Total score of the three measures provide information about algebraic readiness of the student (see <Figure 4>).
- The QD measure assesses students' ability to quickly recognize magnitude differences within and between grade-level-appropriate number systems.
- NP measure assesses students' ability to recognize and use number properties to efficiently solve arithmetic problems.
- PR measure students' ability to read, order, and compare proportions.

Figure 4. Example Items for Each Measures in ARPM

Subtest	Quantity Discrimination	Number Properties	Proportional Reasoning
Example Exemplar Item	$3.35 \square 3\frac{1}{4}$	$3\frac{5}{9}+1\frac{3}{4} \square 1\frac{3}{4}+8\frac{5}{9}$	40% of 40 ☐ 40% of 60
Possible Numerical Reasoning Strategy	The common fraction $\frac{1}{4}$ is routinely converted to 0.25, making this comparison of magnitude about recognizing and evaluating values between number systems. Since the whole numbers are the same and 0.35 > 0.25, then 3.35 > 3.25.	Because of the commutative property of addition, the order of the addends does not affect the sum. Therefore, the comparison a + b ☐ b + c can be determined by comparing a and c. Since $3\frac{5}{9}<8\frac{5}{9}$, then $3\frac{5}{9}+1\frac{3}{4}<1\frac{3}{4}+8\frac{5}{9}$.	The same percent, 40%, is specified for both quantities represented in the comparison. Since 40 is less than 60, then 40% of 40 < 40% of 60.

EVIDENCE FOR PROGRESS MONITORING

Based on the IES practice guide, the panel recommends that schools and district systematically monitor the progress of students receiving supplemental instruction and other students who are at risk. The panel judged the level of evidence supporting the recommendation to be low.

Key Assessment Types and

HOW TO SELECT PROGRESS MONITORING MEASURES?

Schools should evaluate and select screening measures that are efficient and technically rigorous in (1) Performance Level Standards, (2) Growth Standards, and (3) Usability.

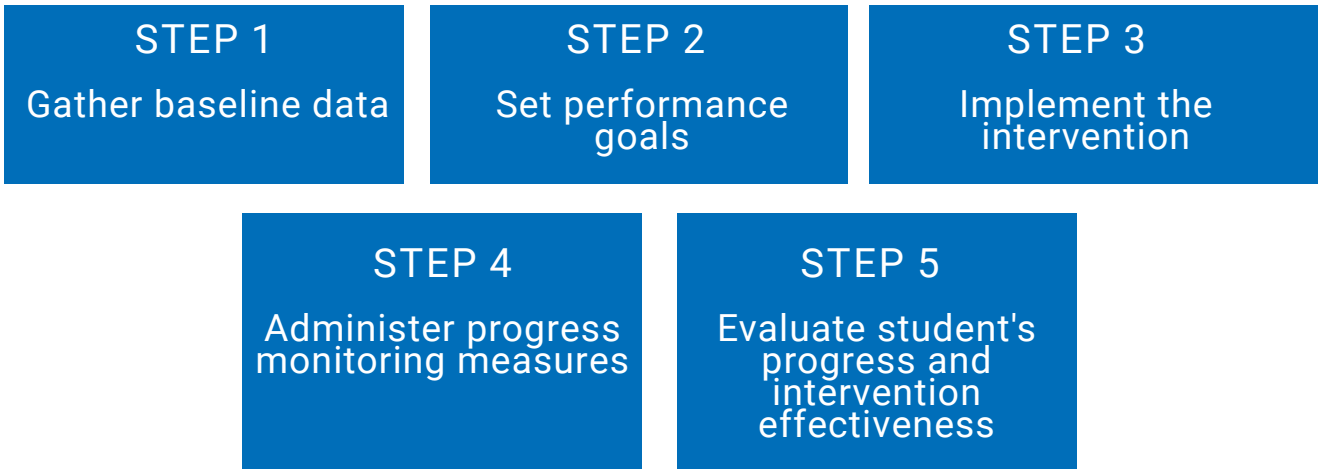
Progress monitoring assessments should be quick and easy to administer, have multiple parallel forms with same difficulty, format, content, and follow standardized

USING PROGRESS MONITORING DATA TO EVALUATE STUDENT'S GROWTH TOWARDS THE GOAL AND INTERVENTION EFFECTIVENESS

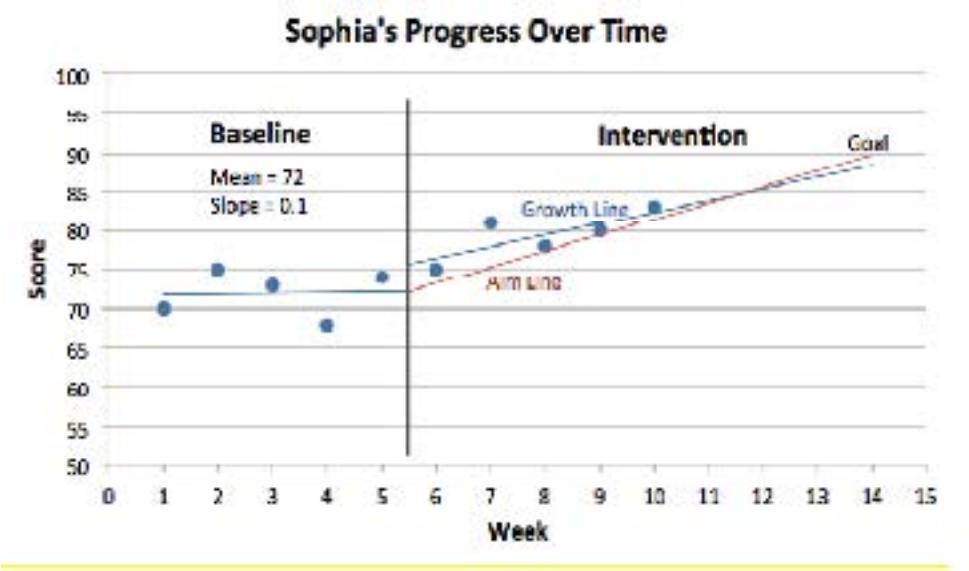
Progress monitoring results should be used to answer the following questions.

- Is the student making adequate progress toward his or her goals?
- Is the intervention effectively meeting the student's needs?

There are five steps to graph and evaluate student's growth over time using progress monitoring data. Let's go through each step by looking at the important considerations with Sophia's progress monitoring graph (Further information for decision making will be provided in 'OBJECTIVE 3 Graphing and Decision Making' section).



Key Assessment Types and Uses



STEPS	CONSIDERATIONS
1. Gather baseline data	Baseline data enables us to evaluate student performance prior to any instructional changes. When you gather baseline data, be sure to collect at least three data points. Student performance may vary based on many factors, so we recommend taking the median of three scores collected within one to two weeks to have an accurate picture of their starting score.
2. Set performance goals	Based on the baseline data, you should set a performance goal to the level you expect your student to improve. The goal should be ambitious but reasonable. For example, in this graph, blue line is her performance goal (i.e., aim line). It means that she is expected to improve her performance up to score of 90 after 15 weeks.

