RESPONSE TO INTERVENTION: USING TECHNOLOGY WITHIN AN RTI MODEL

TCU ANSERS Institute Webinar Series

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TCU COLLEGE OF EDUCATION ANSERS INSTITUTE

RESPONSE TO INTERVENTION: USING TECHNOLOGY WITHIN AN RTI MODEL

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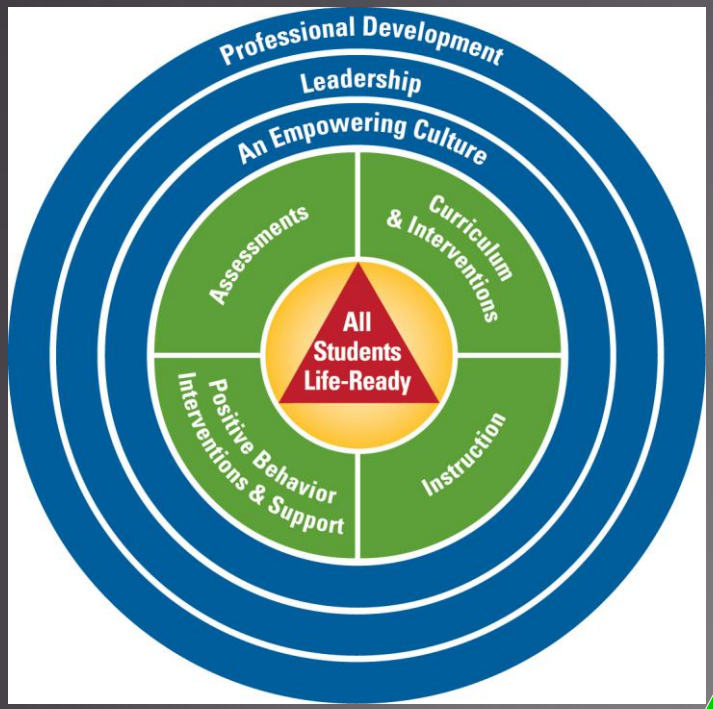
FOCUS OF THIS WEBINAR:

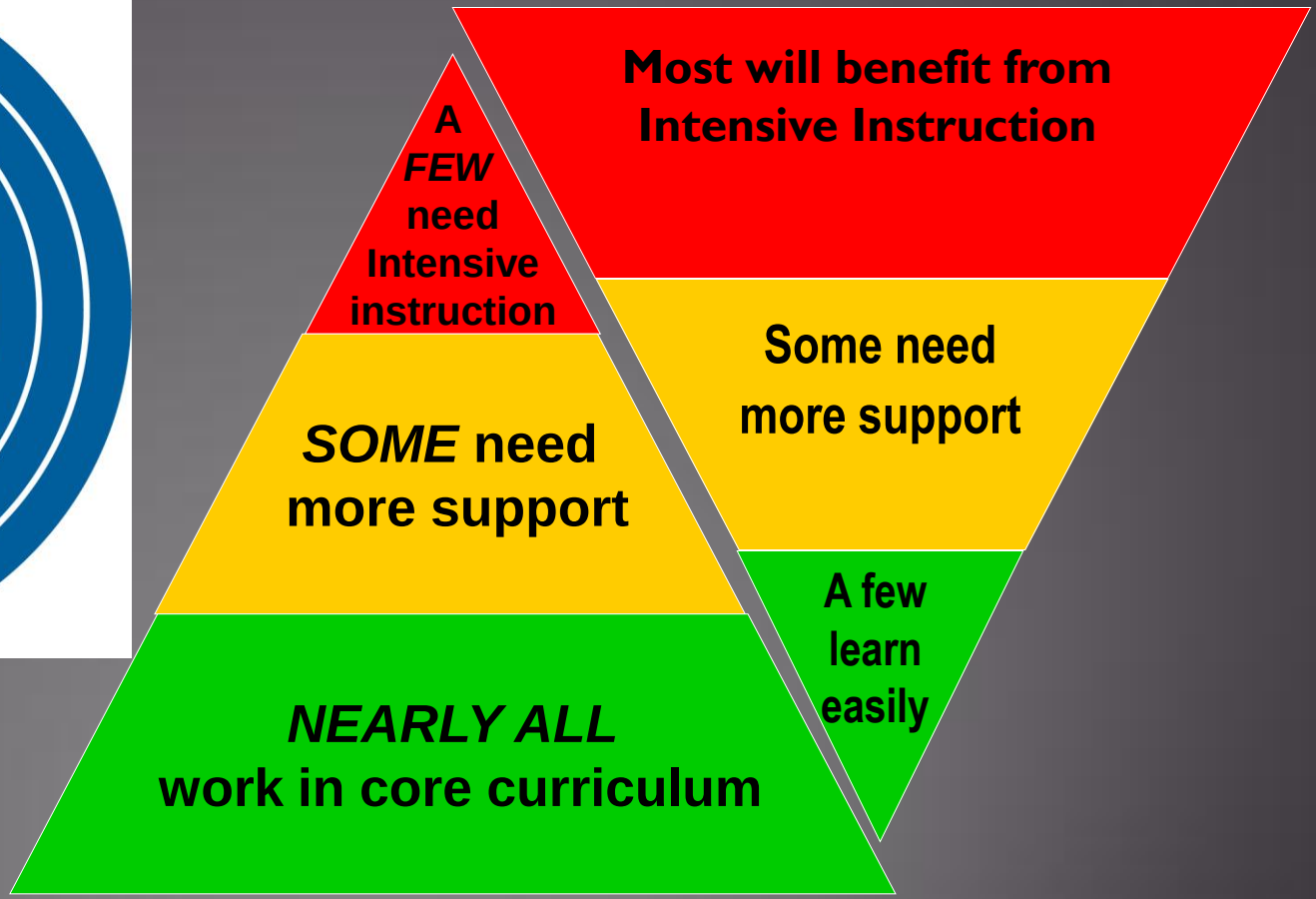
HOW THE THOUGHTFUL INTEGRATION OF TECHNOLOGY & RTI CAN HELP UNLOCK THE POTENTIAL OF ALL STUDENTS

