Data-Based Decision Making in Math

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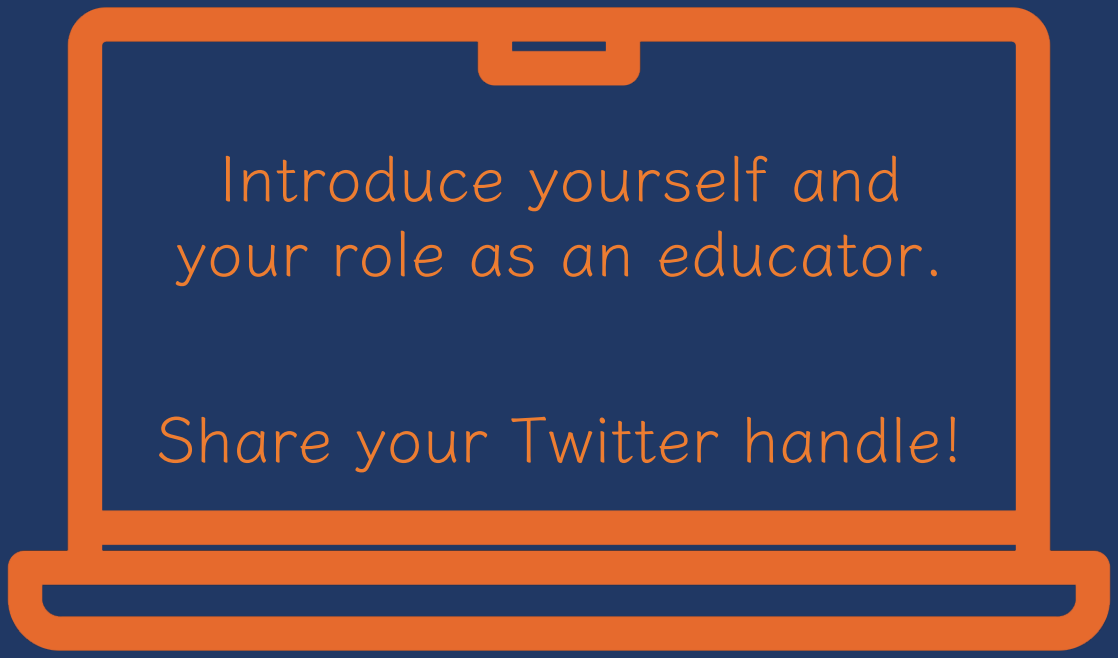
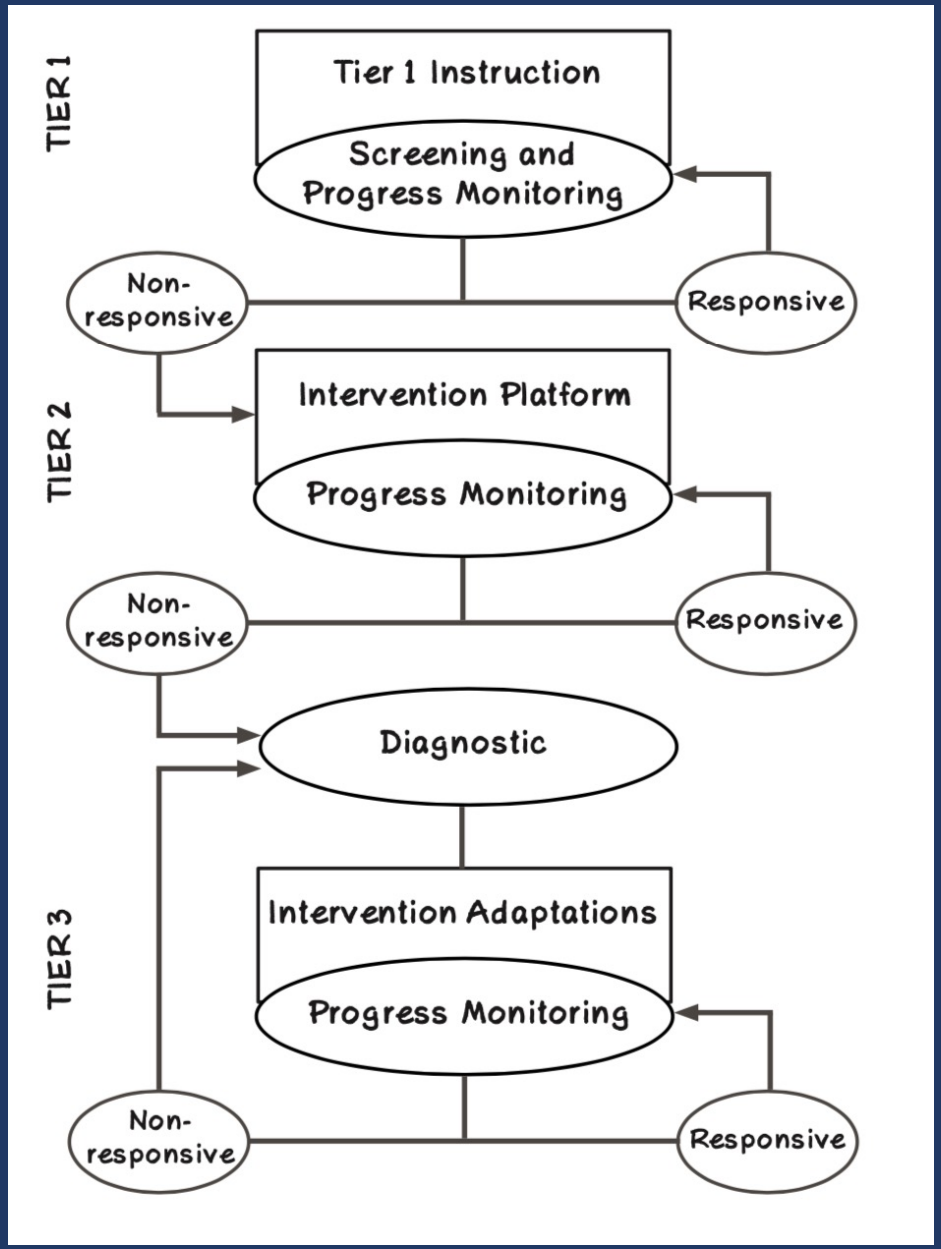
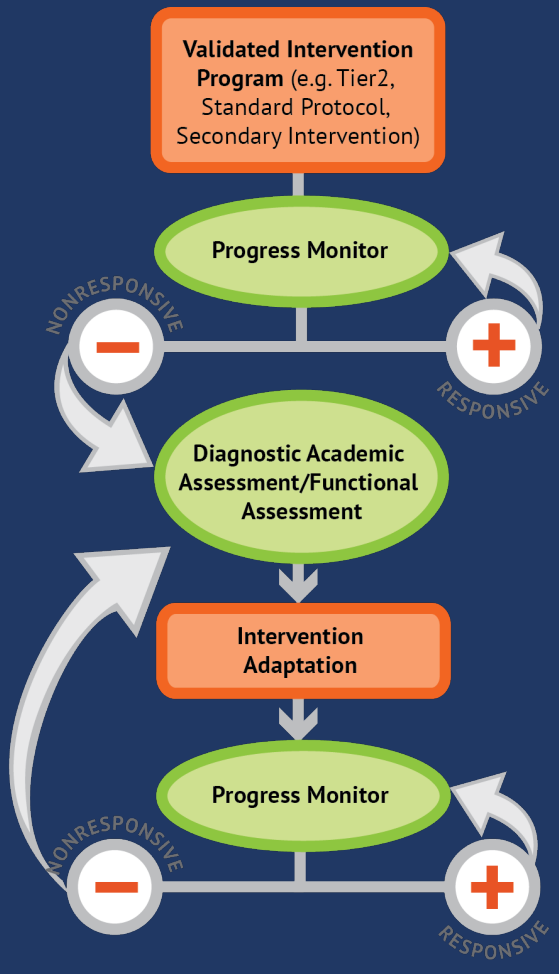
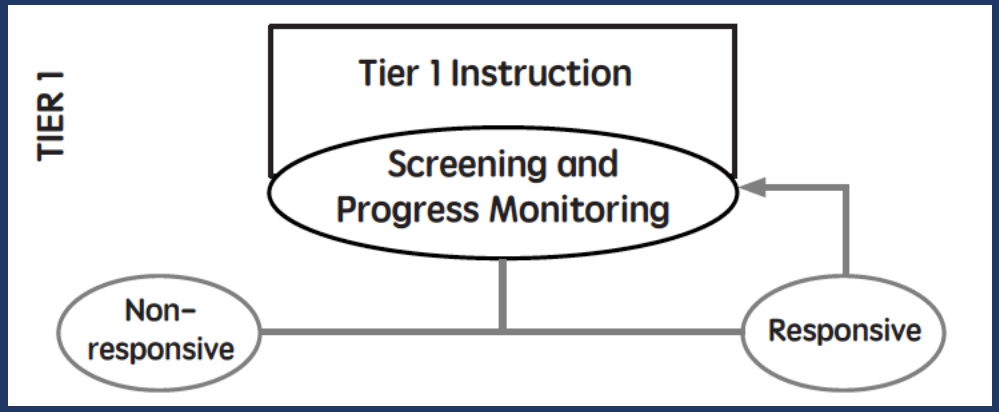






Tier 1 Instruction:



- Core instruction utilizes **evidence-based practices**
- All students **screened** (universal screener)
- Students scoring below a cut-score are suspected **at risk** for math difficulties
- Suspected **at-risk students** monitored for 6 to 10 weeks during primary prevention using **progress monitoring**

evidence-based practice

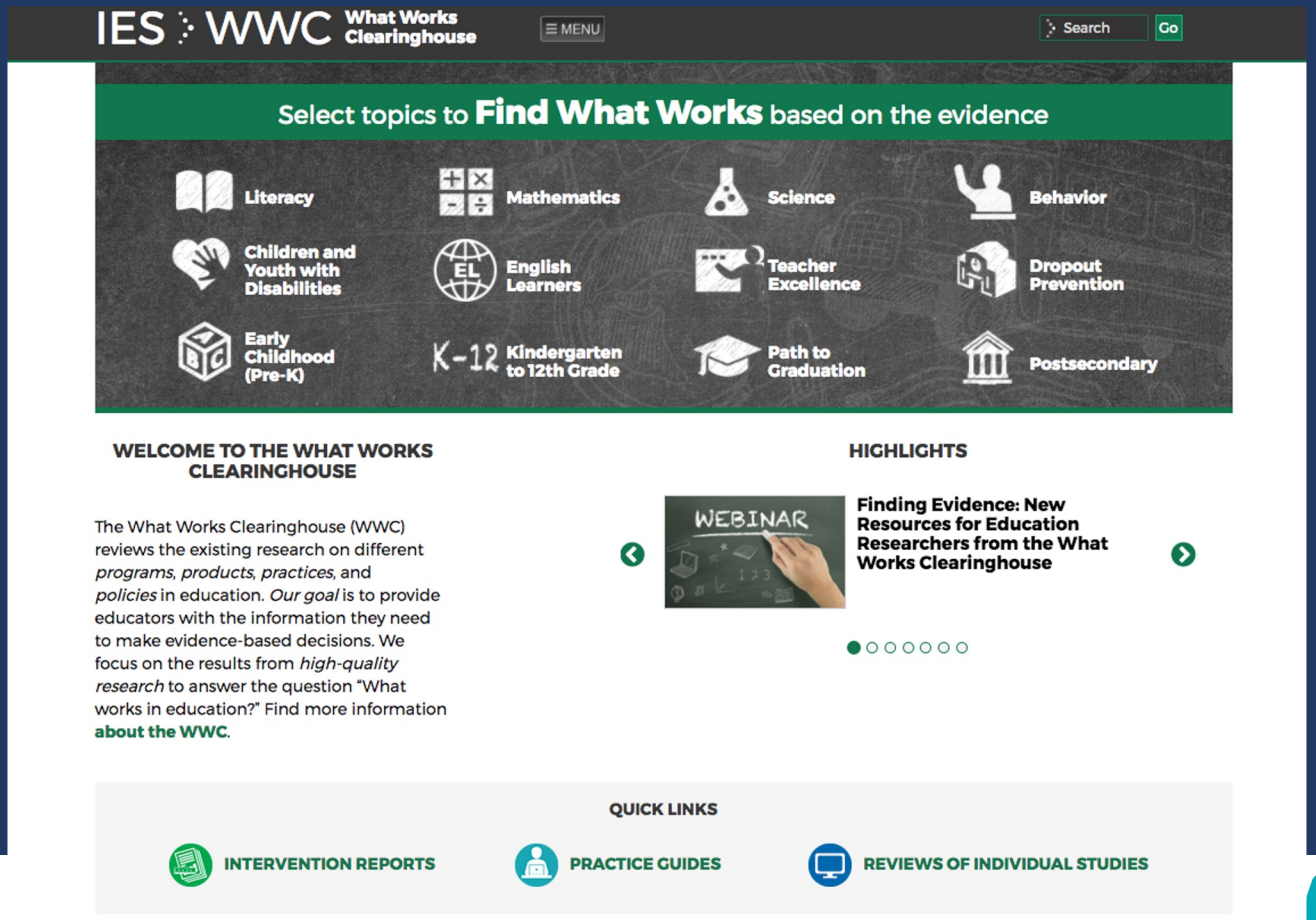
A practice that has shown **consistent and positive** results

An intervention (i.e., packaged program) that has shown **consistent and positive** results

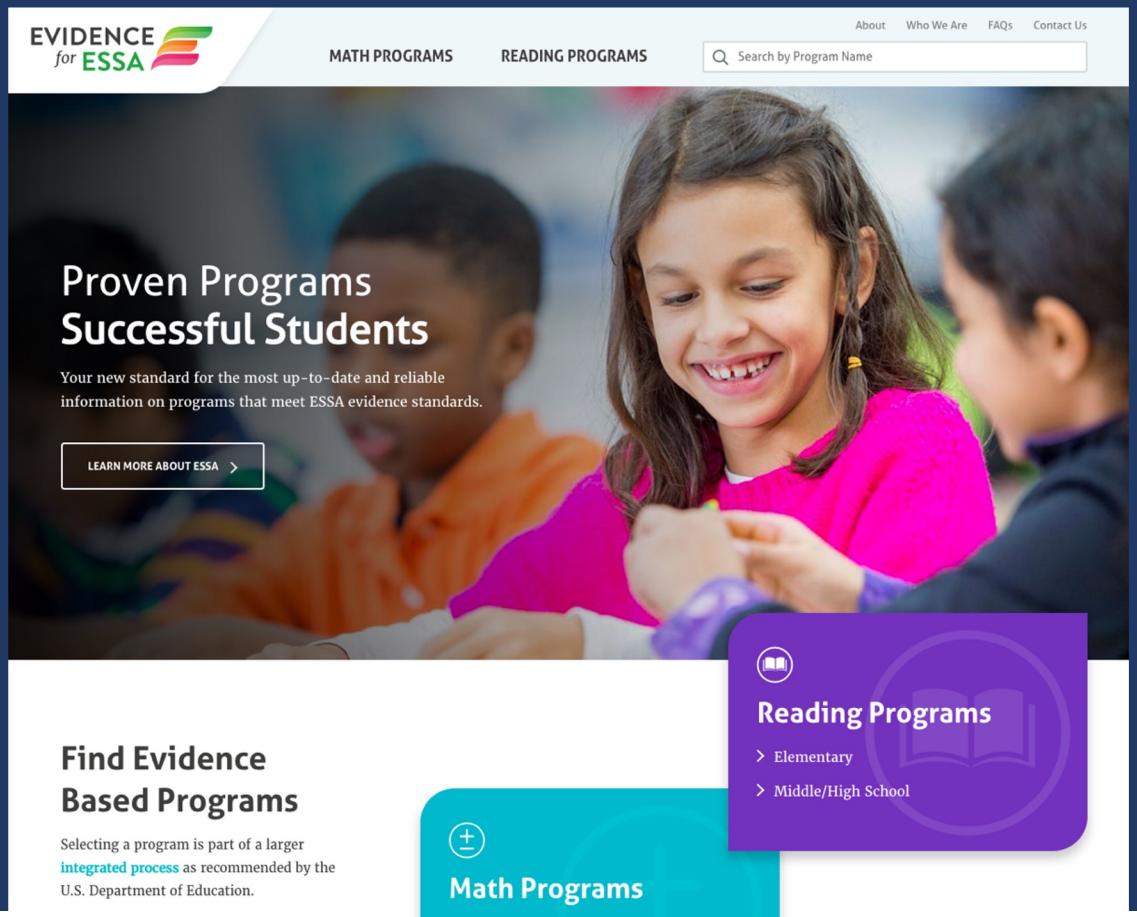
A method or strategy that has shown **consistent and positive** results