Key Assessment Types and

STEPS	CONSIDERATIONS
3. Implement the intervention	Once you've set a performance goal, then you are good to start implementing your intervention. Remember that intervention you're giving should be systematically planned based on student's assessment data and it should be evidence-based.
4. Administer progress monitoring measures at regular intervals	It is important to measure student's progress on a regular basis. In this graph, Sophia's teacher implemented her intervention and administered progress monitoring measures once a week.
5. Evaluate student's progress and intervention effectiveness	There are decision-making rules for evaluating student progress and intervention effectiveness by comparing the trend line to the goal line. Review the graph whenever you add new data point in the graph. For example, if you plan to administer progress monitoring measure once per week, review the graph every week. Further information for decision making will be provided in 'OBJECTIVE 3 Graphing and Decision Making' section.

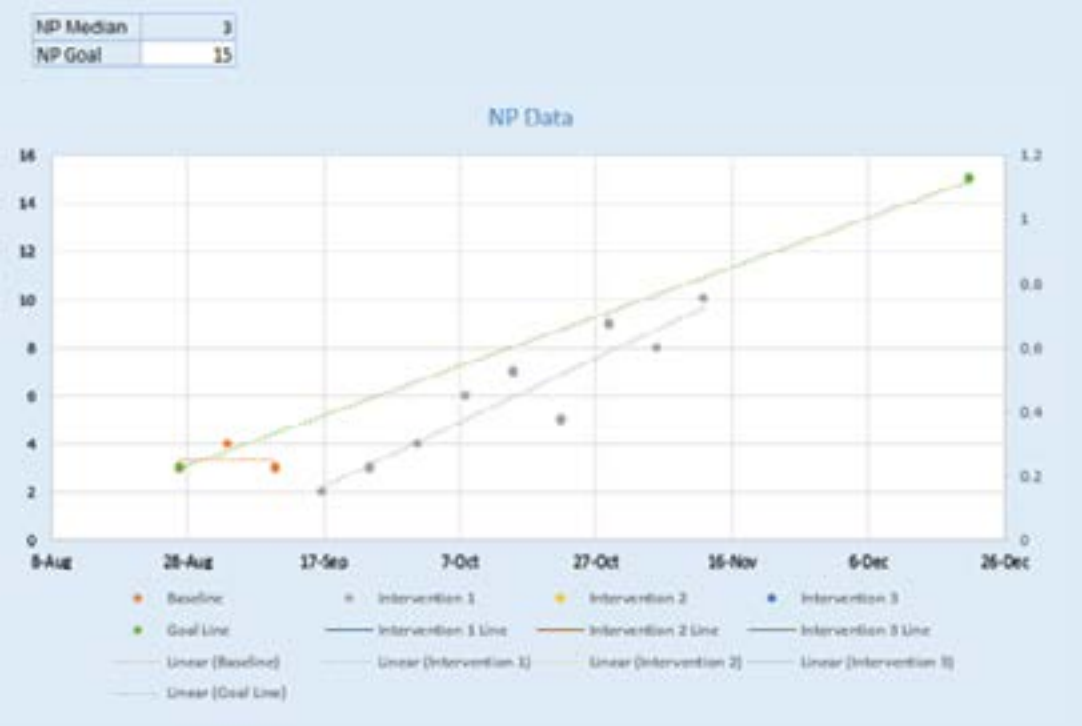
Key Assessment Types and Uses

Teachers can make decisions based on multiple data points that lead them to consistent interpretations of students' progress toward the goal. Student's progress can be evaluated by analyzing the trend of the growth and comparing the trend line against the goal line.

Ask yourself:

- Is the trend line above or the slope of trend line steeper than the goal line?
- Is the trend line the same as or the slope of trend line even with the goal line?
- Is the trend line below or the slope of trend line flatter than the goal line?

APPLIED EXAMPLE: USING ARPM DATA TO MAKE DECISION IN PROJECT STAIR



This is a Number Properties progress monitoring graph for the student participating in Project STAIR. In this graph, the trend line is a gray dotted line, which is generated based on student's progress monitoring scores collected

Key Assessment Types and

INTERPRETING RESULTS FROM PROGRESS MONITORING GRAPH

- The student's baseline data were collected at three time points and the score of 3 was entered as the median score.
- Based on the median score and anticipate duration of the intervention, the score of 15 is set as the goal. This student is expected to improve his or her performance up to a score of 15 after 5 weeks.
- The teacher implemented an intervention and administered progress monitoring measures weekly to assess the effectiveness of the intervention.

MAKE DECISIONS FROM PROGRESS MONITORING RESULTS

Is the student making adequate progress toward his or her goals?

- Yes, student did make adequate progress toward his or her goal based on the fact that the slope of trendline is steeper than the goal line (See OBJECTIVE 3 Graphing and Decision Making for detailed information). Although all the data points during intervention period are below the goal line, the student is on track to meet their goal by the end of the intervention period.

Is the intervention effectively meeting the student's needs?

- Yes, the intervention appears to effectively meet the student's needs since the student showed adequate progress over the time based on the graph.

Key Assessment Types and Uses

DIAGNOSTIC ASSESSMENT

WHAT ARE DIAGNOSTIC ASSESSMENTS?

A diagnostic assessment is a form of assessment where teachers can evaluate students' mastery of relevant prior knowledge and skills on certain topic as well as preconceptions or misconceptions about the material before and during their instruction.

Diagnostic assessments help teachers fine-tune instruction to meet the needs of their students and provide students with information regarding their performance.

EVIDENCE FOR DIAGNOSTIC ASSESSMENTS

According to Gersten's (2009) meta-analysis on instructional approaches that enhance math proficiency of students with learning disabilities, using ongoing formative assessment data for teachers with providing options for addressing instructional needs and for students on their math performance had a range of small to medium effect size.

USING DIAGNOSTIC ASSESSMENT DATA TO PLAN INTERVENTION

Diagnostic assessment results should be used to answer the following questions:

- Why is a student underperforming?
    - What are the student's correct conceptualizations or understandings of the content?
    - What are the student's persistent misconceptions and errors?
- What content and/or instructional design features should be included in the intervention for this student?

Key Assessment Types and

Teachers can use diagnostic assessments specifically for students of whom the teachers are interested in the level of knowledge, skills and understanding at the beginning and during of unity and/or lesson. Diagnostic assessment helps teachers think about the content that they need to work on with their students. To determine which adaptations are needed for the students, consider the following steps:

For each of your students, identify prior knowledge from which instruction should build and areas that need improvement.

Prioritize the content based on:

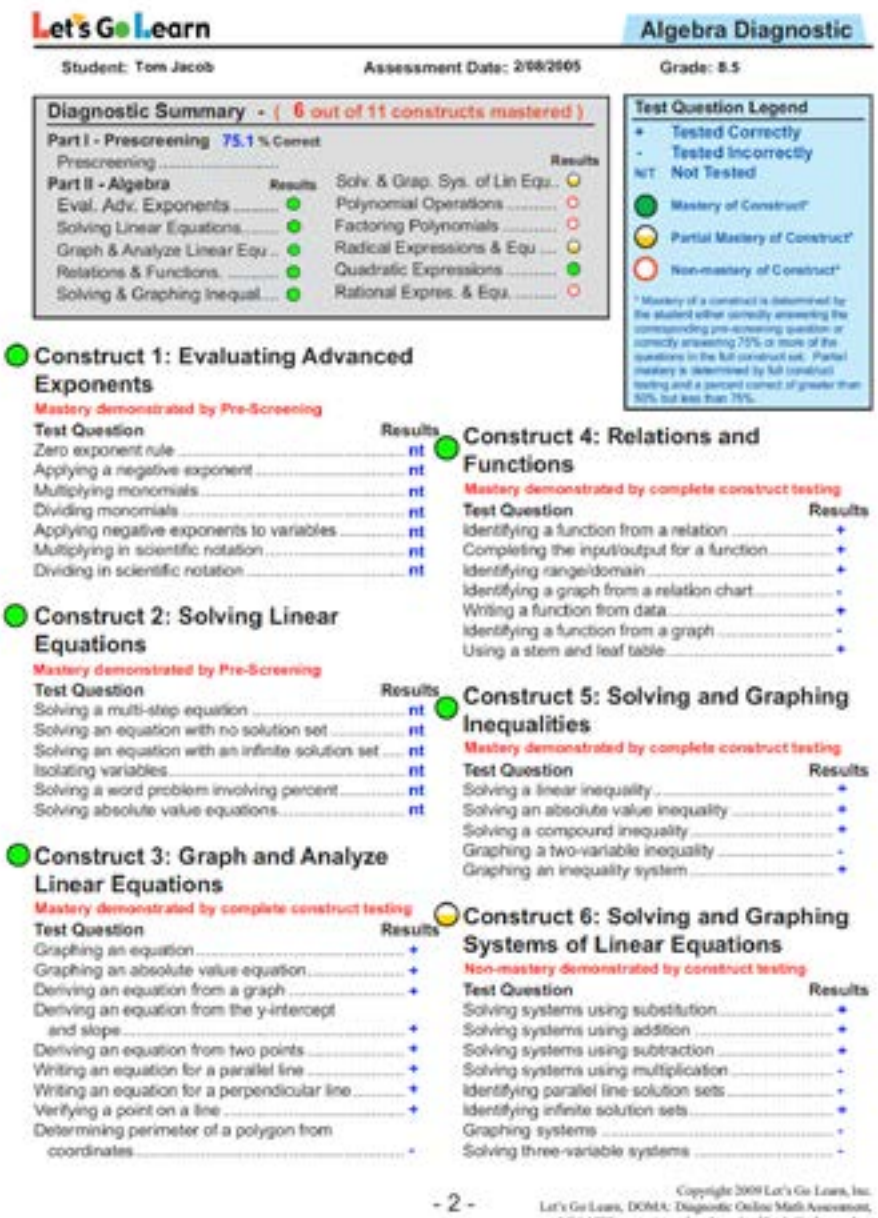
- Current scope and sequence
- Importance of content for future instruction
- Significance of gaps

Determine when you will target this content.

Key Assessment Types and Uses

APPLIED EXAMPLE: USING DATA TO MAKE DECISIONS IN PROJECT STAIR

In Project STAIR, the DOMA was used as a diagnostic assessment for students with math difficulties. Using the diagnostic data you have collected and your pacing guide, think about what content is coming up that your STAIR students will need support with/ or content you've covered that student are still struggling with that you could incorporate into future content.



Let's Go Learn — Algebra Diagnostic

Student: Tom Jacob | Assessment Date: 2/08/2005 | Grade: 8.5

Diagnostic Summary - (6 out of 11 constructs mastered)

Part I - Prescreening 75.1 % Correct

Prescreening

Part II - Algebra — Results

- Eval. Adv. Exponents
- Solving Linear Equations
- Graph & Analyze Linear Equ...
- Relations & Functions
- Solving & Graphing Inequal...
- Solv. & Grap. Sys. of Lin Equ...
- Polynomial Operations
- Factoring Polynomials
- Radical Expressions & Equ ...
- Quadratic Expressions
- Rational Expres. & Equ.

Test Question Legend

- \+ Tested Correctly
- \- Tested Incorrectly
- NT Not Tested
- Mastery of Construct*
- Partial Mastery of Construct*
- Non-mastery of Construct*

* Mastery of a construct is determined by the student either correctly answering the corresponding pre-screening question or correctly answering 75% or more of the questions in the full construct set. Partial mastery is determined by full construct testing and a percent correct of greater than 50% but less than 75%.

Construct 1: Evaluating Advanced Exponents

Mastery demonstrated by Pre-Screening

Test Question	Results
Zero exponent rule	nt
Applying a negative exponent	nt
Multiplying monomials	nt
Dividing monomials	nt
Applying negative exponents to variables	nt
Multiplying in scientific notation	nt
Dividing in scientific notation	nt

Construct 2: Solving Linear Equations

Mastery demonstrated by Pre-Screening

Test Question	Results
Solving a multi-step equation	nt
Solving an equation with no solution set	nt
Solving an equation with an infinite solution set	nt
Isolating variables	nt
Solving a word problem involving percent	nt
Solving absolute value equations	nt

Construct 3: Graph and Analyze Linear Equations

Mastery demonstrated by complete construct testing

Test Question	Results
Graphing an equation	+
Graphing an absolute value equation	+
Deriving an equation from a graph	+
Deriving an equation from the y-intercept and slope	+
Deriving an equation from two points	+
Writing an equation for a parallel line	+
Writing an equation for a perpendicular line	+
Verifying a point on a line	+
Determining perimeter of a polygon from coordinates	-

Construct 4: Relations and Functions

Mastery demonstrated by complete construct testing

Test Question	Results
Identifying a function from a relation	+
Completing the input/output for a function	+
Identifying range/domain	+
Identifying a graph from a relation chart	-
Writing a function from data	+
Identifying a function from a graph	-
Using a stem and leaf table	+

Construct 5: Solving and Graphing Inequalities

Mastery demonstrated by complete construct testing

Test Question	Results
Solving a linear inequality	+
Solving an absolute value inequality	+
Solving a compound inequality	+
Graphing a two-variable inequality	-
Graphing an inequality system	+

Construct 6: Solving and Graphing Systems of Linear Equations

Non-mastery demonstrated by construct testing

Test Question	Results
Solving systems using substitution	+
Solving systems using addition	+
Solving systems using subtraction	+
Solving systems using multiplication	-
Identifying parallel line solution sets	+
Identifying infinite solution sets	+
Graphing systems	+
Solving three-variable systems	-

- 2 -

Key Assessment Types and

MAKE DECISIONS FROM DIAGNOSTIC ASESSMENT RESULTS

- Why is a student underperforming?
  - o In which constructs is the student succeeding?
  - o In which constructs is the student struggling?
  - o In which constructs do you need more information?

- What content should be included in the intervention for this student?

Construct Name	Succeeding	Struggling	Need More information
Evaluating Advanced Exponents	•		
Solving Linear Equations	•		
Graph and Analyze Linear Equations	•		
Relations and Functions	•		
Solving and Graphing Inequalities	•		
Solving and Graphing Systems of Linear Equations			•
Polynomial Operations		•	
Factoring Polynomials		•	
Radical Expressions & Equations			•
Quadratic Expressions	•		
Rational Expressions & Equations		•	