- Requirements for an Effective Tier 2 System
- The Important Role that Technology Can Play:
  - Integrating Assessment and Instruction
  - Delivering Consistent, Motivational Research-Based Instruction
  - Monitoring Progress and Using Reports

IN TCU WEBINAR 1, DR. STEVAN KUKIC INTRODUCED US TO A REFINED PYRAMID



Another Reality



Kukic, S. (2012). TCU ANSERS Institute Webinar Series, RtI: Importance of Precise Planning

FOCUSING ON TIER 2: *SOME NEED MORE SUPPORT* SUPPLEMENTAL INSTRUCTION

- From the CREATE Brief (2009)
  - ✓ Services provided in addition to Tier I
  - ✓ Closely aligned with classroom instruction
  - ✓ Can be provided by classroom teachers by small-group instruction or pull-out (in school, before/after/Sat./summer)
- From the IES Practice Guide-Math (2009)
  - ✓ Students receive supplemental small group math instruction aimed at building *targeted math proficiencies*
  - ✓ Interventions are typically provided for 20 to 40 minutes, four to five times each week.
- From the IES Practice Guide-Reading (2009)
  - ✓ Students receive supplemental, small group reading instruction aimed at building *foundational reading skills*.

IES RTI RECOMMENDATIONS

Recommendation	Level of evidence
Tier 1	
1. Screen all students to identify those at risk for potential mathematics difficulties and provide interventions to students identified as at risk.	**Moderate**
Tiers 2 and 3	
2. Instructional materials for students receiving interventions should focus intensely on in-depth treatment of whole numbers in kindergarten through grade 5 and on rational numbers in grades 4 through 8. These materials should be selected by committee.	**Low**
3. Instruction during the intervention should be explicit and systematic. This includes providing models of proficient problem solving, verbalization of thought processes, guided practice, corrective feedback, and frequent cumulative review.	**Strong**
4. Interventions should include instruction on solving word problems that is based on common underlying structures.	**Strong**
5. Intervention materials should include opportunities for students to work with visual representations of mathematical ideas and interventionists should be proficient in the use of visual representations of mathematical ideas.	**Moderate**
6. Interventions at all grade levels should devote about 10 minutes in each session to building fluent retrieval of basic arithmetic facts.	**Moderate**
7. Monitor the progress of students receiving supplemental instruction and other students who are at risk.	**Low**
8. Include motivational strategies in tier 2 and tier 3 interventions.	**Low**

RTI Action Network, Fuchs

Tier 2 math interventions must incorporate six instructional principles:

1. Instructional explicitness
2. Instructional design that eases the learning challenge
3. Strong conceptual basis for procedures that are taught
4. Emphasis on drill and practice
5. Cumulative review as part of drill and practice
6. Motivators to help students regulate their attention and behavior and to work hard

RTI Action Network, Johnson & Pesky

- According to the NCRTI (National Center on Response to Intervention), Tier 2 has three characteristics that distinguish it from core instruction:
  1) It is evidence-based,
  2) It consists of small-group instruction,
  3) It involves a clearly articulated intervention implemented with fidelity

- Provides limited, but targeted, support system for students who struggle to meet grade-level performance standards.
- Remediate academic skill deficits with the idea that in doing so, students will be successful in the Tier 1 program without support.
- The reality for most schools is that they do not have adequate resources to implement a comprehensive intervention system as defined above. Many schools struggle with implementation because it seems overwhelming to meet the specifications of a well-designed Tier 2 system.

IES & OTHERS ALSO REMIND US OF THE MANY ROADBLOCKS

- *Some teachers might worry about aligning the tier 2 intervention program with the core program.*
- *Interventionists may not be expert with the underlying math content.*
- *Schools tend to give the least experienced teachers the toughest-to-teach students.*
- *The intervention materials may not incorporate enough models, think-alouds, practice, and cumulative review.*
- *Many intervention materials provide very few visual representations.*
- *Some teachers or interventionists believe that instruction in concrete manipulatives requires too much time.*
- *Students within classes are at very different levels.*

Etc.

CLEARLY, TEACHERS & STUDENTS NEED HELP

HOW TECHNOLOGY CAN HELP TEACHERS/TEAMS IMPLEMENT RTI

- **Supplemental**
- **Systematic**
- **Small groups**
- **Targeted, consistent, and explicit instruction**
- **Data & reporting**
- **Integration of assessment and instruction with feedback loops**
- **Practice, practice…plenty of examples and opportunities to visualize and try**

INTEGRATING ASSESSMENT AND INSTRUCTION

USING TECHNOLOGY TO PINPOINT GAPS: *DIAGNOSTIC ASSESSMENT - PRESCRIPTIVE INTERVENTION*

. Which ratios are equivalent?