A method or strategy that has shown a **positive** result

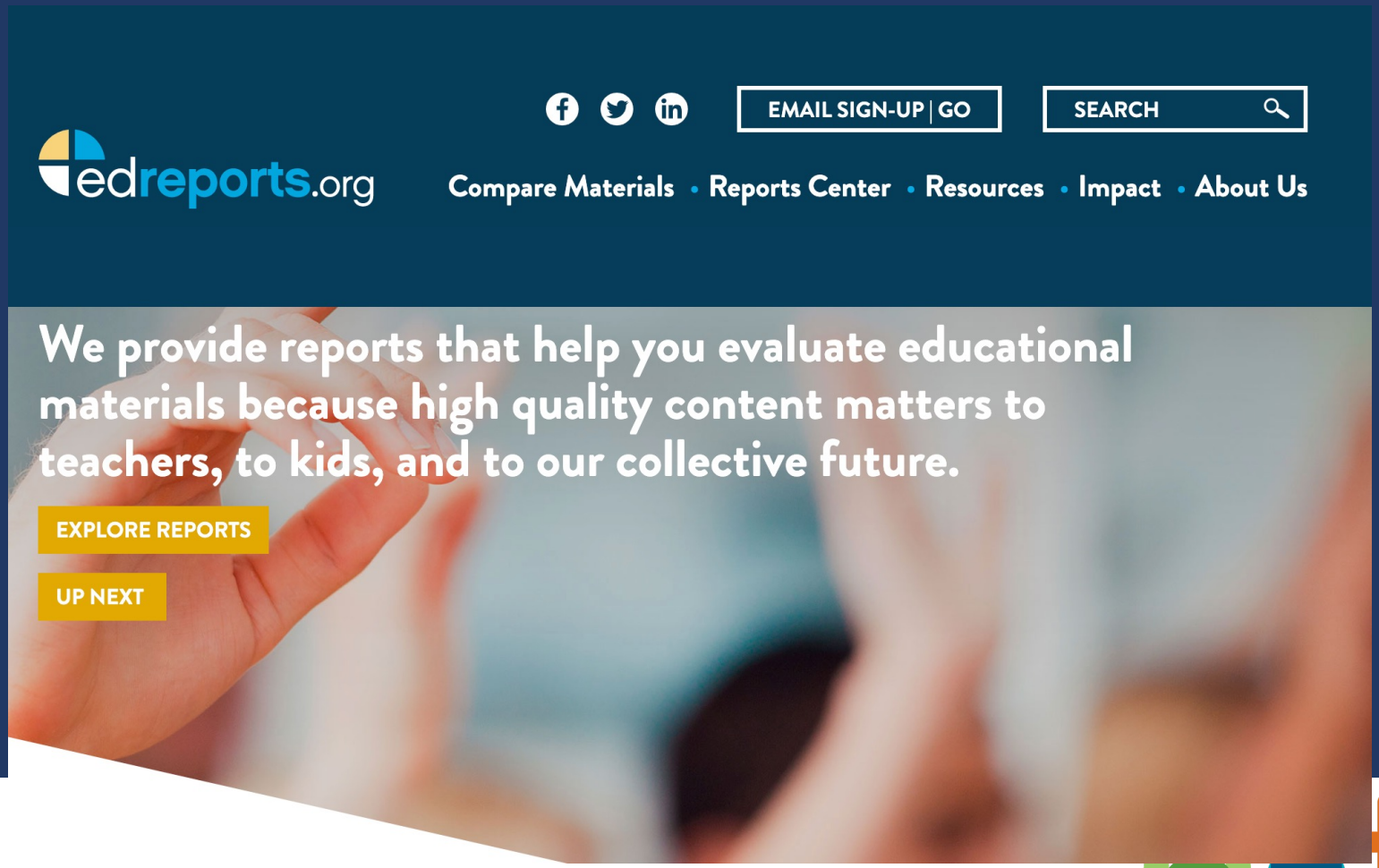
Websites
ies.ed.gov/ncee/wwc/



Websites
www.evidenceforessa.org



Websites
www.edreports.org



Websites

www.intensiveintervention.org

Assessment data to show results

Improvement from before intervention

Improvement compared to no treatment students

Replication

Multiple researchers

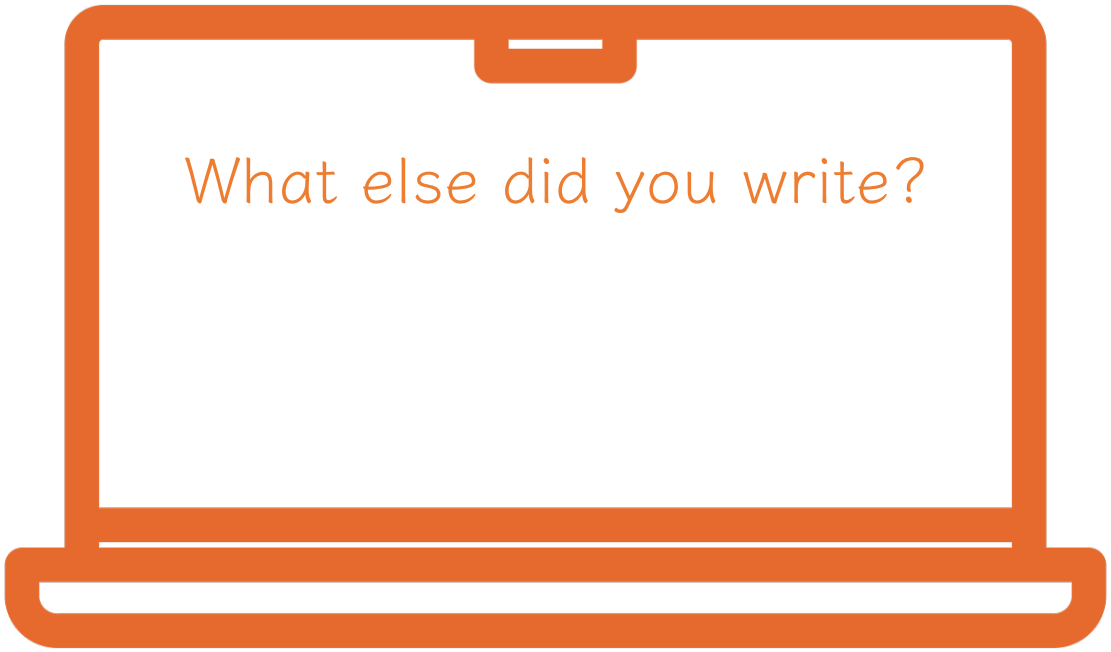
Multiple students

Multiple times

Setting and students similar to your own

Tier 1 Instruction:

- Evidence-based practices



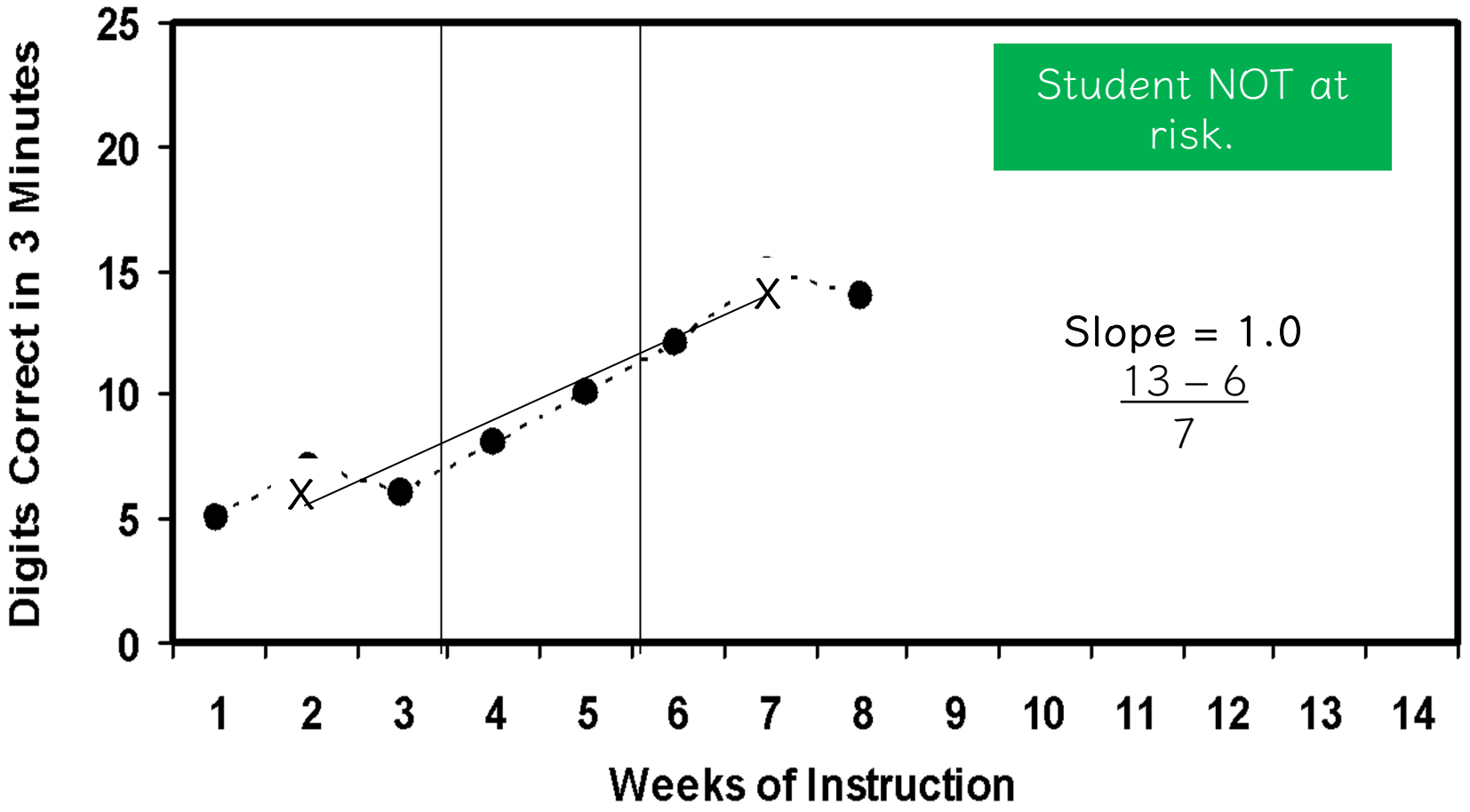
Screening and Progress Monitoring:

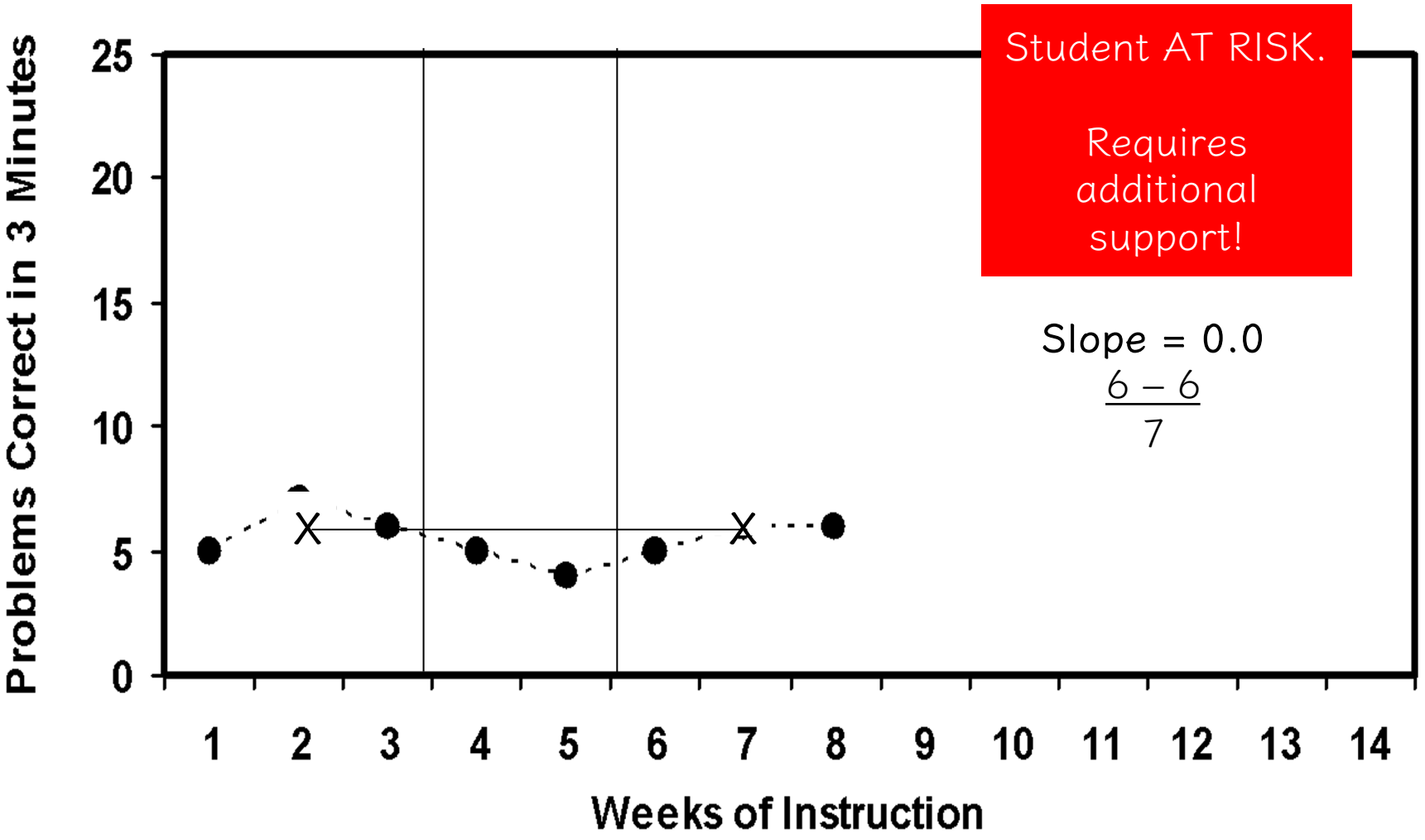
- Reliable measures with normative data
- Usually administered fall, winter, spring

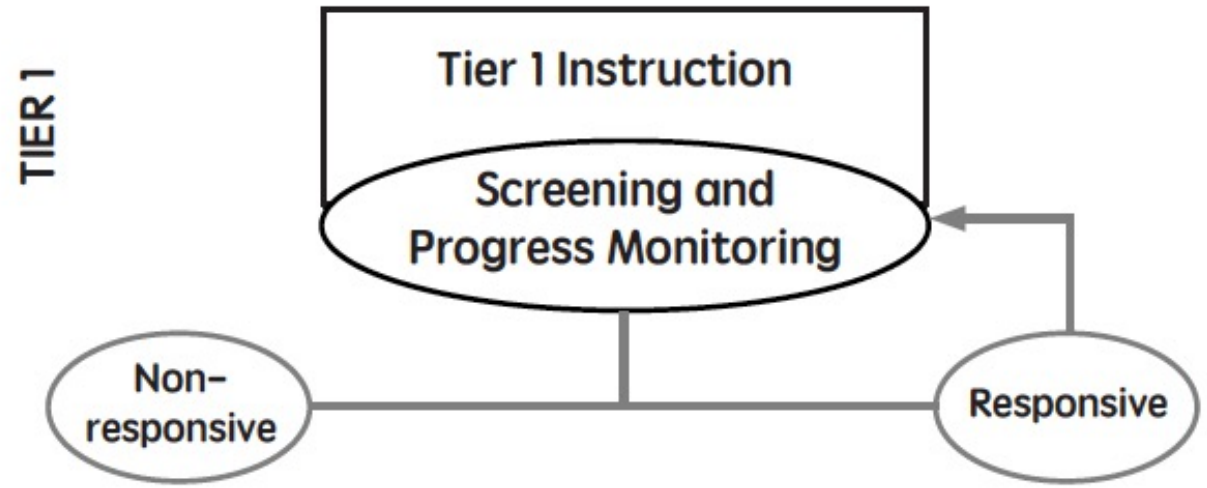
- Reliable measures, administered regularly

Decision Making:

- After 6-10 weeks, student risk status is **confirmed** or **disconfirmed**







What are your school's Tier 1 strengths and weaknesses?