Key Assessment Types and Uses

ERROR ANALYSIS

1. WHAT IS ERROR ANALYSIS?

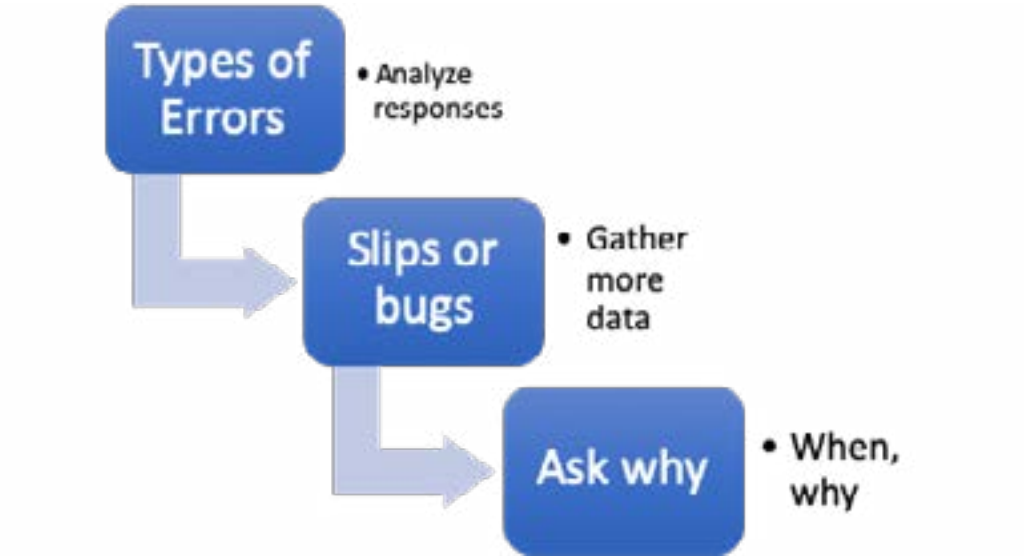
Error Analysis is another approach to collecting diagnostic assessment data.

1. Analyze a student's errors on a worksheet, test, or other measure
2. Provides information about types of errors
3. Examine the type of errors a student makes to check for.
   a. Slips: random errors
   b. Bugs: persistent errors

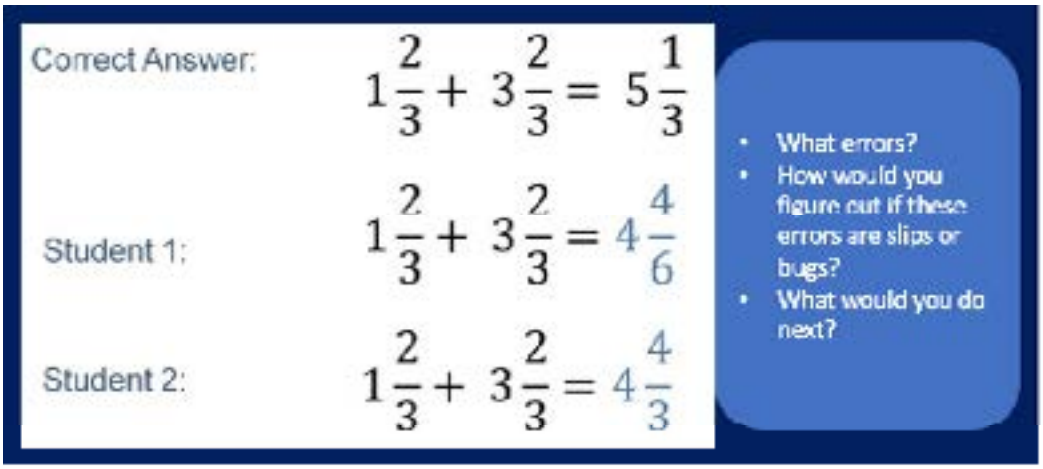
Definition	• Determine which errors students are making and whether they are making them consistently
General	• Collect student responses on computation problems • Classify the type of errors • Determine if the errors are consistent or random
Pros	• Allows teacher to directly teach the correct procedure • Can be conducted on already collected data
Cons	• While there are common errors, some errors may be specific to a particular student, which may make analysis challenging • Limited "windows" into students' thinking • Focused primarily on computation errors • Requires follow up information to be collected

Key Assessment Types and

2. HOW TO USE ERROR ANALYSIS FOR DIAGNOSIS?



3. WHAT ERRORS? WHAT'S NEXT?



- Student 1 added the digits in each place –whole number, numerator, and denominator —instead of only adding the numerators of the fractions. This student appears to need explicit instruction in adding fractions with the same denominator.
- Student 2 added correctly but did not reduce the answer. This student may need instruction on how to convert improper fractions to mixed numbers.

Key Assessment Types and

4. EXAMPLES OF TRACKING ERRORS AND MASTERY

Score Report for Zachary

Skill	Number of Items Per Skill	Zachary's Score	Zachary's Skill Analysis
Long division	2	2	●
Convert to decimal	3	1	⊙
Convert to fraction	3	2	⊙
Multiplication with carrying	2	1	⊙
Addition of fractions	3	1	⊙
Subtraction of fractions	1	0	○
Multiplication of fractions	2	1	⊙
Division of fractions	3	1	⊙
Addition with decimals	1	1	●
Subtraction with decimals	3	1	⊙
Multiplication with decimals	1	1	●
Division with decimals	1	0	○

● = Mastered
⊙ = Partial Mastery
○ = Not Mastered

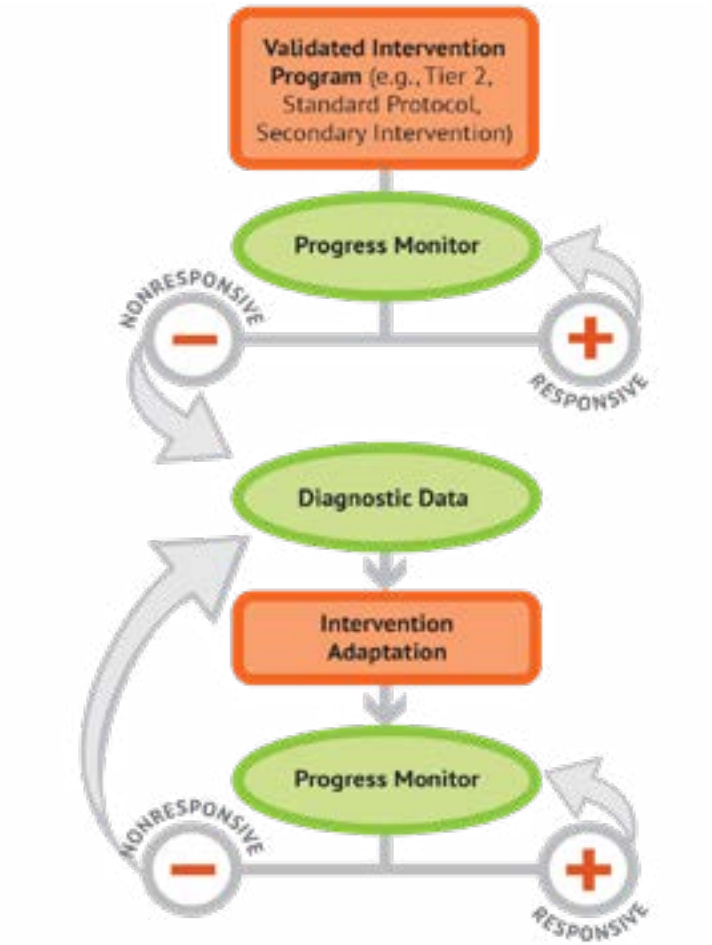
Graphing and Decision Making

HOW DOES GRAPHING FIT WITHIN THE DBI FRAMEWORK?

You'll recall that DBI has three main elements, it is (1) systematic, (2) relies on data, and (3) helps individualize instruction. As you read in objective 2, collecting progress monitoring data is systematic, occurs frequently and regularly to provide data that can be used to help inform the individualization of instruction. Progress monitoring data best supports instructional decision making when it is graphed regularly. This allows for a visual of student progress relative to the goals you've set for quick decision making.