A.7:2 and 2/7
B. 1/3 and 0.3
C. 2:4 and 4: 2
D. 2/3 and 0.6 [correct answer]

Grade 6: (6.1) Number, operation, and quantitative reasoning. The student represents and uses rational numbers in a variety of equivalent forms. The student is expected to:
(B) generate equivalent forms of rational numbers including whole numbers, fractions, and decimals

Prescriptions:

NMS Lesson: 11 (Working with Rational Numbers) – define sets of rational numbers; describe relationships between sets of rational numbers, including equivalency; compare and order rational numbers – whole numbers, integers, fractions, and decimals

Math Foundations 3 Lesson: 4 (Number Line) – represent decimals on a number line; represent fractions and mixed numbers on a number line; represent positive and negative integers on a number line.

Math Foundations 2 Lesson: 2 (Fractions & Decimals) – understand fractional equivalents using models; understand fraction and decimal equivalents

MATCHING EACH STUDENT'S SPECIFIC NEEDS WITH THE RIGHT CONTENT: *PERSONALIZE LEARNING PATHWAYS*

Question 5
STANDARD MISSED:
AB: Grade 5
(CCS: 4.NF2) ***Number and Operations-Fractions*** Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, and <, and justify the conclusions, e.g., by using a visual fraction model.
BACKGROUND KNOWLEDGE MISSED:
Prescriptions:
Math Foundations 2 Lesson: 2 (Fractions & Decimals) - understand fractional equivalents using models
GRADE LEVEL MISSED:
Prescriptions:
Math Foundations 3 Lesson: 4 (Number Lines) - represent decimals on a number line; represent fractions and mixed numbers on a number line; represent positive and negative integers on a number line