Data-based Individualization

DBI is a process and NOT a single program or strategy

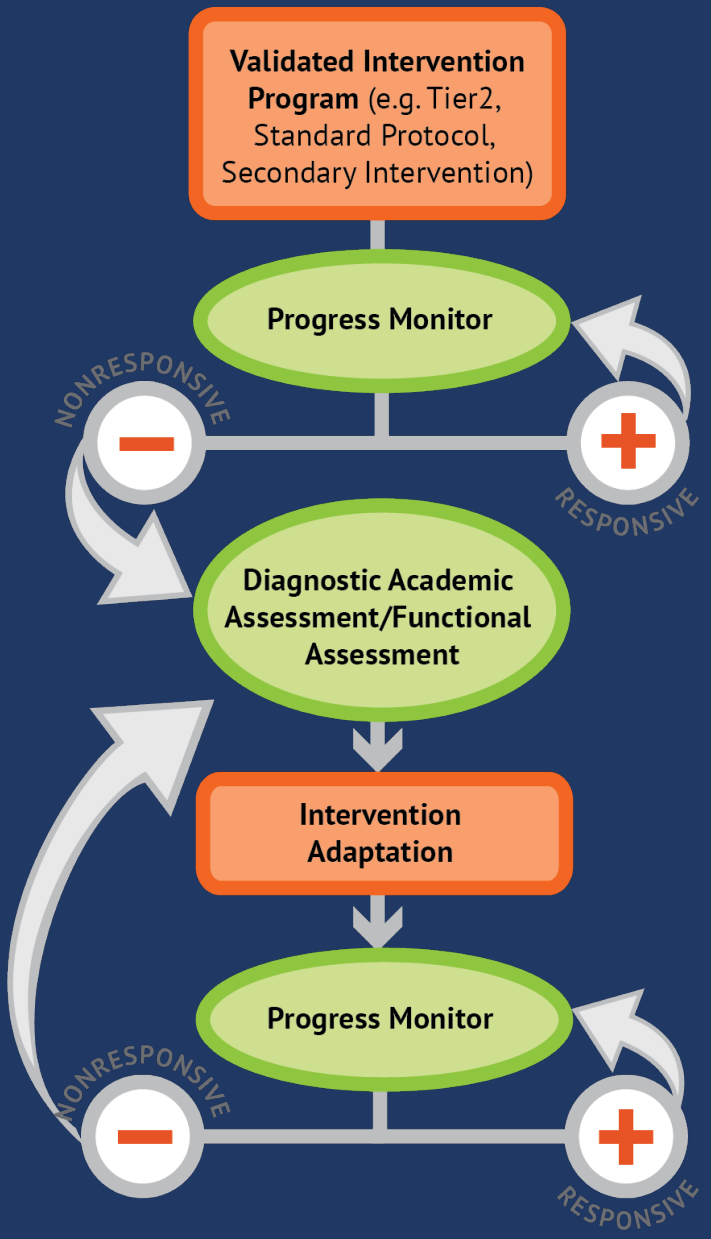
DBI is an ongoing process in which intervention and assessment are linked; it's NOT a one time fix

DBI is often domain-specific but can be implemented in multiple domains

DBI will likely need to occur over a sustained period of time

www.intensiveintervention.org

Intervention: Occurs frequently and with intensity

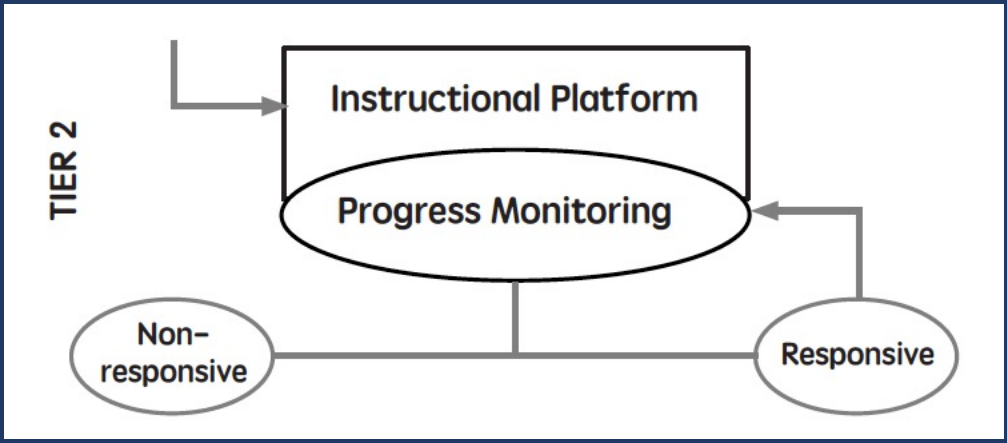


Assessment: Formative

Assessment: Diagnostic

Assessment: Formative

Intervention adaptation: Content, dosage, explicit instruction, attention to transfer



- Students are tutored in small groups using **evidence-based practices**
- Tutoring takes place three or four times a week
- Each tutoring session lasts 30 to 60 minutes
- Tutoring lasts 10 to 20 weeks
- **Progress monitoring** continues weekly

Instructional Platform:

Instructional Platform

INSTRUCTIONAL DELIVERY

Explicit instruction

Precise language

Multiple representations

INSTRUCTIONAL STRATEGIES

Fluency building

Problem solving instruction

Explicit instruction

MODELING

Step-by-step explanation

Planned examples

PRACTICE

Guided practice

Independent practice

SUPPORTS

Ask high-level and low-level questions

Eliciting frequent responses

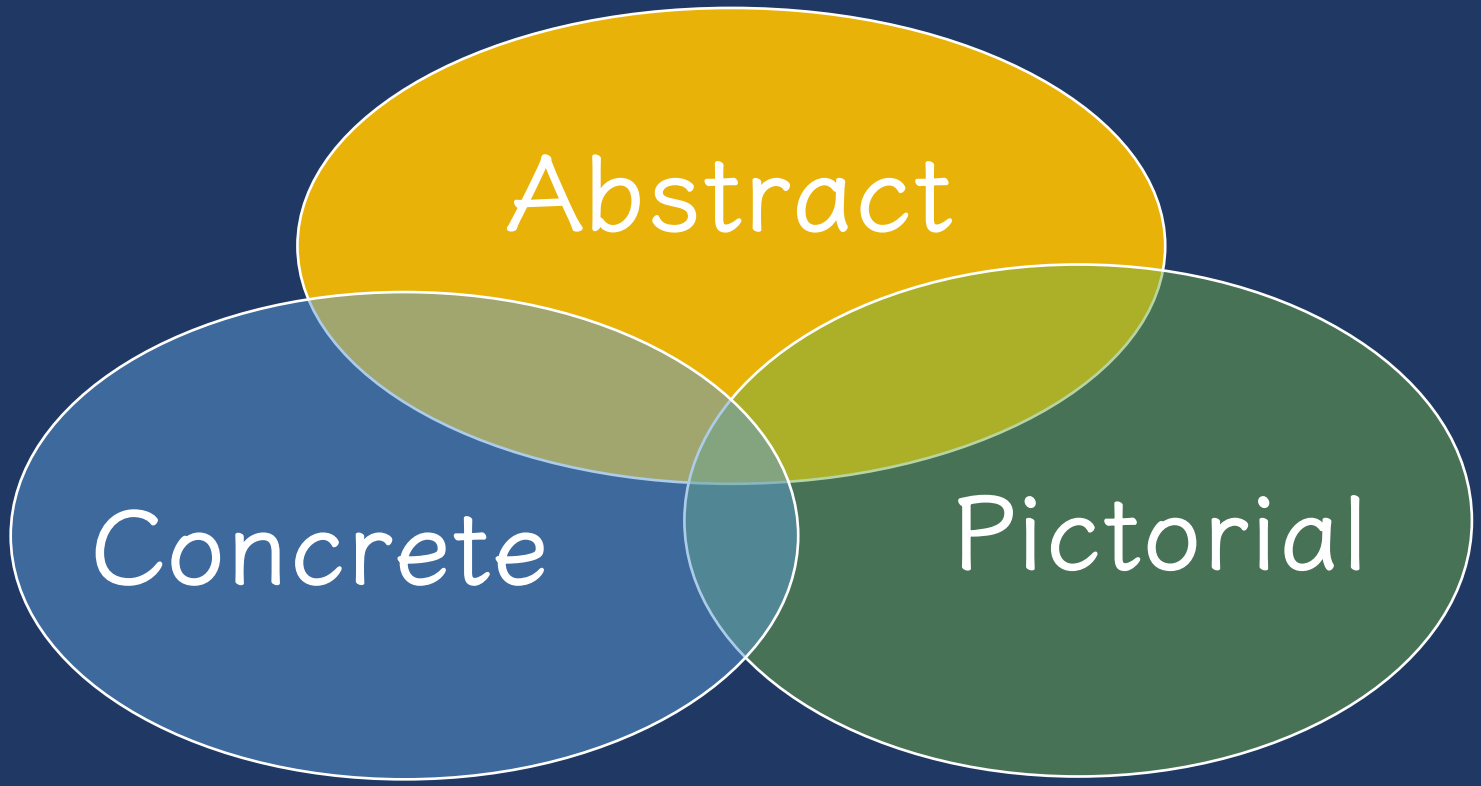
Providing affirmative and corrective feedback

Precise language

Use formal math language

Use terms precisely

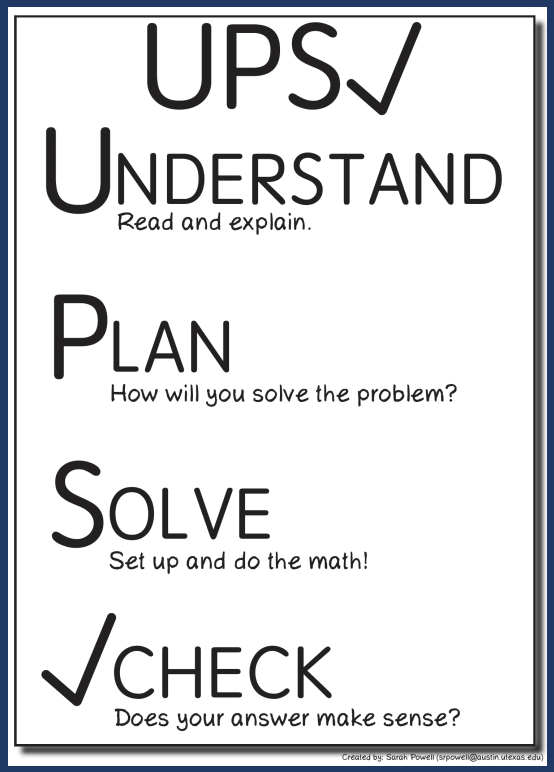
Multiple representations



Fluency building

Addition	Subtraction
Multiplication	Division

Problem solving instruction



Total

Difference

Change

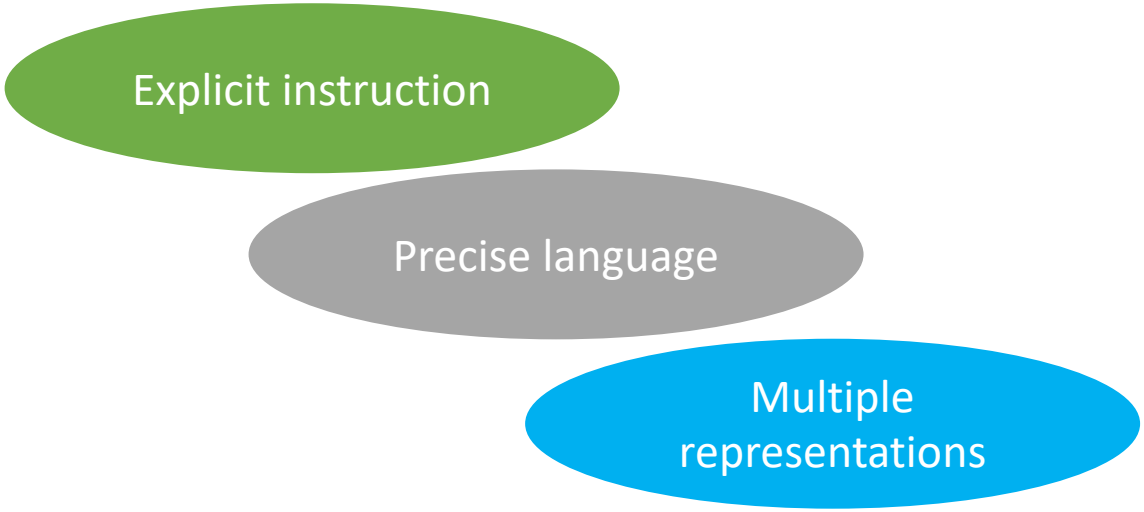
Equal Groups

Comparison

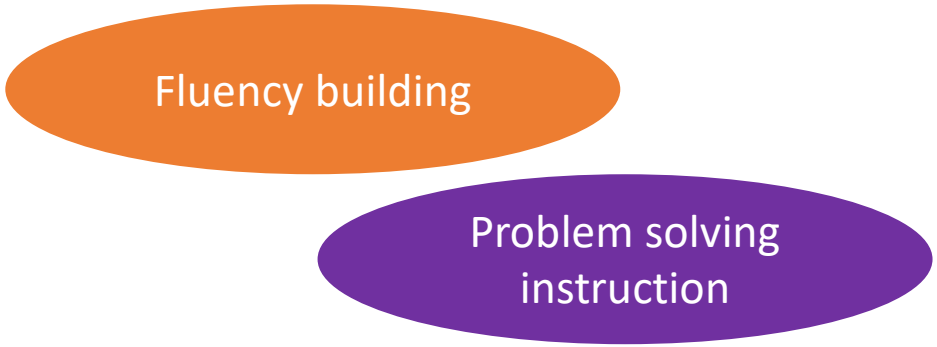
Ratios/Proportions

Instructional Platform:

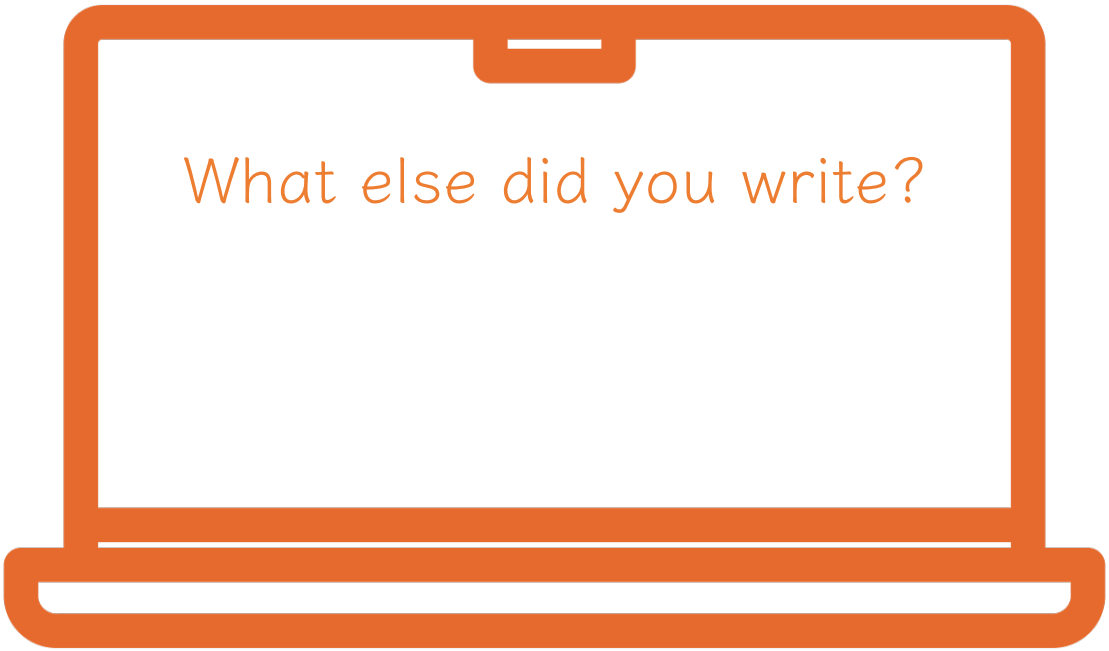
INSTRUCTIONAL DELIVERY

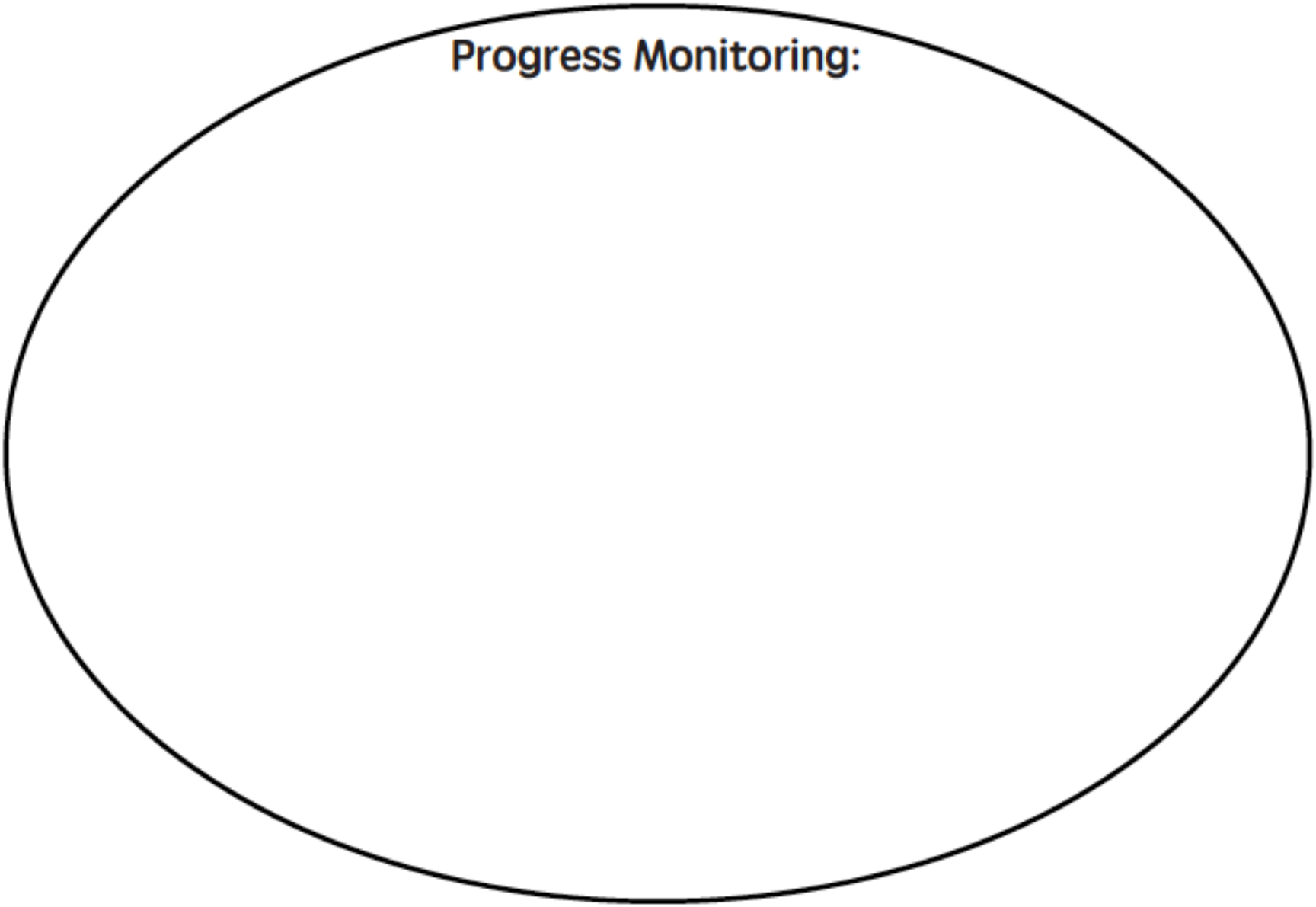


INSTRUCTIONAL STRATEGIES

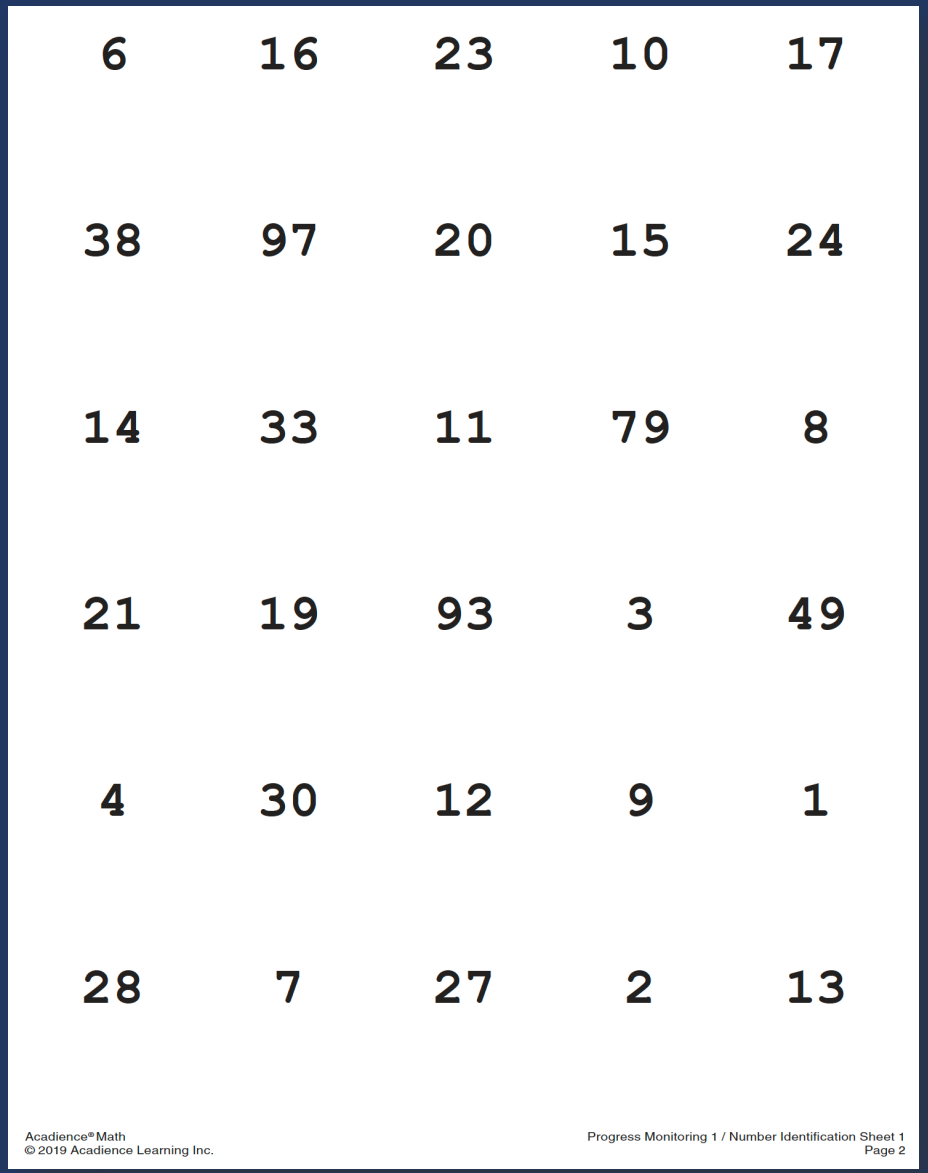


Instructional Platform:



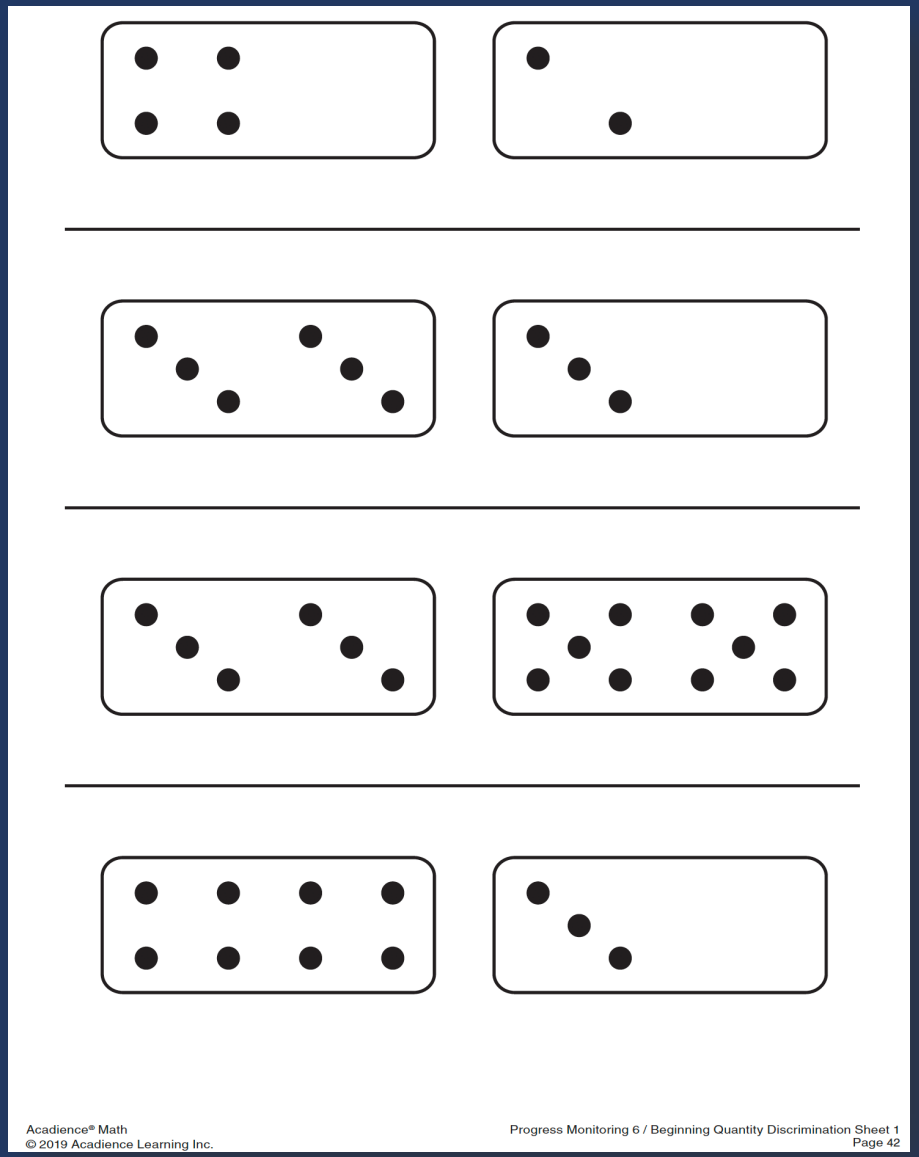


Number Identification



6	16	23	10	17
38	97	20	15	24
14	33	11	79	8
21	19	93	3	49
4	30	12	9	1
28	7	27	2	13

Quantity Discrimination



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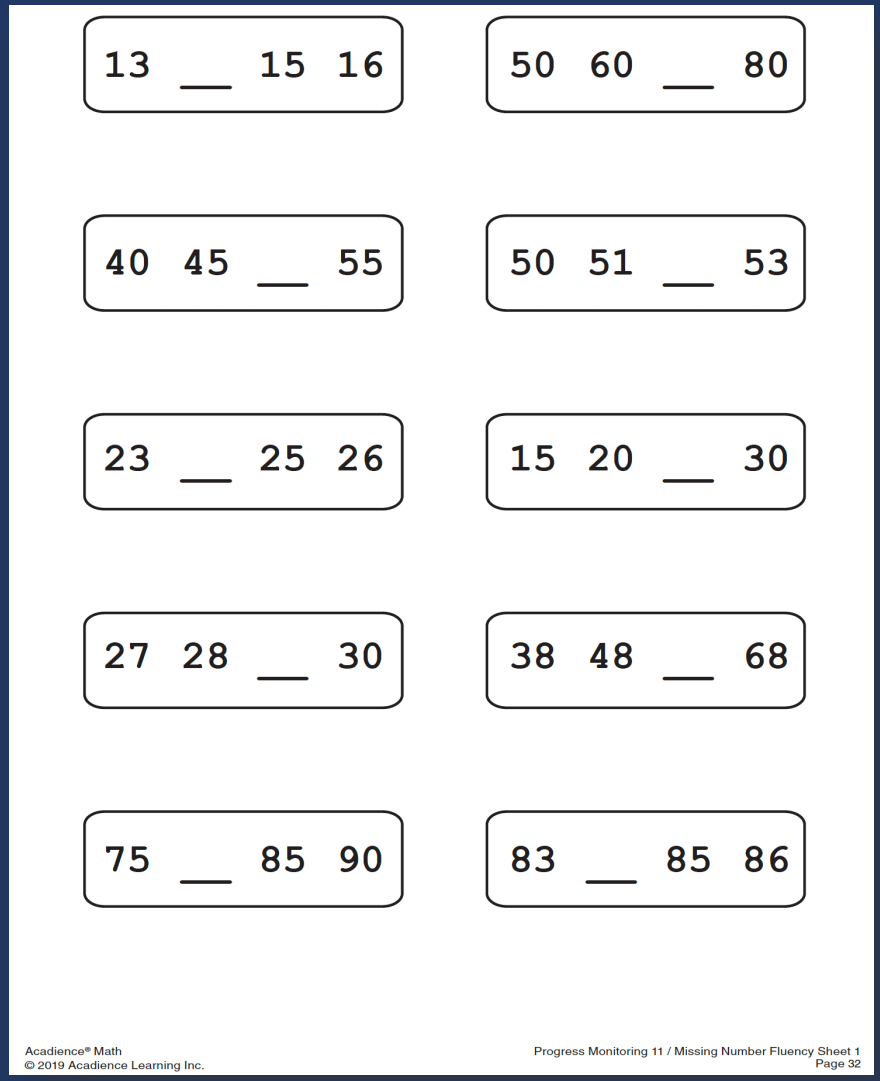
Missing Number



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Computation

Acadience® Math / Computation Grade 4
Benchmark 1 / Form A

Total: _____

1. $527 + 320$	2. $4778 + 2242$	3. $8\frac{4}{5} - 6\frac{2}{5} =$	4. 9×8	5. $4\overline{)573}$
6. $197 - 74$	7. $\frac{5}{8} + \frac{2}{8} =$	8. $7273 - 387$	9. 19×11	10. $9\frac{7}{12} - 1\frac{4}{12} =$
11. $8\overline{)642}$	12. $7\overline{)49}$	13. 99×72	14. $\frac{1}{4} + \frac{2}{4} =$	15. 526×6
16. $8\frac{9}{10} - 1\frac{5}{10} =$	17. $\frac{1}{3} + \frac{1}{3} =$	18. $\frac{9}{12} - \frac{2}{12} =$	19. 829×7	20. $6\overline{)939}$
21. $3\overline{)397}$	22. 65×23	23. $2414 - 668$	24. $7568 + 1638$	25. 34×12

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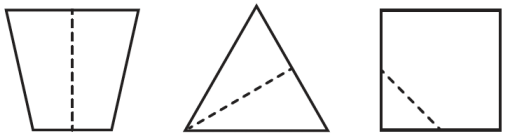
Concepts and Applications

Acadience® Math / Concepts and Applications
Grade 4 / Benchmark 1

Total: _____

1. Is the dotted line a line of symmetry for each shape? Write "yes" or "no" in the space provided below each shape.



_____ _____ _____

2. Compare the number in Box 1 with the number in Box 2. Fill in the blank with > (greater than), = (equal to), or < (less than):

Box 1	>, =, <	Box 2
835		751
333		613
131		168

3. List three numbers that are multiples of 4:

_____ _____ _____

4. Jake read 17 books over the summer that were nonfiction and 43 books that were fiction. His friend Ross read 38 books total. How many more books did Jake read than Ross? _____ books.