The progress monitoring graph will allow you to easily:

1. Set reasonable and ambitious goals
2. Monitor the appropriateness of the student's goal
3. Judge the adequacy of the student's progress
4. Determine the effectiveness of the student's math instructional program
5. Use decision rules to make changes to the student's instructional program when needed

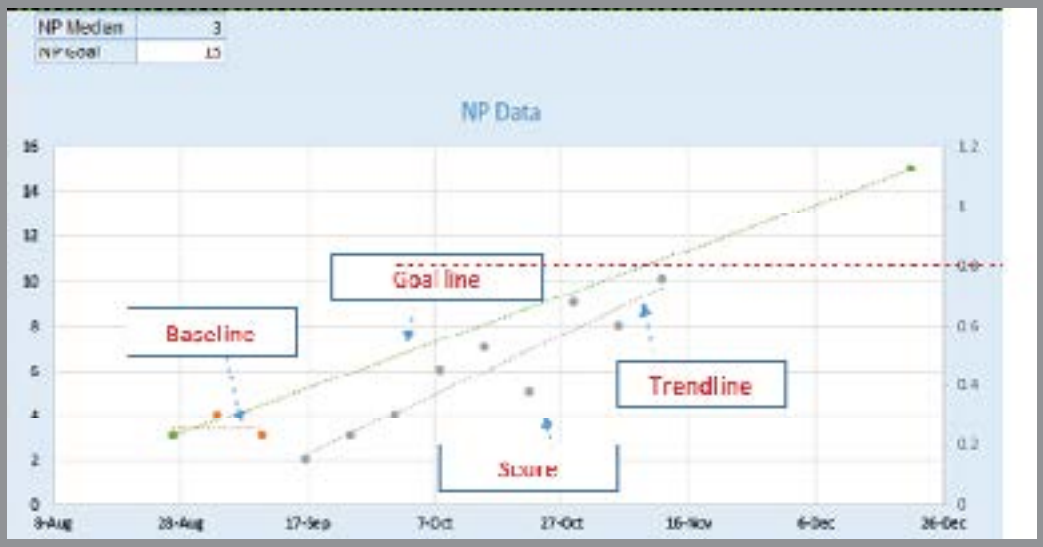


Graphing and Decision Making

GRAPHING PROGRESS MONITORING DATA FOR DECISION

KEY TERMS

Baseline – score(s) that represent median student performance prior to initiating intervention
Slope – growth rate of student progress
Trendline – a line which shows the direction of the students' overall growth during intervention period
Goal line – a line which connects the baseline score to the score expected at the end of the intervention



Project STAIR recommends graphing student progress monitoring data weekly, and as soon as possible after it is collected. This allows you to constantly have your finger on the pulse of your student's progress in response to the instructional adaptations you've made.

STEP 1:

The first step to setting up a graph is to enter the three benchmark scores you collected upon initiating progress monitoring. This establishes a baseline of where your student is performing prior to any instructional changes.

Graphing and Decision Making

STEP 2:

The next step is to set a reasonable but ambitious goal. By the end of the intervention period, how much progress do you expect the student to make? We recommend calculating a goal based on growth rate (slope). For this project, we're using a growth rate (slope) of 1.

1. Multiply growth rate (slope) by the number of weeks left in intervention (e.g., 12 weeks)
2. Add to baseline score

Once the baseline and goal are established the graph will produce a goal line, which shows the expected progress over time. This will be helpful in determining if the student's performance is on track to meet the goal.

STEP 3:

The next step is to enter the student's score from the progress monitoring measure each week as it is collected. Each time you enter a new score, the graph will update a trendline, this shows the general trend of student progress and can be compared to the goal line for decision making.

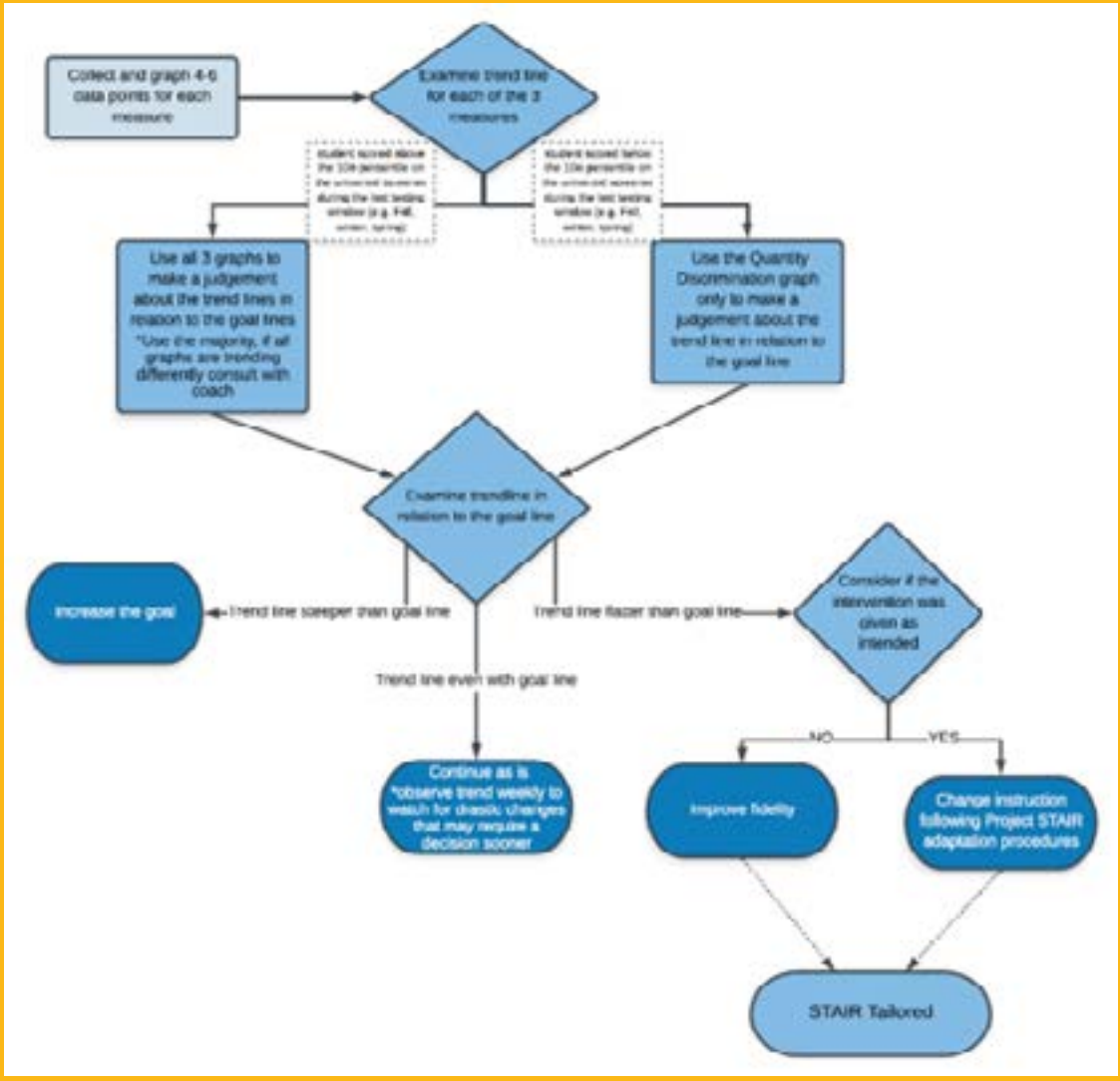
PRACTICE OPPORTUNITY A

Label the following parts of the graph below: *scores, dates, baseline, goal line, trendline*

*See Appendix for answers

Graphing and Decision Making

DECISION-MAKING RULES



As you are reviewing your graphed data to make decisions about instruction adaptations or individualization you should apply consistent decision rules. These decision rules, based on the following questions, are evidence-based to best support your data-based decision making.