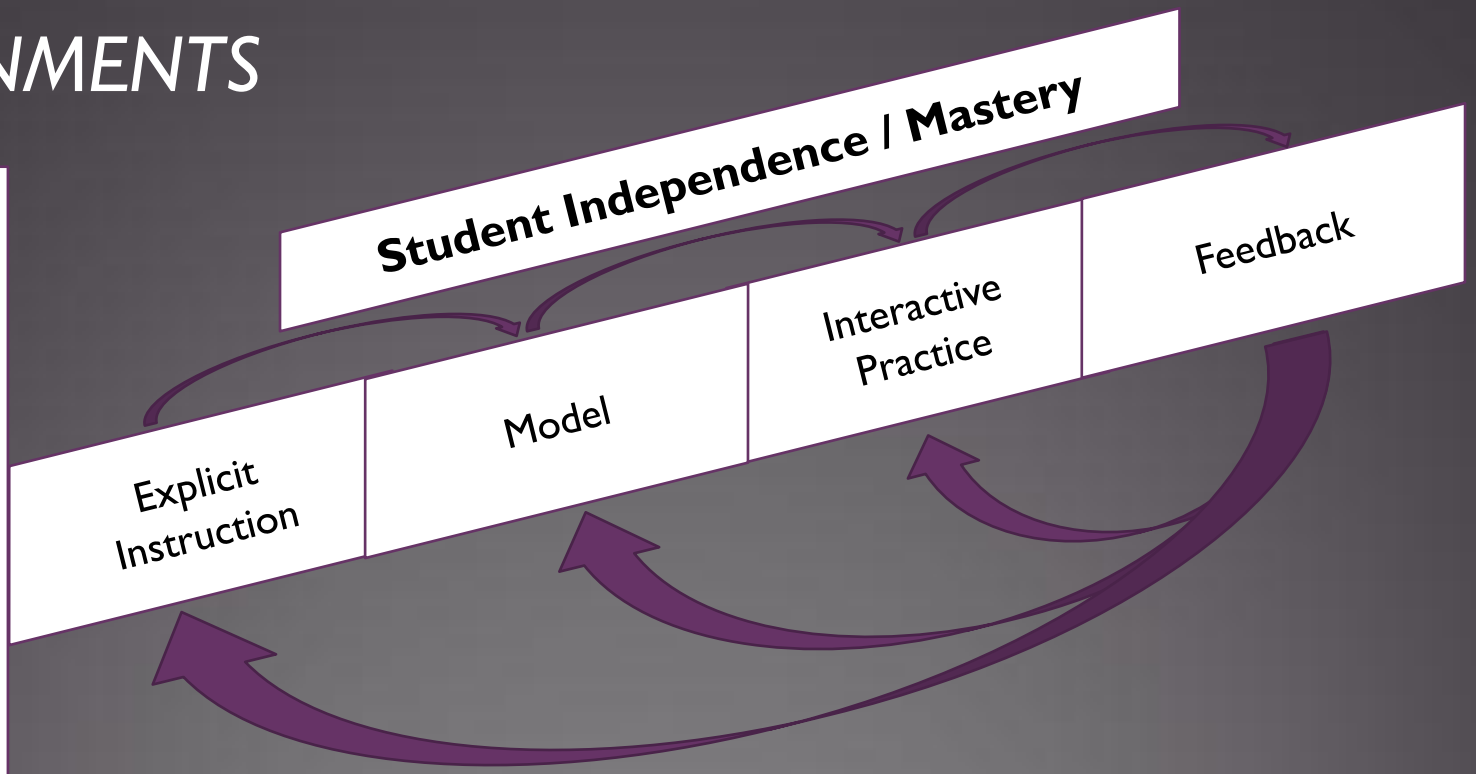
PERSONALIZE LEARNING ENVIRONMENTS

Diagnostic-Prescriptive

Pretest Identify Knowledge & Skills Gap

First time: all 4 parts

Second and subsequent times: loop as needed

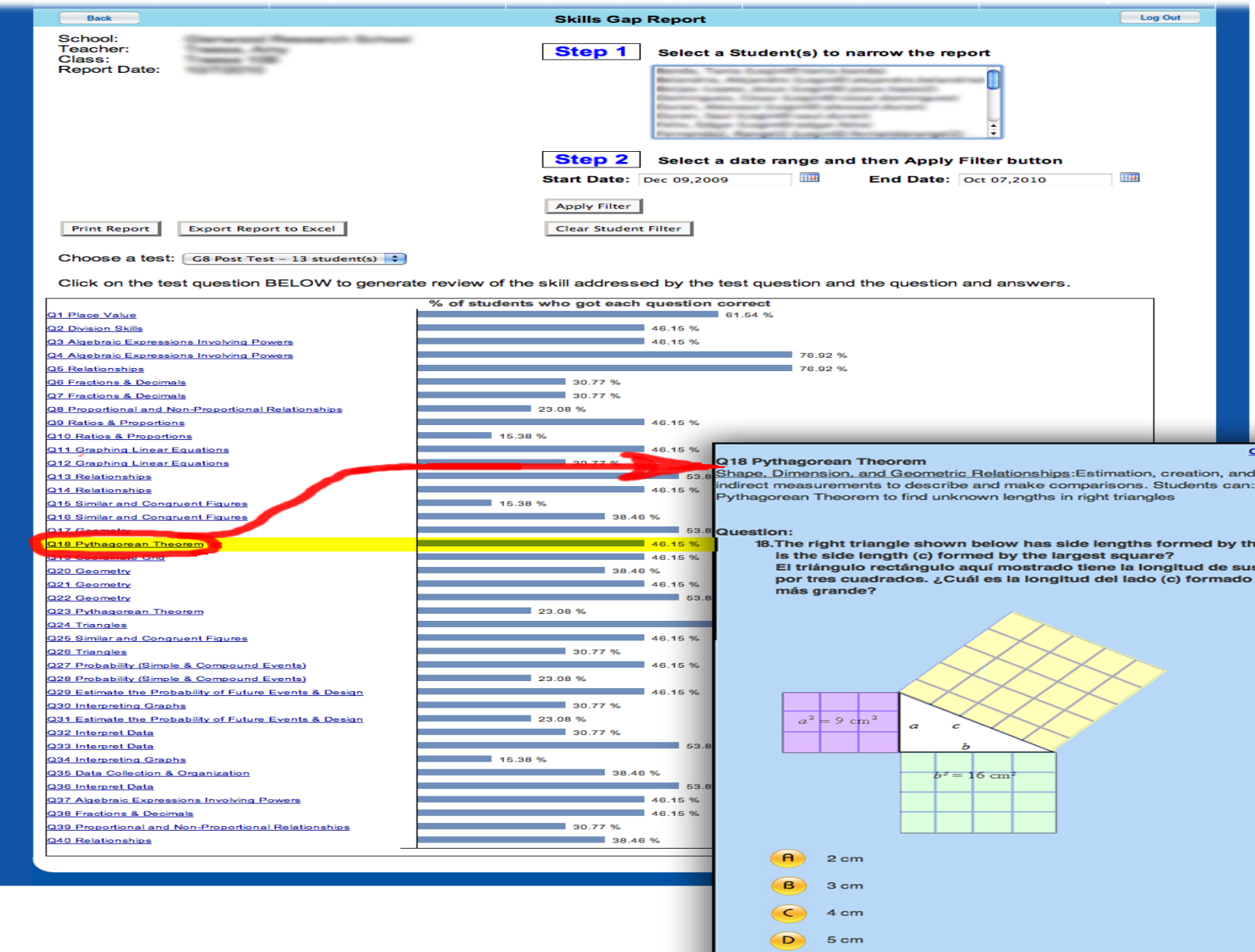


Spanish Translation	Interactive Notepad & Peer Collaborate Social Wall	Virtual Tools (Protractor, etc.)	Virtual Interactives (Number Lines, Base 10 Blocks, etc.)	Key Terms & Hyperlinks Definitions	Read Aloud Text	Student Progress Email Alert to Teacher