5. Compare the decimal in Box 1 with the decimal in Box 2. Fill in the blank with > (greater than), = (equal to), or < (less than):

Box 1	>, =, <	Box 2
0.47		0.25
0.39		0.68
0.89		0.91

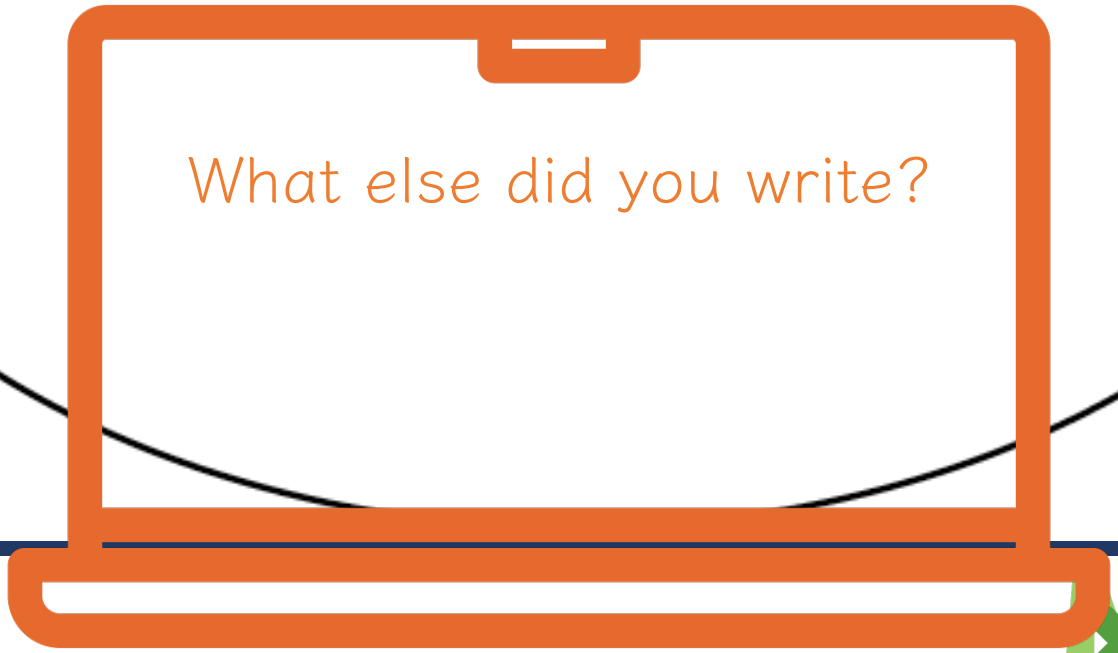
6. We rented a movie that was 2 hours and 15 minutes long. How many minutes total was the movie? _____ minutes.

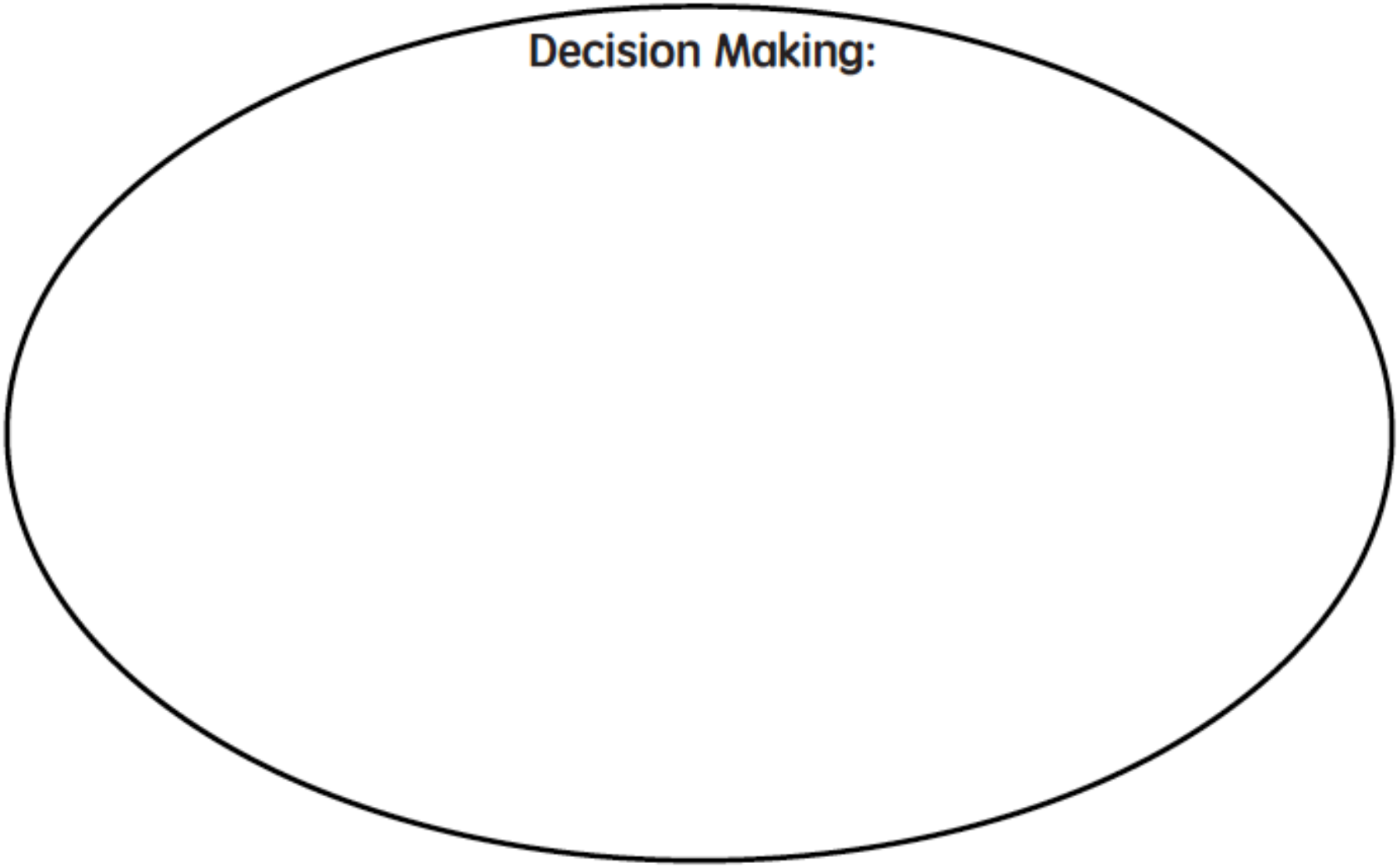
Progress Monitoring Considerations

- Skills to be measured—age and grade appropriate
- Cost and training requirements
- Administration and scoring time
- Data management
- Technical rigor (consider population)
  - Reliability
  - Validity
  - Evidence of being sensitive to change
  - Alternate/parallel forms

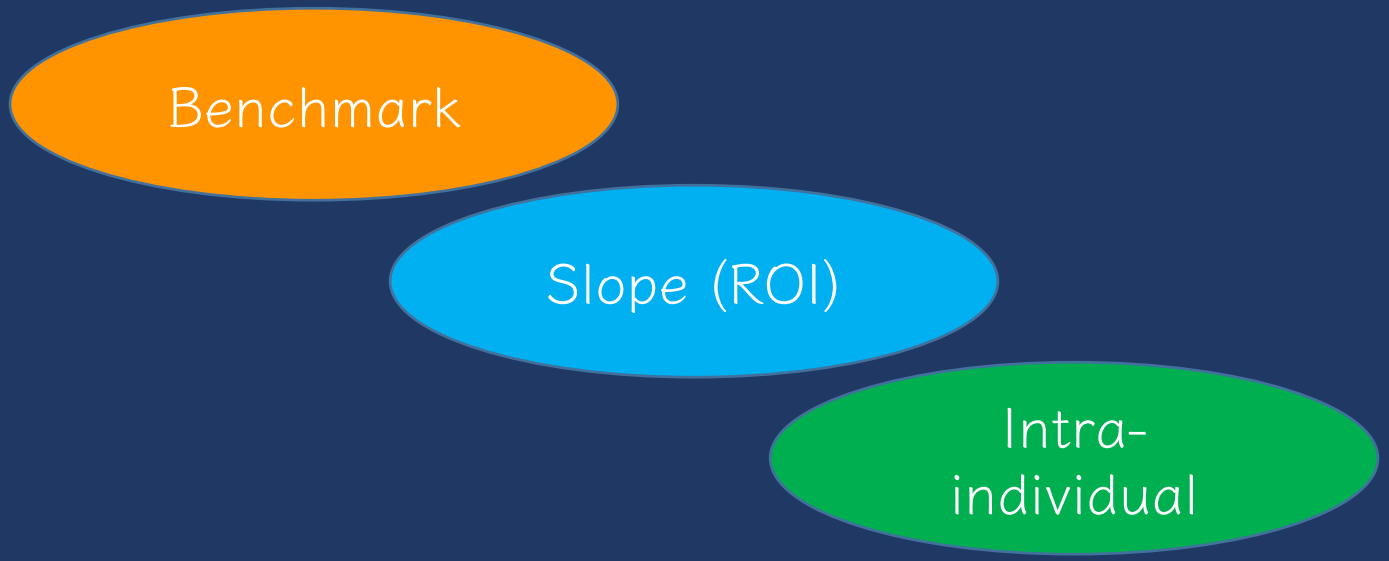
Progress Monitoring:

- Reliable measures, administered regularly
- Efficient and easy to administer
- Skills assessed serve as indicators of general knowledge





Setting Goals



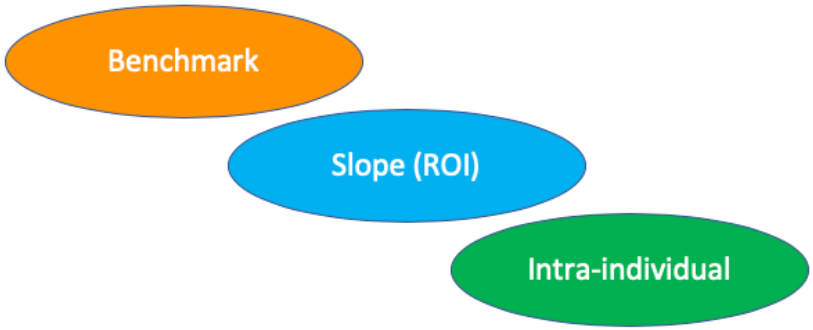
Determining Response

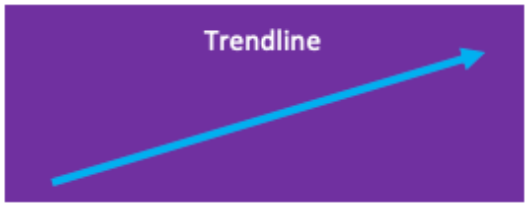
Four most recent, consecutive scores

Trendline

Decision Making:

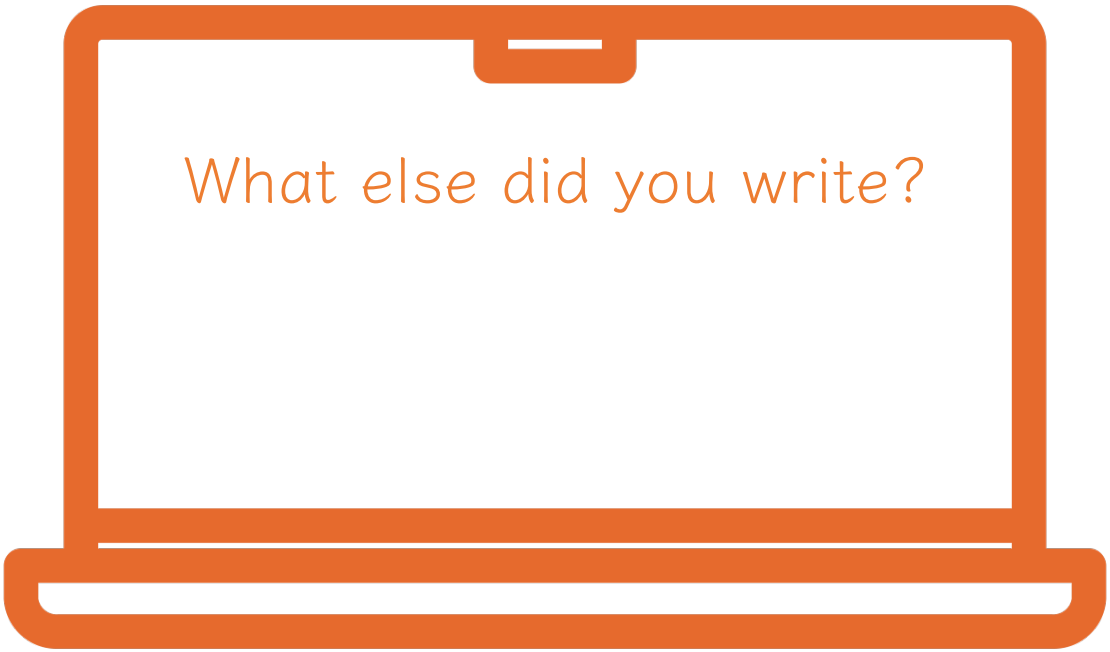
- Teachers set goals



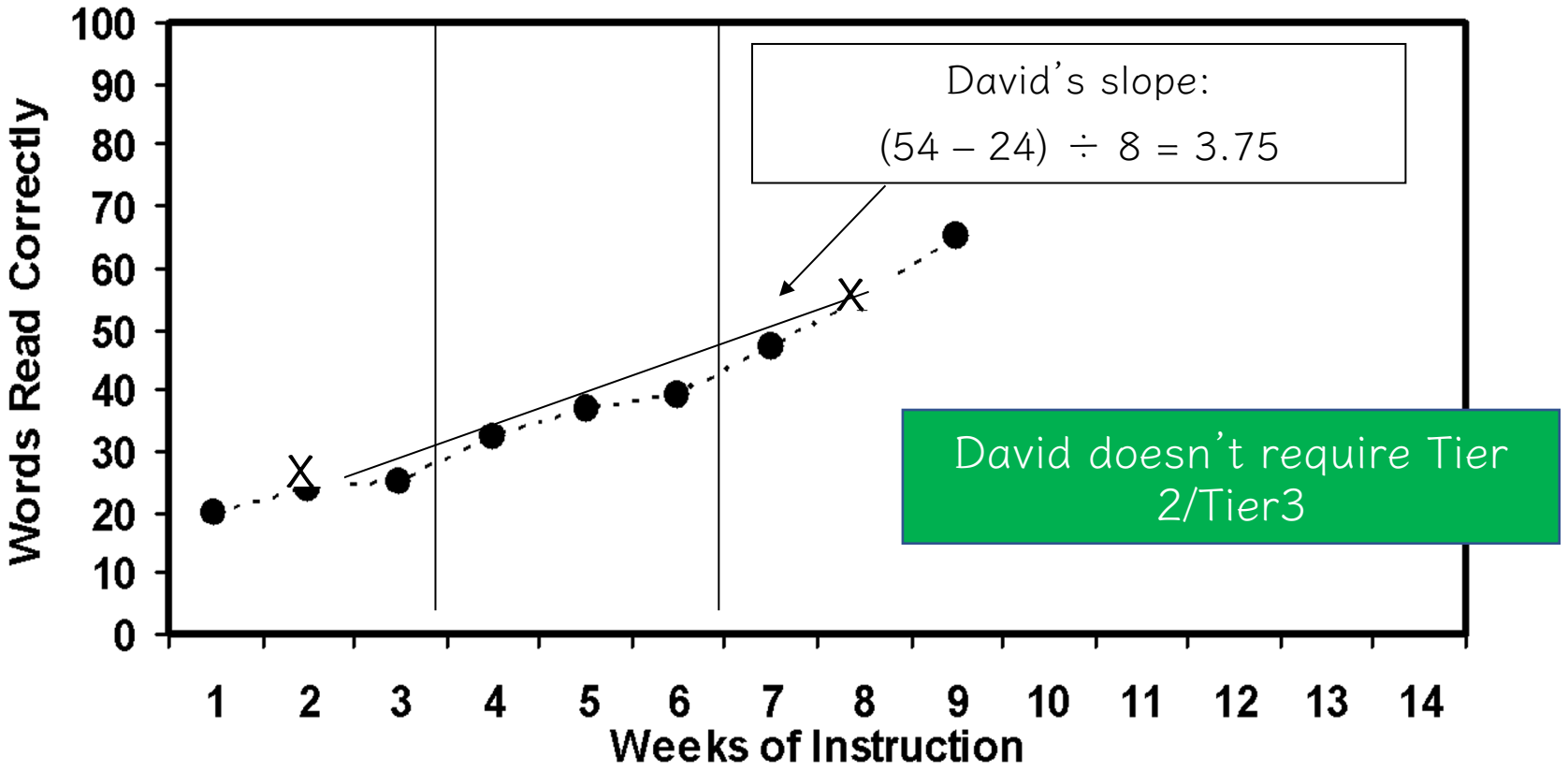


- After 10-20, student progress is determined
  - Adaptations to instructional platform
  - Intensify support (Tier 3)