Is the trend line above or the slope of trend line steeper than the goal line?
Is the trend line the same as or the slope of trend line even with the goal line?
Is the trend line below or the slope of trend line flatter than the goal line?

Graphing and Decision Making

HOW TO USE THE DECISION-MAKING FLOW CHART

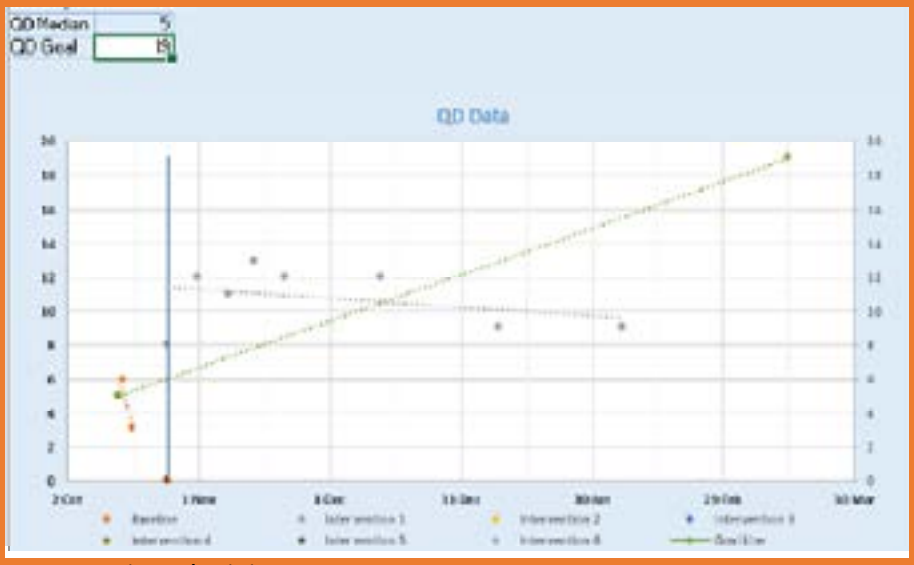
1. The first step in using the decision-making flowchart is to determine if it is an appropriate time to make a decision. Research suggests that 4-6 data points is most appropriate to ensure that any change you've made has had time to be effective. If you've been implementing something new, you cannot be sure if it is the cause of change in data, or a lack of change in the data, until an appropriate amount of time as passed.
2. Next, you'll determine which data you'll consider to make decisions. Project STAIR has used the ARPM, previously described in Objective 3. The ARPM has three measures that can all be considered, or if the student is below the 10th percentile on the screening measure, you may attend only to the most basic of the measures. If you are using a different progress monitoring measure, it may be appropriate to skip that step and focus on the graphed data you have available.
3. Once you've determined the graph you are looking at, you should examine the relationship of the trendline to the goal line.

- If the trendline is steeper than the goal line, this indicates that the student is on track to exceed the goal. You can consider increasing the goal.
- If the trendline is even with the goal line, this indicates that the student is on track to meet their goal. You should continue as is and observe the trendline weekly.
- If the trendline is flatter than the goal line, this indicates that the student is not on track to meet their goal.
    - In this instance, you will first want to consider the fidelity of implementation.
        - Was the intervention administered as intended?
        - Was the student present for all of the intervention?
        - If the answer to either of these questions is no, the first step is to address fidelity and revisit the graph in 4-6 more data points.
    - If fidelity is not a concern, you should consider a change in instruction. See the Intensification guide for further guidance.

Graphing and Decision Making

PRACTICE OPPORTUNITY B

Using this student graph, walk through each stage of the decision-making flowchart.



Circle the appropriate decision:

Increase goal Continue as is Consider fidelity, then make an instructional change

*See Appendix for answers

Discussion points:

1. What do you notice about the trend of this data?
2. What might account for that change?
3. Note when data was collected and the frequency of that data collection. What might those factors indicate?

Putting it all Together:
Aligning Assessments in a DBI Framework

One consideration to make when implementing the DBI framework is selecting assessments for each step of the process that are well aligned for the content and grade level. For example, in Project STAIR we are focused on algebraic readiness in middle school and have therefore selected specific assessments at each step of the process that will provide the appropriate depth of information related to that content. It would not be useful to implement a basic fact fluency measure to monitor student progress within an intervention focused on algebraic concepts informed by a diagnostic assessment that assessed algebraic readiness. If assessments are poorly aligned in this way, it does not provide useful information about student performance. Well aligned assessments will inform and support decision making about the targeted content or skill.

CASE STUDY

In the applied example below, you will see the full DBI process implemented for one student experiencing math difficulties. Note the clear alignment of the assessments used and how the assessment data directly informs instructional decision making.

Applied Example

Rebecca, a Project STAIR coach, meets with Mr. Gladstone to implement DBI. Rebecca has a background in special education and experience coaching special educators on intervention and data use. Mr. Gladstone is a veteran math teacher of 20 years and has recently moved from teaching high school students to middle school students. After receiving professional development in DBI from the Project STAIR team, Mr. Gladstone is excited to start applying what he has learned STAIR DBI process (Figure 2) and has a few students in mind that he knows are struggling but he hasn't been sure how to best support them.

Screening

As a first step of the process, Mr. Gladstone and Rebecca review the screening data he has recently collected in order to determine which students DBI is appropriate for. The school district already uses an evidence-based math screening measure that provides information about grade-level math performance, so it is unnecessary to collect additional data.

NOTES FROM THE COACHING MEETING:

Mr. Gladstone meets with his Project STAIR coach, Rebecca to review the screening data and note that there is one student, Sienna, that is below the 10th percentile on the assessment and has been flagged as requiring urgent intervention. Mr. Gladstone confirms that this student has been struggling and although he tries to work with her during the independent practice portion of his lessons, he hasn't been sure how else to support her.

Putting it all Together:
Aligning Assessments in a DBI

Applied Example continued

Instruction

Mr. Gladstone is implementing the district supported intervention. He now implements the one of the instructional adaptations from the STAIR Intensive phase of the DBI process. To meet Sienna's needs, one of the instructional adaptations Mr. Gladstone learned about in the Project STAIR Core professional development was multiple representations.

Before making any changes to instruction, Mr. Gladstone needs to establish baseline data on the progress monitoring measure so that he can set an appropriate and ambitious goal for Sienna. He has Sienna complete the ARPM assessment three times over the course of a week to get a median score to start from.

NOTES FROM THE COACHING MEETING:

Mr. Gladstone meets with his Project STAIR coach, Rebecca to review the benchmark data and set a goal. Sienna has the following scores:
QD: 4, 8, 6 Median: 6
NP: 6, 4, 14 Median: 6
PR: 5, 14, 11 Median: 11
Using a growth rate of 1, and planning 20 weeks of intervention, they set the following goals for Sienna:
QD Goal: 26
NP Goal: 26

Progress Monitoring

After setting up the STAIR Intensive instructional adaptation, Mr. Gladstone sets up a progress monitoring plan for Sienna. Sienna takes the ARPM assessments weekly to monitor her progress and provide information to Mr. Gladstone about the effectiveness of the intervention. These assessments provide a global indication of Sienna's algebraic readiness.