Support Tools to Shelter Content

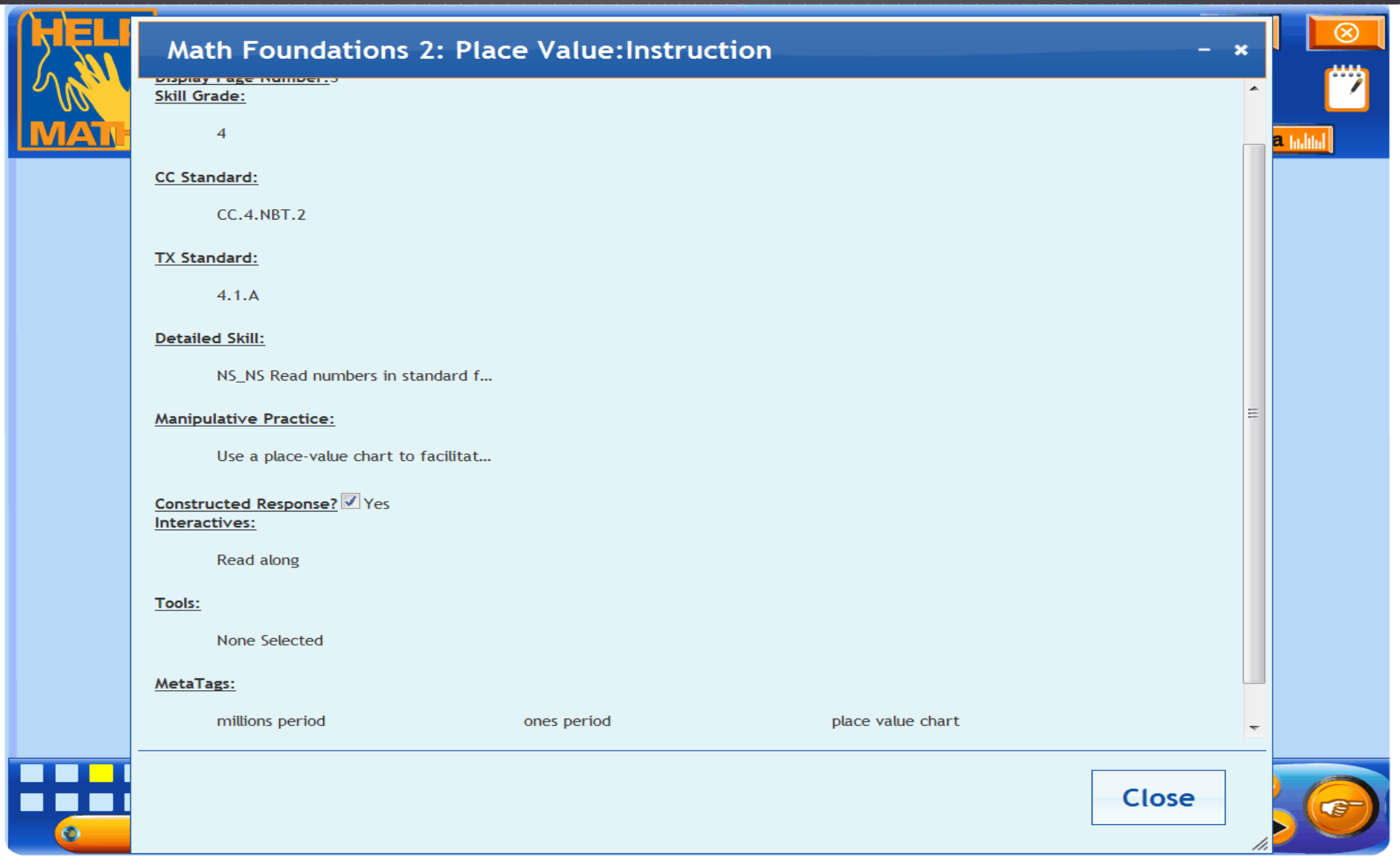
Phase in and out as needed - No hierarchy from left to right