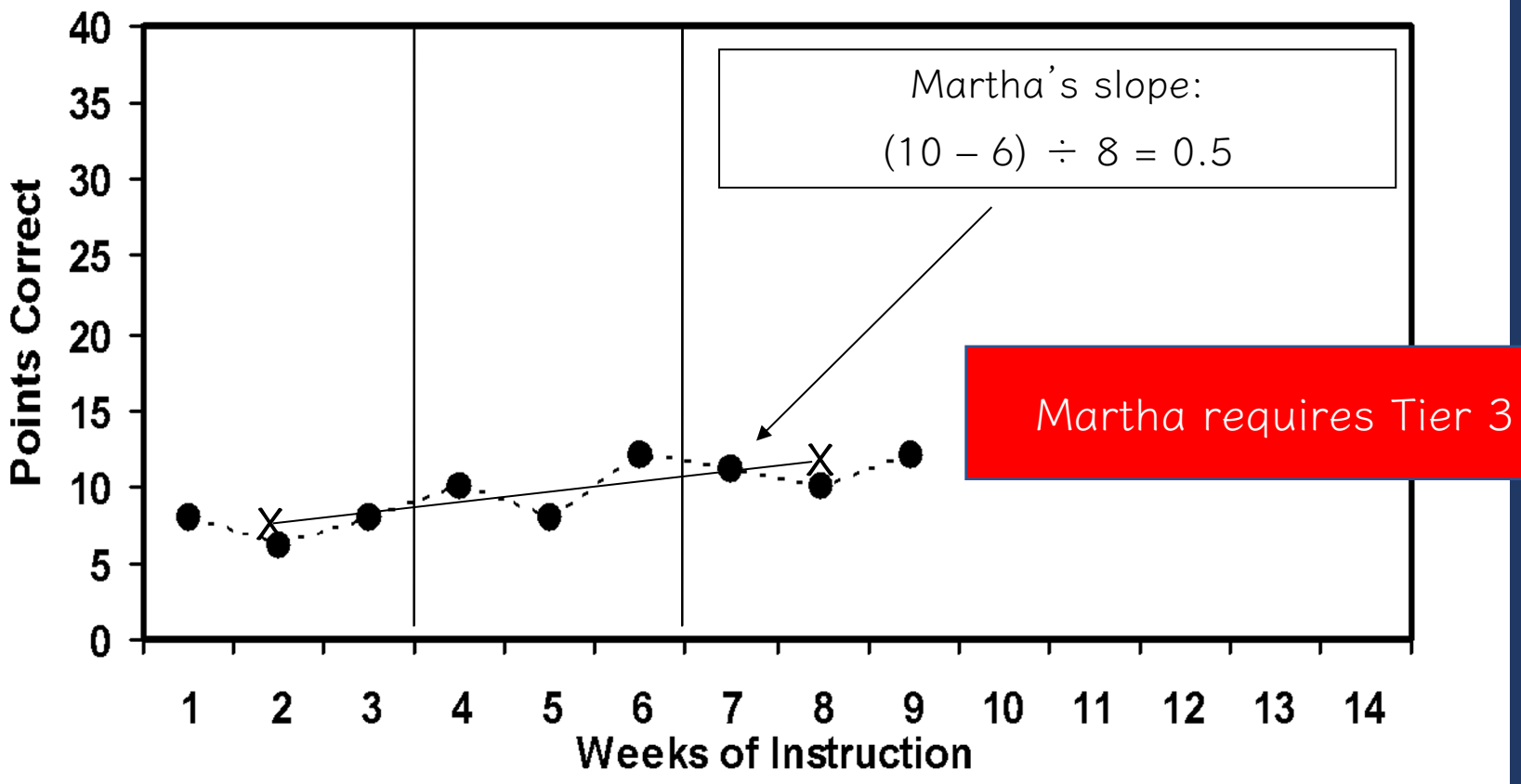
Decision Making:

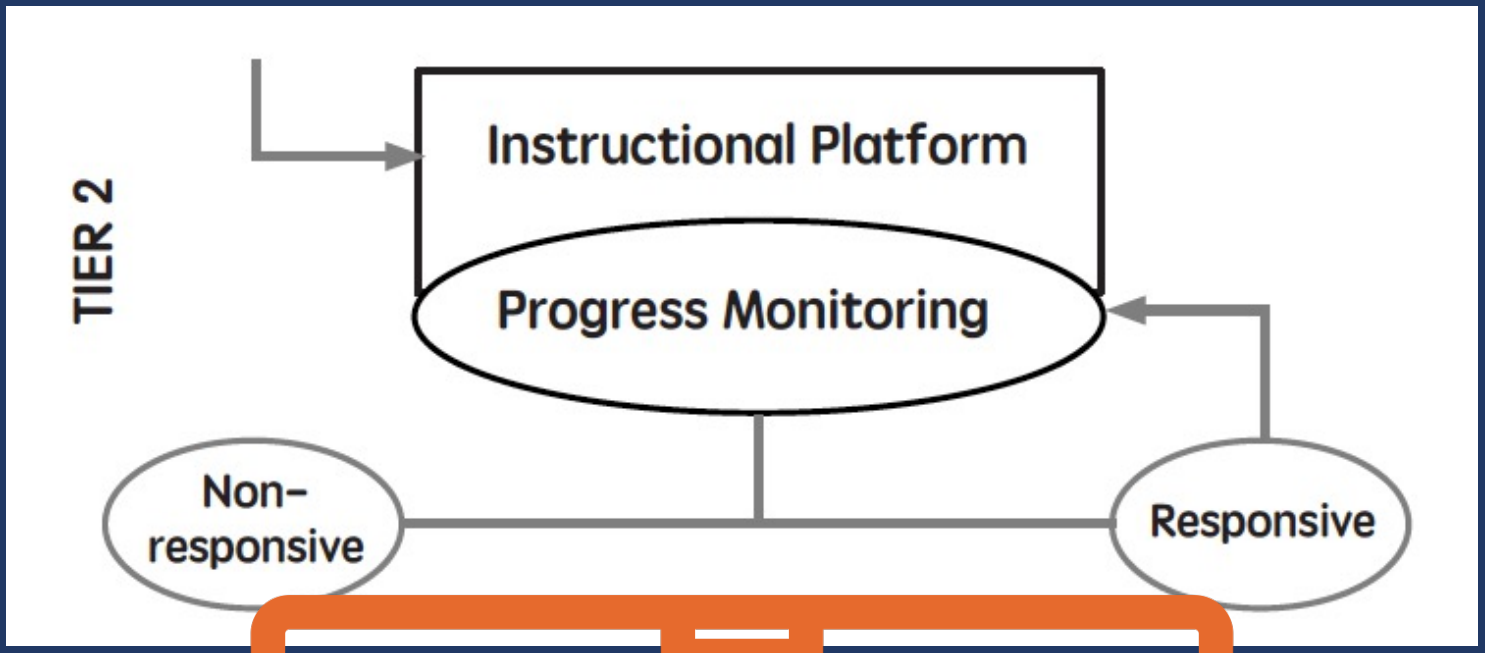


David

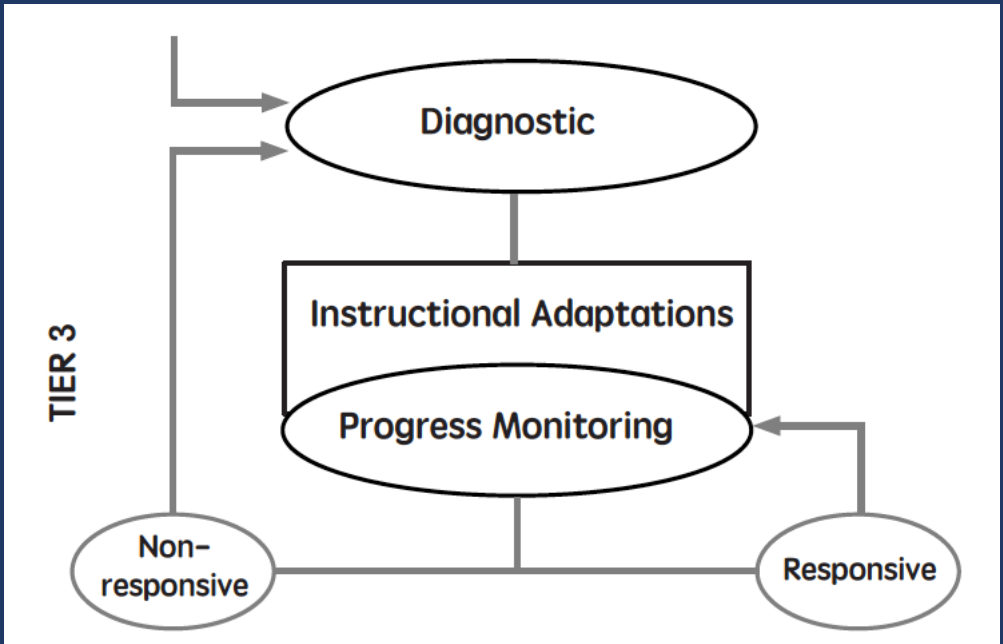


Martha



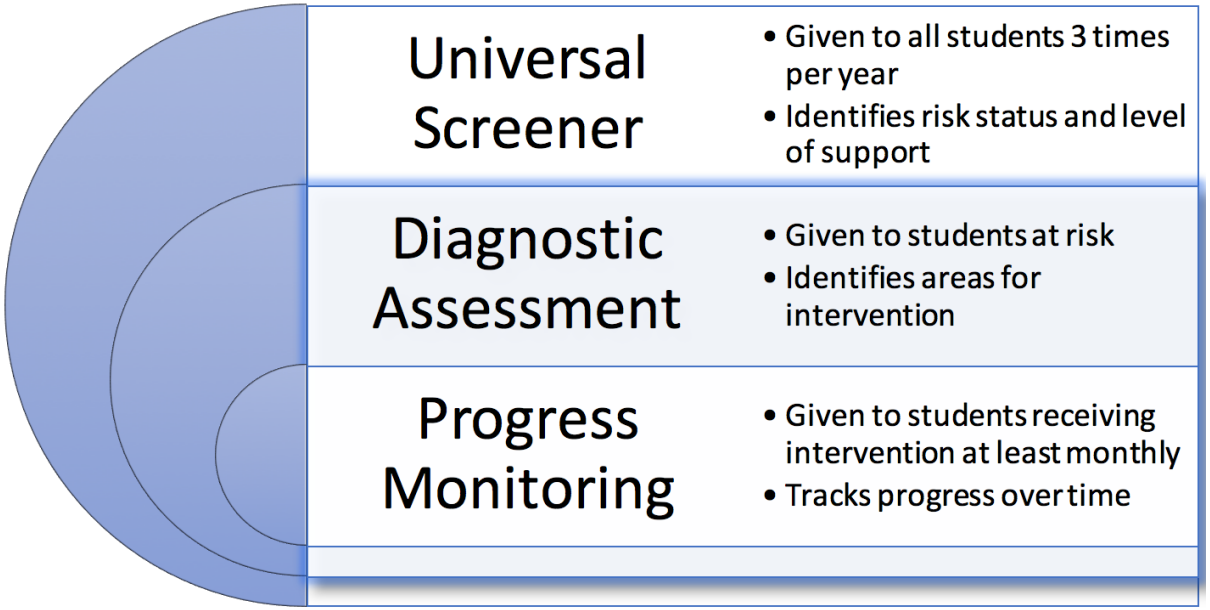


What are your school's Tier 2 strengths and weaknesses?



- **Diagnostics** *are conducted*
- **Adaptations** *are made to the student's intervention*
- Student progress is monitored weekly
  - With adequate slopes or end levels, students return to Tier 1 or 2

Diagnostic:



Source: Leanne Ketterlin-Geller

Instructional Adaptations:

Implement with greater fidelity

Ensure that you are implementing the intervention or strategy with fidelity

Cover, Copy, and Compare:

1. Create a sheet for the student. This sheet should contain 10 problems and cover material the student needs to practice. All problems should be answered.
2. Ask the student to look at each problem and read it aloud.
3. Ask the student to cover the problem with an index card.
4. Ask student to copy the entire problem to the right of the covered problem.
5. Ask student to lift up index card and compare his or her copy to the original.
6. Repeat for all problems.
7. Conduct three times per week.

Implement with greater fidelity

Ensure that you are implementing the intervention or strategy with fidelity

Math Fact Flash Cards

__ Tutor greets student.
__ Tutor starts timer.
__ Tutor begins flash card activity immediately.
__ Tutor reminds student of flash card procedures; answers questions if necessary.
__ Tutor sets timer for 1 minute.
__ Tutor allows student to respond to cards.
__ Tutor prompts student to Count Up if incorrect.
__ Tutor stops presenting cards when timer goes off.
__ Tutor prompts student to count correct cards.
__ Tutor encourages student to "beat the score."
__ Tutor sets timer for 1 minute.
__ Tutor allows student to respond to cards.
__ Tutor prompts student to Count Up if incorrect.
__ Tutor stops presenting cards when timer goes off.
__ Tutor prompts student to count correct cards.
__ Tutor prompts student to graph the higher number.
__ Tutor records flash card score in attendance log.
__ Tutor rewards student with gold coin.

Word Problem Warm-Up

__ Tutor presents word problem from previous session's Pirate Problems.
__ Tutor encourages student to talk through solution steps.
__ Tutor assists with explanation, as needed.
__ Tutor rewards student with gold coin.

Tutoring Lesson

__ Tutor begins tutoring lesson immediately.
__ Tutor prompts student to describe Counting Up strategy.
__ Tutor quizzes student on 4 math facts, reminding student to Count Up as necess

__ Tutor presents story problem #1.
__ Tutor allows time for student to respond.
__ Tutor praises/corrects student's responses.
__ Tutor rewards student with gold coin.

__ Tutor presents story problem #2.
__ Tutor allows time for student to respond.
__ Tutor praises/corrects student's responses.
__ Tutor rewards student with gold coin.

__ Tutor presents story problem #3.
__ Tutor allows time for student to respond.
__ Tutor praises/corrects student's responses.
__ Tutor rewards student with gold coin.

Sorting Activity

__ Tutor begins sorting activity immediately.
__ Tutor reminds student of sorting procedures and answers questions as necessary.
__ Tutor sets timer for 2 minutes.
__ Tutor reads cards out loud for student.
__ Tutor allows student to place cards on sorting mat without interrupting.
__ Tutor prompts student to stop when timer goes off.
__ Tutor goes through correction procedure with up to 3 cards from "incorrect" pile.
__ Tutor goes through cards with student, counting the number of correct cards.
__ Tutor rewards student with gold coin.
__ Tutor records sorting cards score on Attendance Log.