NOTES FROM THE COACHING MEETING:

The next step in the Project STAIR DBI process is coaching with reflections on the STAIR Intensive instructional adaptations and Sienna's progress monitoring data. Mr. Gladstone meets with his Project STAIR coach, Rebecca after about 6 weeks of intervention to review the data for decision making. They note that Sienna's trendline is flatter than the goal line in each of the three graphs, although not by much. They review the decision-making flowchart and determine that Sienna is not making sufficient progress and they discuss why that might be. First, they consider fidelity, Mr. Gladstone is confident that Sienna has been present for received the intervention as intended. He has incorporated multiple representations into each lesson and Sienna has been engaged. Next, they consider the content, Mr. Gladstone has been covering fraction operations over the past eight weeks.

Putting it all Together: Aligning Assessments in a DBI

Applied Example continued

Diagnostic Assessment

After coaching, the next step in the Project STAIR DBI model is to go back to progress monitoring or make further adaptions based on STAIR Tailored. Mr. Gladstone and Rebecca decide they need more information about what content Sienna has and hasn't mastered to try to pinpoint an appropriate intervention or instructional adaptation. Sienna completes the DOMA, an assessment that provides specific information about grade level appropriate aspects of algebraic readiness.

NOTES FROM THE COACHING MEETING:

Mr. Gladstone meets with his Project STAIR coach, Rebecca to review the diagnostic data and note that although Sienna has mastered many skills that can serve as a starting point, she has not yet mastered some prerequisite skills necessary for multiplying and dividing fractions. They determine she may be struggling with the concept of simplifying fractions, impeding her ability to make use of the instruction Mr. Gladstone has been implementing. They decide to provide Sienna and the class with a review lesson of that concept using multiple representations before continuing with the unit. In addition, Rebecca recommends that Mr. Gladstone watch a STAIR Tailored video on incorporating multiple representations effectively.

Progress Monitoring

Following the decision-making flow chart, Mr. Gladstone has made an instructional change and continues monitoring Sienna's progress weekly. He graphs that data regularly and is seeing an improvement in scores. He meets with Rebecca to review the data after 4 weeks.

NOTES FROM THE COACHING MEETING:

Mr. Gladstone meets with his Project STAIR coach, Rebecca, to review the progress monitoring data. They are happy to see that Sienna's trendline is now on track to meet her goals. Mr. Gladstone reports that the class seems to enjoy the concrete representations and since reviewing the STAIR Tailored video he has been using them less as an engagement tool and more to connect to and explain the mathematical concepts. He is also encouraging his students to explain their thinking using more visual and concrete representations. He and Rebecca plan to continue to monitor Sienna's graphs and make adjustments as needed.

Reflection

If you were part of this team, how might you have supported Sienna differently?

How did the alignment of the assessments come into play in this case study?

What role did the coaching relationship between Rebecca and Mr. Gladstone play in this case study?

How might things have gone differently if the relationship was less collaborative?

Assessment in the Virtual Environment

WHAT ARE THE KEY CONSIDERATIONS FOR ASSESSMENT IN A VIRTUAL LEARNING ENVIRONMENT?

The assessments in the virtual environment section applies to both synchronous and asynchronous assessments. The section is split into four parts:

1. Know your student's Individualized Education Plan (IEP) accommodations
2. Be aware of potential inequities
3. Be mindful about your purpose for assessing
4. Preparedness and communication are key

Know your student's IEP accommodations

For virtual assessments, teachers must appropriately support accessibility, accommodations, and equity. In this section we discuss supporting accommodations. Teachers need to ensure that they meet the needs of students with IEPs. Teachers need to reference the IEP for each student with an IEP to ensure that all appropriate accommodations are met for each assessment. The accommodations in a student's IEP have been created by the IEP team to best fit the strengths and needs of that student and must be carried out on each assessment.

To ensure that all accommodations are in place, general education teachers, special education teachers, other building specialists, guardians, and the student need to collaborate. Providing and supporting access to accommodations will vary based on the student. While a child may be independent in utilizing one accommodation, they may need more support to access another accommodation.

Some common accommodations support the Americans with Disabilities Act (ADA) accessibility, assistive technology for speech-to-text/text-to-speech, and executive functioning supports. In properly carrying out the appropriate accommodations, teachers will support fair access to the tested material for all students (Center for Assessment, 2020).

Teachers need to ensure that the students who need assistive technology have it available at home and know how to access it. For example, teachers need to make sure that the digital content has various technology supports such as built-in speech-to-text or text-to-speech.

Additionally, teachers need to ensure that they are considering ADA accessibility when appropriate. Are the students with physical disabilities able to take assessment at home with remote proctoring? Such students need to have access to the full range of test-taking accommodations they would have taking an assessment in school.

Last, teachers need to make sure that the demands of executive functioning skills are supported during the virtual assessment.

Assessment in the Virtual Environment

Be aware of potential inequities

Teachers need to consider accessibility and equity when conducting assessments in the virtual classroom. Similar to the in-person classroom, in the virtual classroom, student access to school resources is influenced by home resources. Teachers must keep this in mind when making decisions for assessments in the virtual classroom.

Prior to assessments teachers must ask the following questions:

a. Do all students have sufficient technology capacity (For example: Internet bandwidth, and a computer or laptop that meets the needs for completing the assessments)?
b. Are the students familiar with the online testing platform with remote proctoring?
c. Can students operate the technology independently?
d. Are the testing instructions equally accessible without the teacher to provide in person instructions?

Teachers must also consider comparability in results:

a. Are scores obtained from at-home test administrations and remote proctoring comparable to those from traditional in-school test administrations?
b. Are there variations due to the platform or other factors not related to student understanding of the content?
c. Are all students taking the assessment virtually? Are some students taking virtually and others taking in person?

Possible supports to address inequities within virtual assessments:

- Possible digital tools and materials that assessments are accessible, on-demand, and meaningful
- Develop grading practices to support learning, but stay away from bias based on resources
- Work with students to build agency and self-regulation for independent test taking skills (Center for Assessment, 2020)
- Although it is a challenge to define fair, teachers should work to create fair practices in test design and test use (Center for Assessment, 2020)
- Promote social interaction online and support individual learning
- Short large-scale assessments promote equity (Center for Assessment, 2020)
- Take advantage of the knowledge and experiences from student homes and communities as a part of assessment (Center for Assessment, 2020)
- Offer assessments in multiple modes. Have students demonstrate their knowledge using multiple formats (Center for Assessment, 2020)

Assessment in the Virtual Environment

Be mindful about your purpose for assessing

The purpose of the assessment needs to be clear to the teacher, the families, and the students. The focus of virtual assessments should be on formative assessment. Formative assessments are valuable for finding out more about student learning and how to support their growth. With formative assessments you will be able to monitor student progress and make changes to the curriculum based on student needs. Formative assessments have a clear and straightforward purpose for virtual assessment.

It is also valuable to use self-assessment during remote learning to encourage students to self-monitor their growth. This can generate student engagement in their own learning progress.

The purpose of virtual assessments should NOT be summative accountability. With remote learning, summative assessments to evaluate student learning at the end of a unit are not going to benefit the student or provide the teacher with useful information.