IDENTIFYING SMALL GROUPS



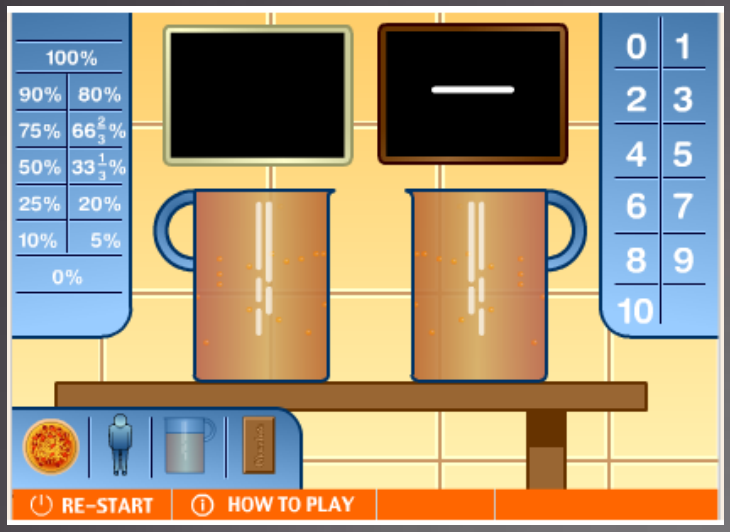
DELIVERING CONSISTENT & RESEARCH-BASED INSTRUCTION

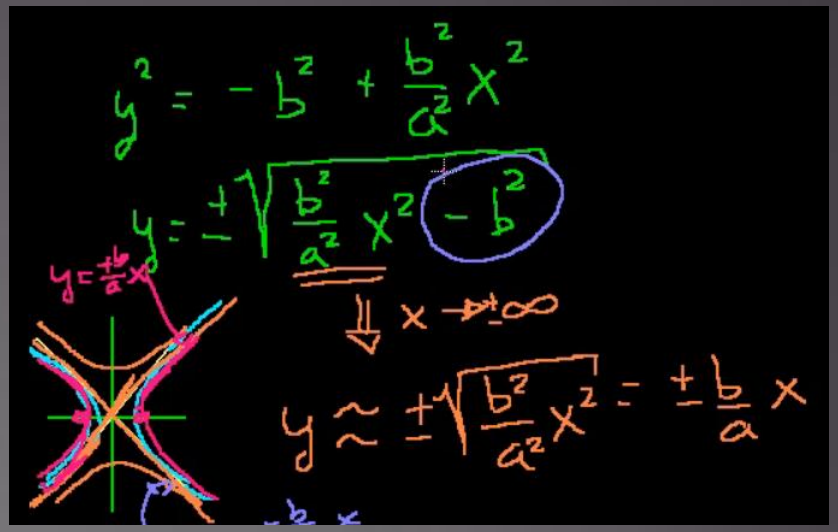
WITH STANDARDS AS A BACKBONE

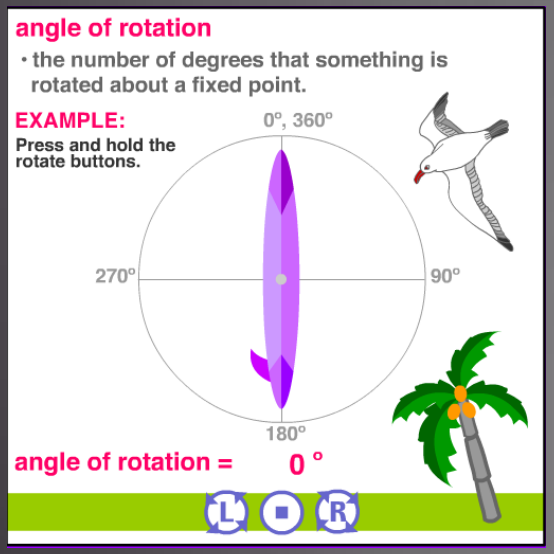


BLENDING INSTRUCTION

TEACHERS-TECHNOLOGY, DIFFERENT PROGRAMS, WITHIN A PROGRAM, DIFFERENT TOOLS



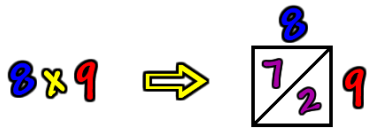




Lattice Multiplication

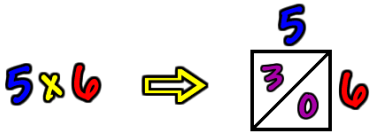
A fun and easy way to multiply bigger numbers (page 2 of 4)

Here's another one:



So, 8x9=72

Get it? Here's another one:



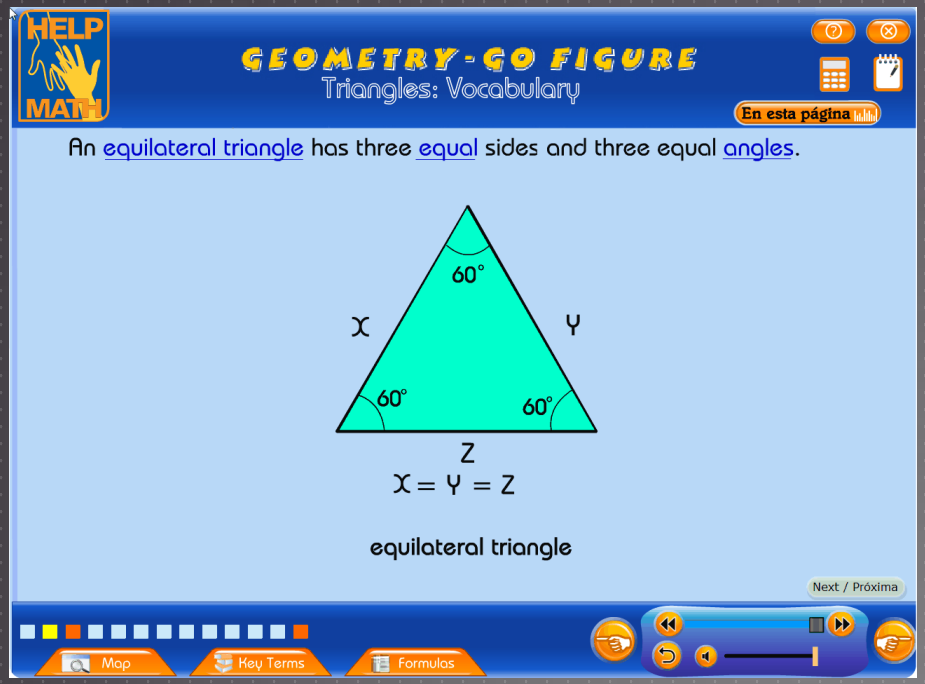
So, 5x6=30

IN TCU WEBINAR 2, WE LEARNED FROM DR. ANITA ARCHER: *EXPLICIT INSTRUCTION IS SYSTEMATIC, RELENTLESS & ENGAGING*

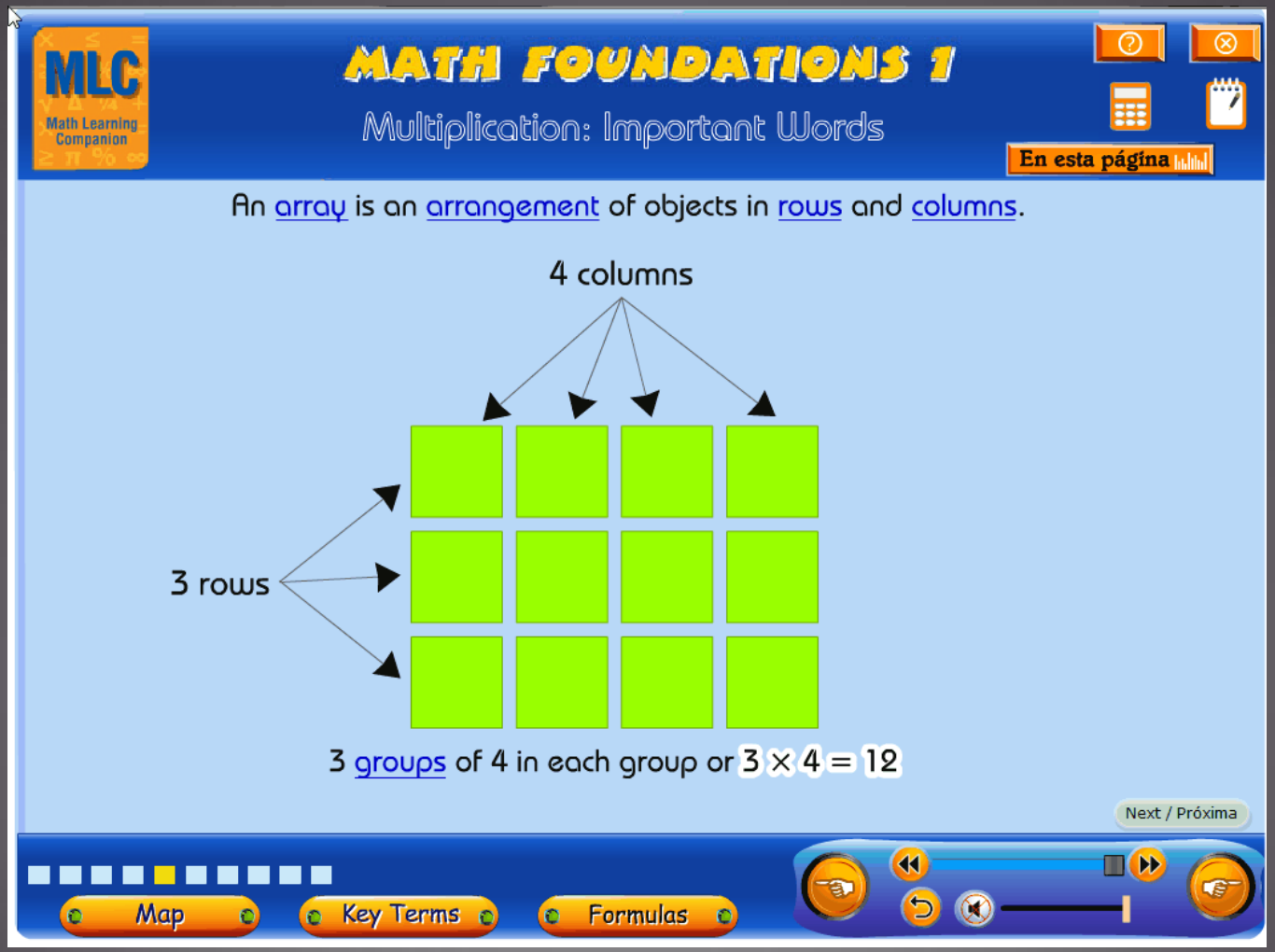
- ✓ Organized and focused lessons
- ✓ Begin with a statement of goals
- ✓ Provide review of pre-skills and knowledge
- ✓ Provide step-by-set demonstrations
- ✓ Provide guided and supported practice
- ✓ Use clear and concise language
- ✓ And, practice, practice, practice…

Archer, A. (2012). TCU ANSERS Institute Webinar Series, RtI: Benefits of Explicit Instruction.