Pirate Problems Daily Review

__ Tutor begins Pirate Problems Daily Review immediately.
__ Tutor reminds student of Pirate Problems procedures; answers questions as necessary.
__ Tutor sets timer for 2 minutes.
__ Tutor allows student to work independently for 2 minutes.
__ Tutor prompts student to stop when timer goes off.
__ Tutor sets timer for 2 more minutes (for word problem on back).
__ Tutor allows student to work independently for 2 more minutes.
__ Tutor prompts student to stop when timer goes off.
__ Tutor corrects the problems while student watches.
__ Tutor models Counting Up strategy for incorrectly answered items.
__ Tutor writes score on corner of sheet.
__ Tutor records Pirate Problems score in attendance log.
__ Tutor rewards student with gold coin.

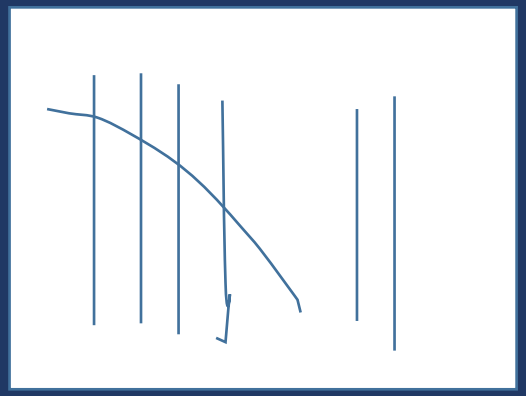
__ Tutor prompts student to count coins and mark on map.
__ Tutor dismisses student to return to class.
__ Tutor stops timer.
__ Tutor records time of session in attendance log.
__ Tutor records date in attendance log.

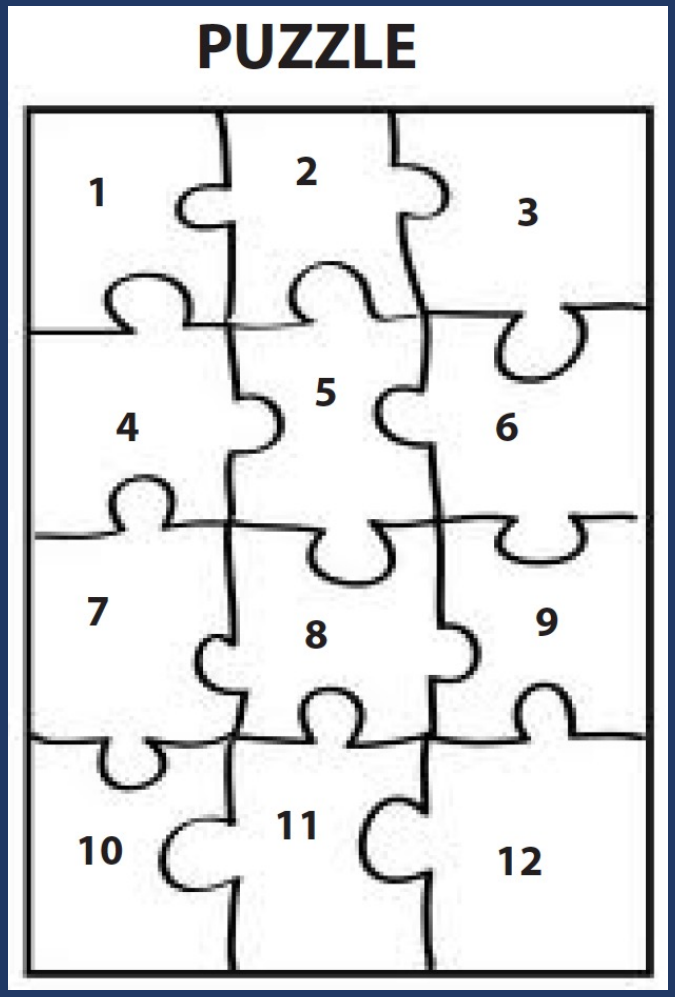
Fuchs et al. (2008)

Implement with greater fidelity

Embed behavioral supports

May want to incorporate strategies to improve self-regulation and minimize nonproductive behavior





Powell, Driver, & Julian (2015)

Implement with greater fidelity

Embed behavioral supports

May want to incorporate strategies to improve self-regulation and minimize nonproductive behavior

UPSCheck

Understand

Plan

Solve

Check

Implement with greater fidelity

Embed behavioral supports

Increase dosage

Conduct longer sessions, more sessions per week, or more weeks within DBI

Implement with greater fidelity

Embed behavioral supports

Increase dosage

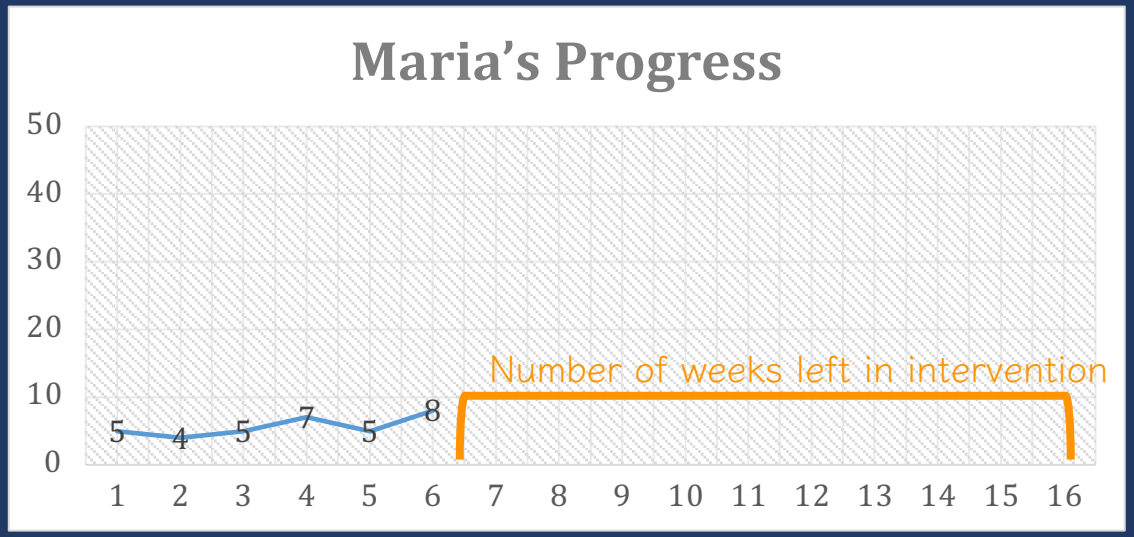
Conduct longer sessions, more sessions per week, or more weeks within DBI

Implement with greater fidelity

Embed behavioral supports

Increase dosage

Conduct longer sessions, more sessions per week, or more weeks within DBI



Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

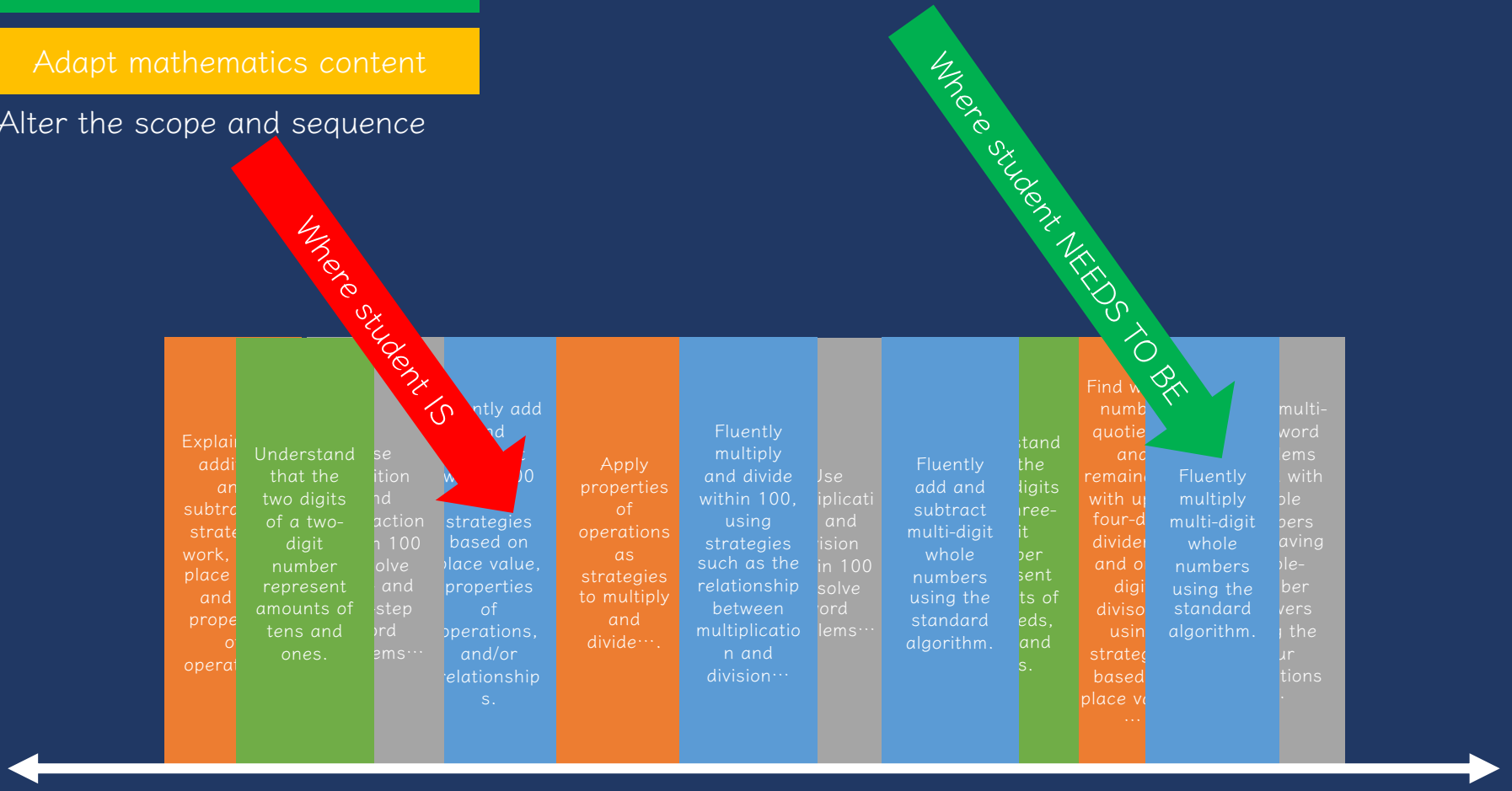
Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

Alter the scope and sequence



Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

Break down problems into smaller steps

Solve

Write equation

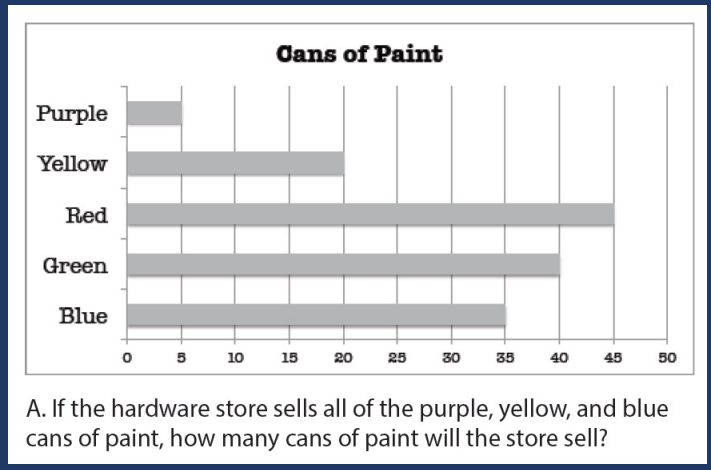
Draw picture

Identify schema

Label graph

Underline labels

Read the problem



A. If the hardware store sells all of the purple, yellow, and blue cans of paint, how many cans of paint will the store sell?

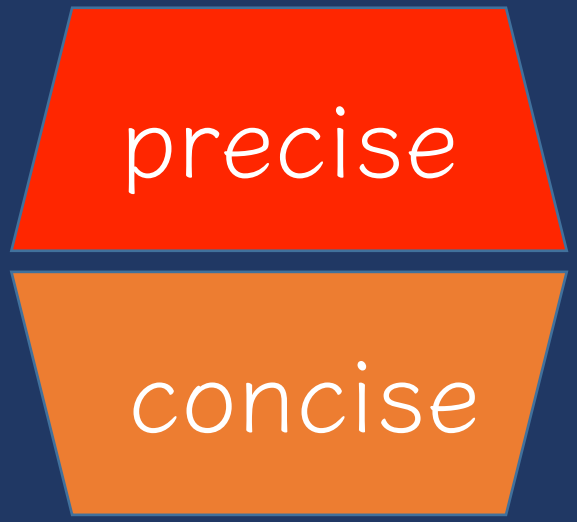
Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

Focus on the language of mathematics



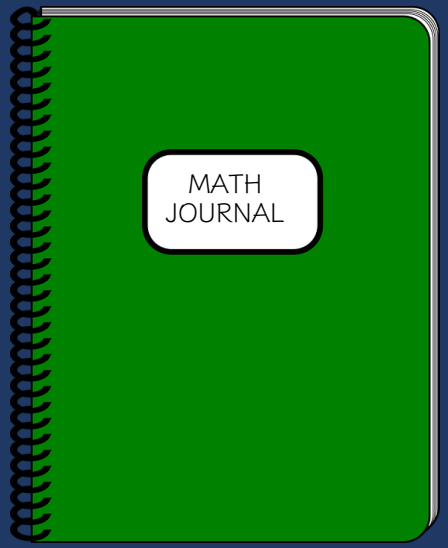
Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

Focus on the language of mathematics



Define:	**Characteristics:**
Example:	Non-example:

Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

Engage student in more discourse

"Tell me how you solved this problem."

"What were you thinking about when you regrouped?"

"How would you teach this problem to another student?"

"Describe the word problem in 10 words or less."

Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

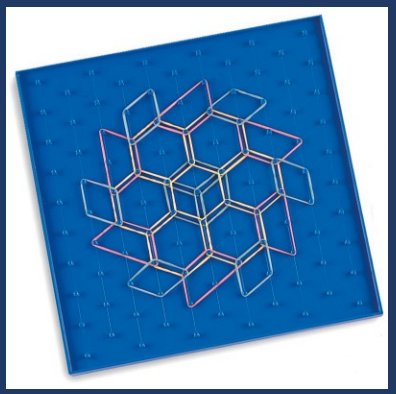
Provide worked examples

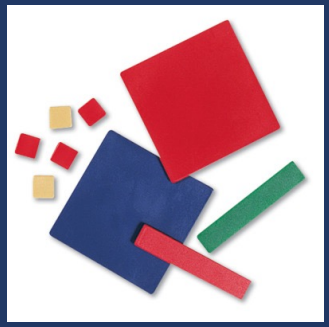
"Talk through this problem with me."

$$\begin{array}{r} 405 \\ +\ 16 \\ \hline 411 \end{array} \qquad \begin{array}{r} 405 \\ +\ 16 \\ \hline 421 \end{array}$$

- Implement with greater fidelity
- Embed behavioral supports
- Increase dosage
- Adapt mathematics content