Additionally, teachers need to consider security around online assessments:

- Safeguards need to be in place to prevent testing improprieties, such as cheating (by students and their guardians) and test-question sharing.
- Teachers can work to decrease cheating by making the purpose of the assessments clear to the families and students. If families and students know that the purpose of the assessments is primarily to support student learning, the likelihood of cheating may decrease.
- Cheating most often happens under high stakes environments. So, if the stakes are low (which we recommend here), cheating should be less likely to happen.

Preparedness and communication are key

Clarity and repetition are essential for virtual assessments. Direct teacher-to-family communication is a key driver for quality of data.

Before the assessments:

- It is the teacher's responsibility to get ahead of the technology hurdles.
- The teacher should practice using the assessment platform before providing the assessment.
- The teacher should also make it available to students and families so they can practice using the assessment platform before taking the assessment.

Assessment in the Virtual Environment

Preparedness and communication are key, continued

It is also important that teachers have a communication plan for students and families before, during and after assessments.

- Teachers need to set up a standard for collaboration around the assessment with families and students. This can be through email, messaging, google classroom, ClassDojo or another online communication system. Whatever system a teacher uses, it must be clear, consistent and a reliable form for communicating. Families and students should be able to have resources available and a clear way for them to ask informal questions.
- Teachers should also set up a space for information about the assessment. This may include How-To videos or step by step written instructions about the assessment procedures.
- It will be most accessible to families if they can receive all of this information and the information about the purpose of the assessment from the same place. Consistency and simplicity are important for easing the transition to online assessments.

An Applied Example:

While teaching remotely, you are working through the DBI process with Abbey. To best support her for through diagnostic assessments and progress monitoring you must consider the four virtual environment tips.

1. Know your student's IEP accommodations

What you know:

Abbey does not have an IEP, so this does not apply to her.

2. Be aware of potential inequities

What you know:

Abbey is the oldest of three kids. They each have their own device and fast internet, but they share a learning environment.

How to respond:

Before assessing, you must discuss with Abbey the importance of the test taking environment. Ask her what about where she feels most comfortable testing and if there is a better time for her to take assessments than the assigned class period. Develop a plan to allow Abbey to perform at her true level rather than have the assessments reflect her environment.

3. Be mindful of your purpose for assessing

What you know:

The assessments you are conducting are for the DBI process so they are formative assessments.

How to respond:

While you know the purpose of assessing, make it clear to Abbey why she is taking extra assessments and how she benefits from working hard. Talk with her one on one via video chat and share her data with her as she progresses.

4. Preparedness is key

What you know:

You need to conduct online assessments and your school regulates that you use the google classroom platform.

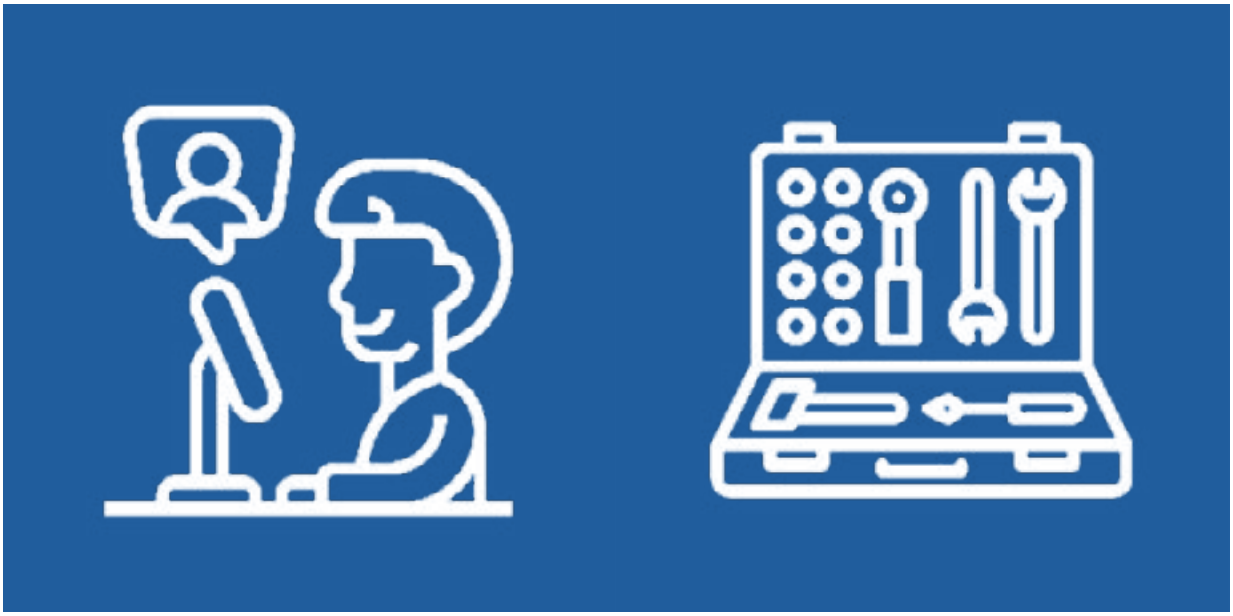
How to respond:

Take all assessments yourself before completing the assessments with Abbey, make video instructions for each assessment, and ensure that Abbey knows how to use the messaging format on google classroom. Also, follow up with her and her parents after each assessment to learn about her test taking experience.

Assessment in the Virtual Environment

RESOURCES FOR ASSESSMENT IN THE VIRTUAL ENVIRONMENT

I Station	Blended learning and assessments	https://www.istation.com/
NWEA	Flexible delivery options for assessments	https://www.nwea.org/
iReady	Using iReady assessments in the virtual environment	https://www.curriculumassociates.com/products/i-ready/how-i-ready-supports-teachers-leaders-2020-2021
Center for Assessment	Covid-19 response resource	https://www.nciea.org/current-initiatives/covid-19-response-resources
Council for Exceptional Children	Research on teaching remotely	https://exceptionalchildren.org/improving-your-practice/resource-library/resources-teaching-remotely



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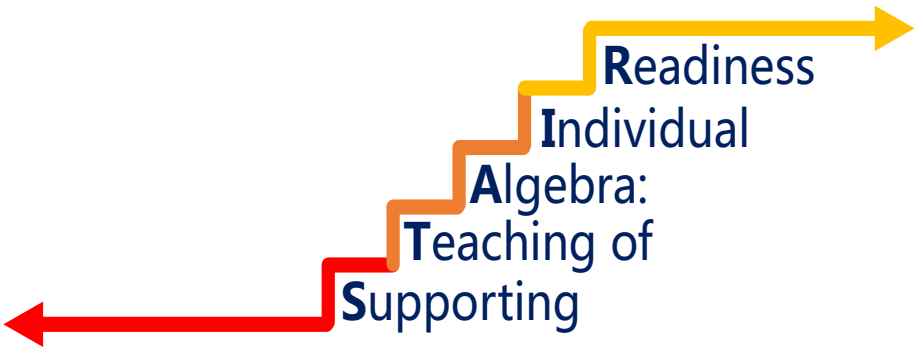

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Appendix

PRACTICE OPPORTUNITY ANSWERS

A. (CLOCKWISE STARTING AT THE TOP) GOAL LINE, TRENDLINE, SCORES, DATES, BASELINE

B. CONSIDER FIDELITY, THEN MAKE AN INSTRUCTIONAL CHANGE