Utilize more three-dimensional representations





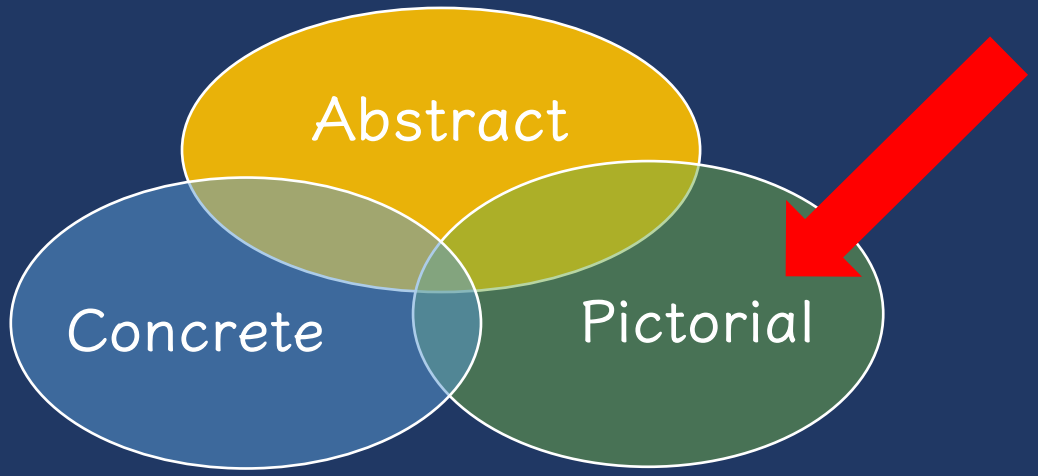
Implement with greater fidelity

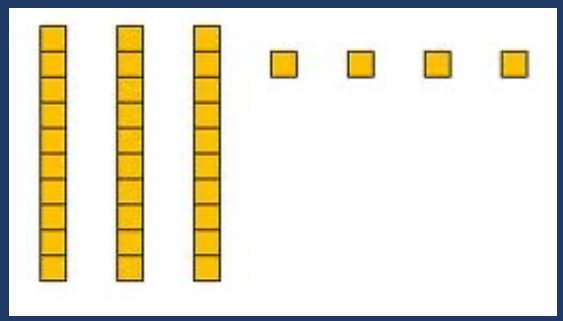
Embed behavioral supports

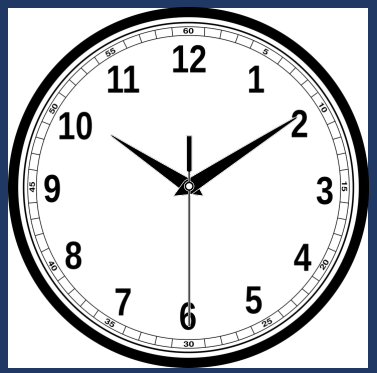
Increase dosage

Adapt mathematics content

Utilize more two-dimensional representations







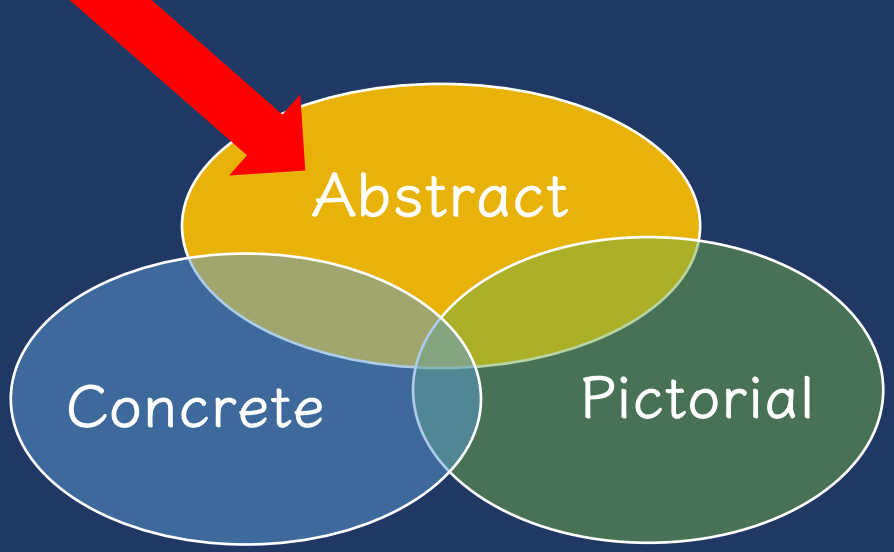
Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

Ensure students understand the abstract



$2 + 8 = 10$

34 = 3 tens and 4 ones

$x - 6 = 8$

$$\begin{array}{r} 4{,}179 \\ +\ \ 569 \\ \hline \end{array}$$

Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

Focus on fact fluency

Addition	Subtraction
Multiplication	Division

Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

X	1	2	3	4	5

-3 + (-4) = ___

5 – (-6) = ___

Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

Teach alternate algorithms

Subtraction

Standard

$$\begin{array}{r} 315 \\ -\ 96 \\ \hline \end{array}$$

Partial Differences

$$\begin{array}{r} 315 \\ -\ 96 \\ \hline \end{array}$$

Add Up

$$\begin{array}{r} 315 \\ -\ 96 \\ \hline \end{array}$$

Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

Encourage alternate methods and solutions

$$\begin{array}{r} 405 \\ +\ 16 \\ \hline 400 \\ 10 \\ +\ 11 \\ \hline 421 \end{array}$$

$$\begin{array}{r} 405 \\ +\ 16 \\ \hline 421 \end{array}$$

Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

Explicitly teach problem solving

Don't tie **key words** to **operations**

Have an **attack strategy**

Teach word-problem **schemas**

Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

Utilize explicit instruction

Make sure you're doing it! And do it well!

MODELING

Step-by-step explanation

Planned examples

PRACTICE

Guided practice

Independent practice

SUPPORTS

Ask high-level and low-level questions

Eliciting frequent responses

Providing affirmative and corrective feedback

Implement with greater fidelity

Embed behavioral supports

Increase dosage

Adapt mathematics content

Utilize explicit instruction

Explicitly teach transfer

Explicitly teach how current learning relates to other learning

$$\begin{array}{r} 405 \\ +\ 16 \\ \hline \end{array} \qquad \begin{array}{r} 4305 \\ +\ 216 \\ \hline \end{array}$$

Marney baked 89 cookies and sold 40 cookies at the bake sale. How many cookies does Marney have left?

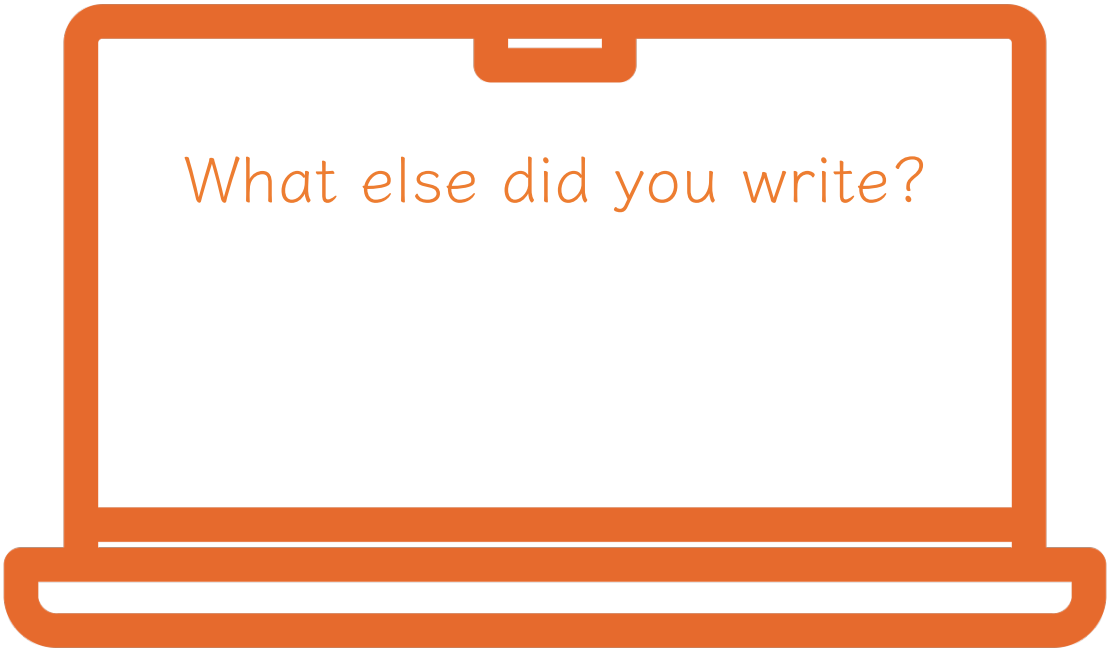
Marney had $89 and spent $40 on shoes. How many much does Marney have left?

Marney had $89 and spent $40 on shoes. How much money will Marney have after buying the shoes?

Instructional Adaptations:

- Implement with greater fidelity
- Embed behavioral supports
- Increase dosage
- Adapt mathematics content
- Utilize explicit instruction
- Explicitly teach transfer

Instructional Adaptations:

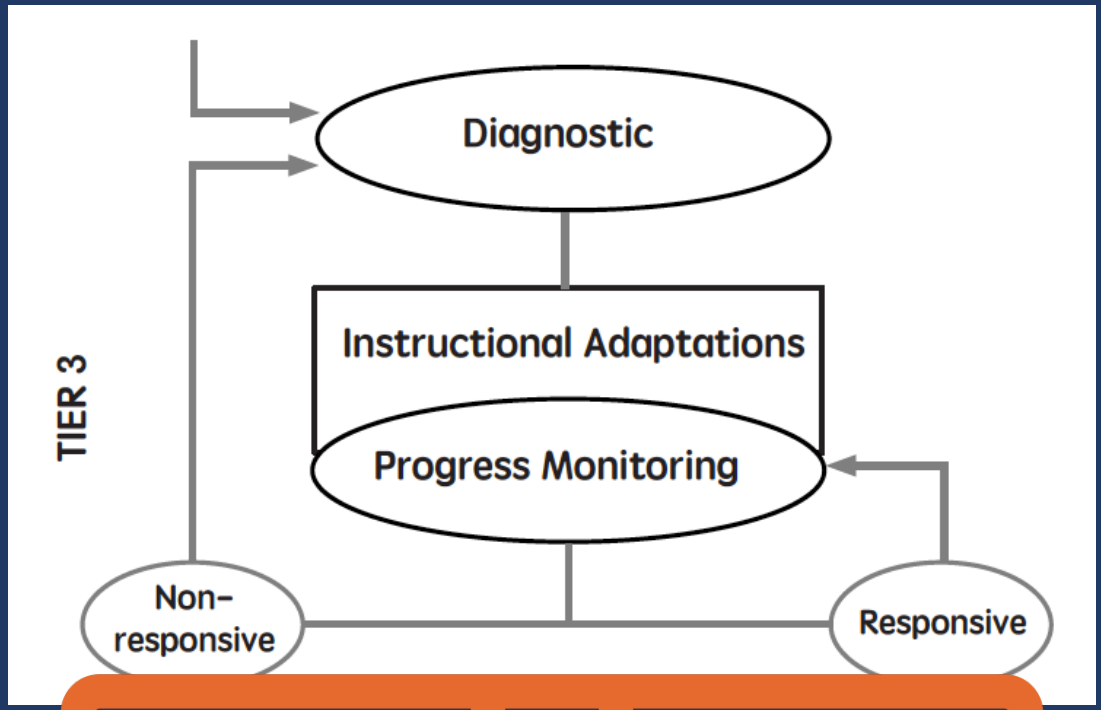


Progress Monitoring:

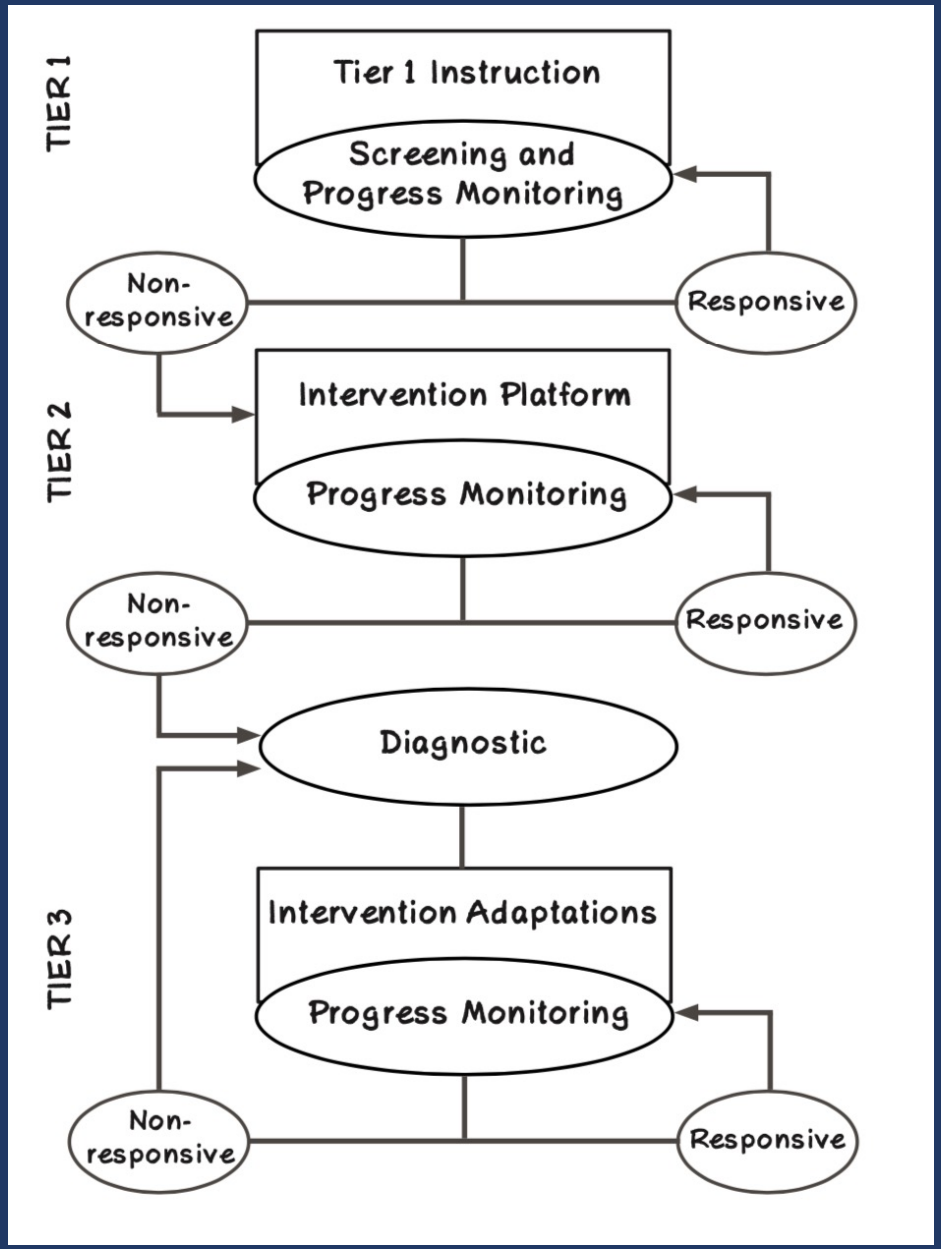
- Reliable measures, administered regularly
- Efficient and easy to administer
- Skills assessed serve as indicators of general knowledge

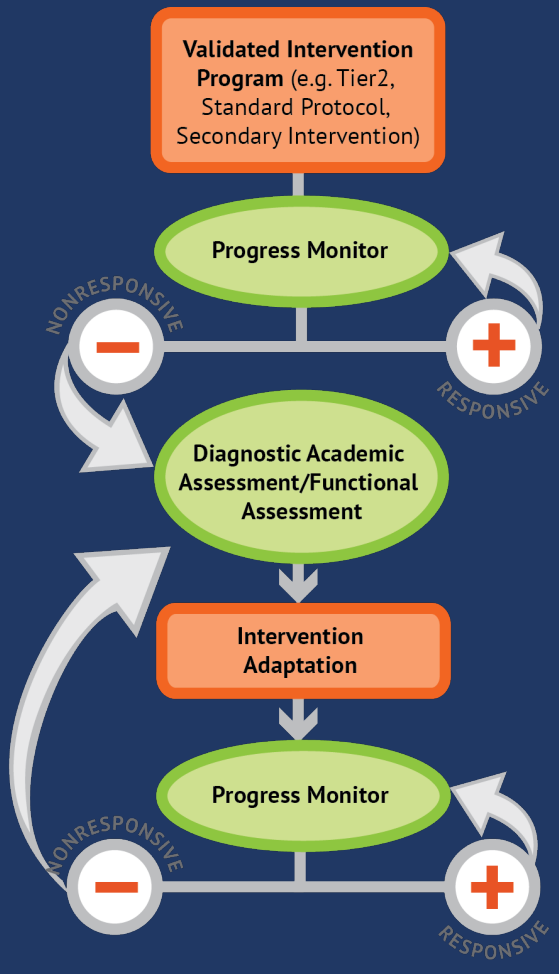
Decision Making:

- After 10-20 weeks, student progress is determined



What are your school's Tier 3 strengths and weaknesses?





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