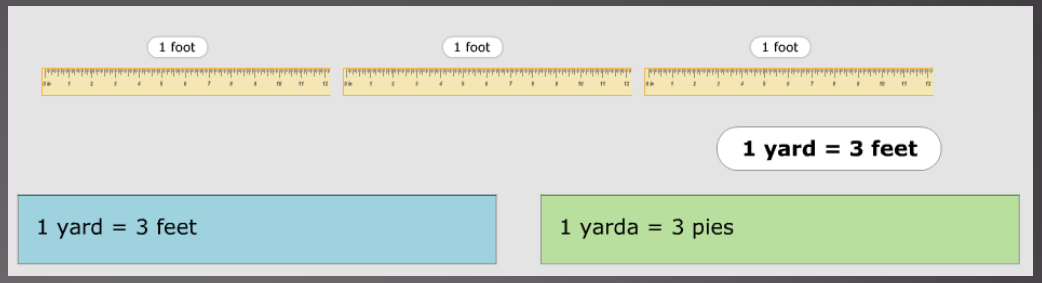
EXPLICIT INSTRUCTION IS SYSTEMATIC
WORDS, EXPLANATIONS, ILLUSTRATIONS

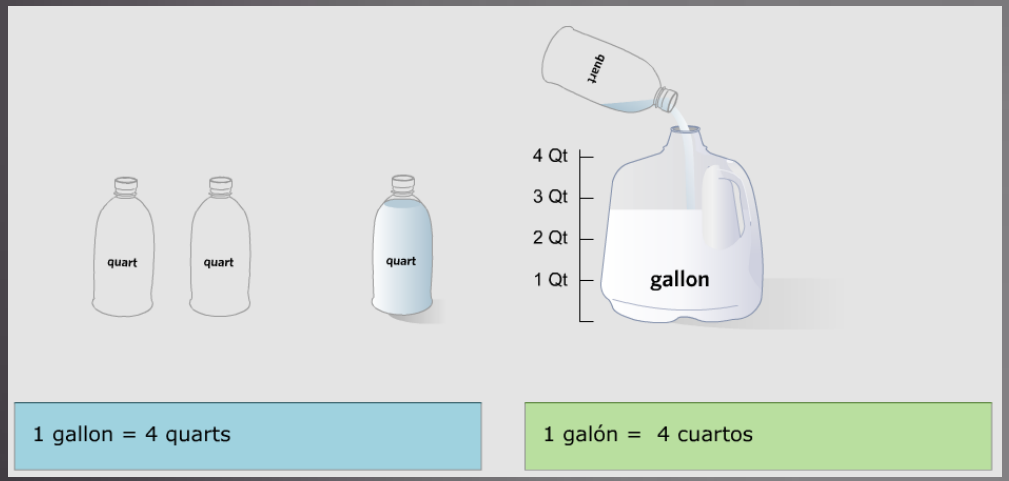


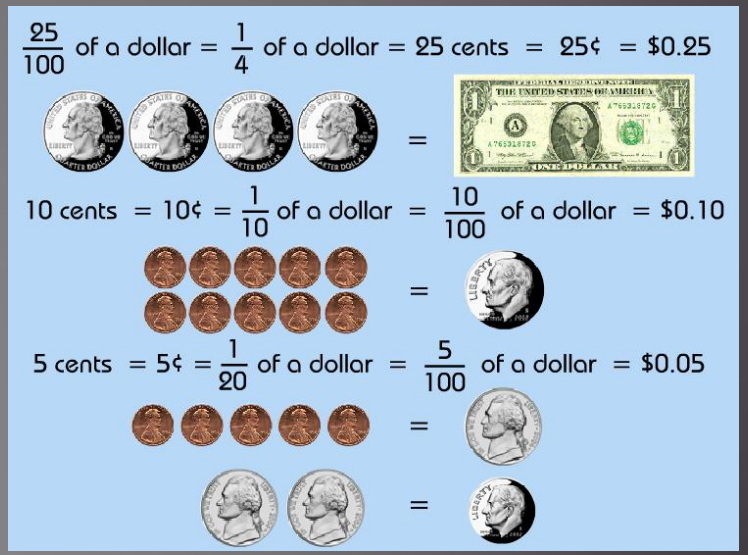
MASTERY OF FOUNDATIONAL KNOWLEDGE AND SKILLS



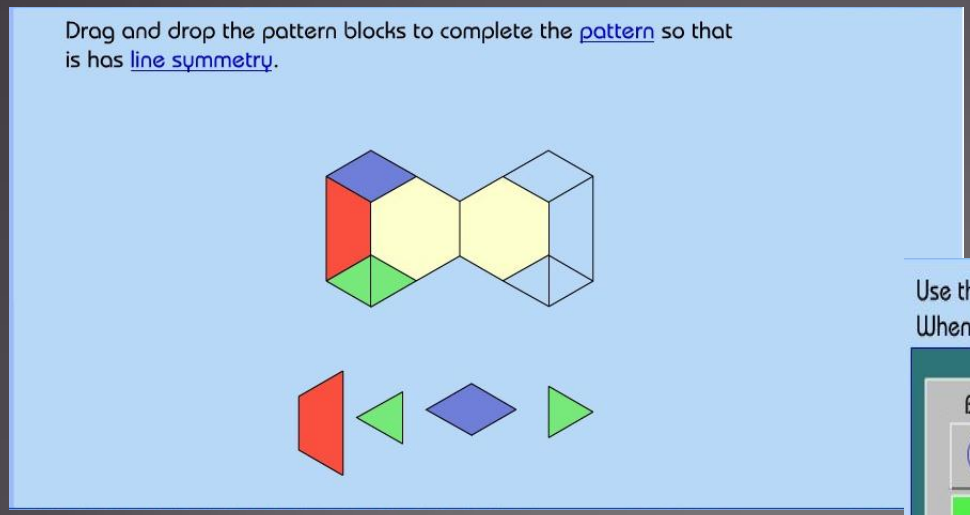
LOTS OF VISUAL REPRESENTATION

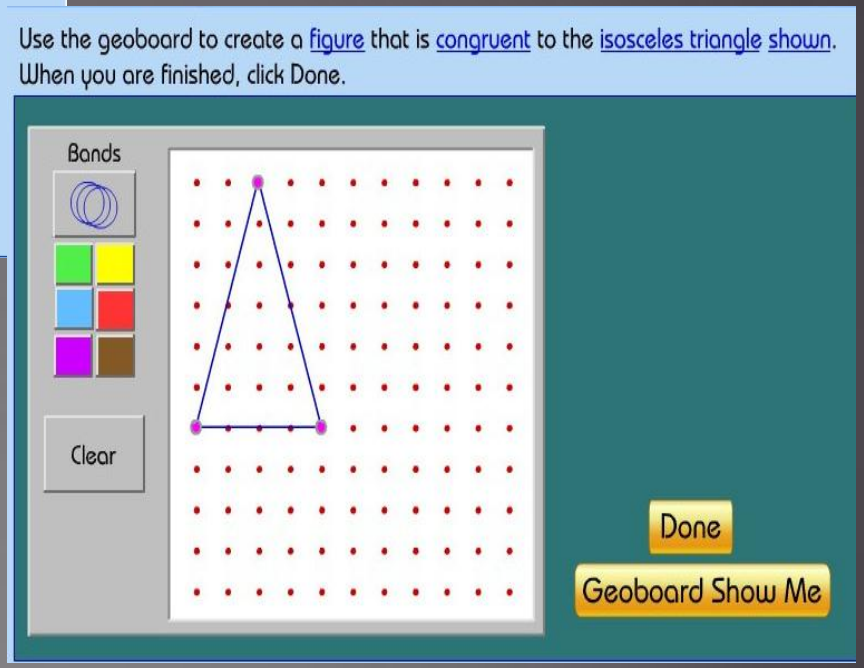


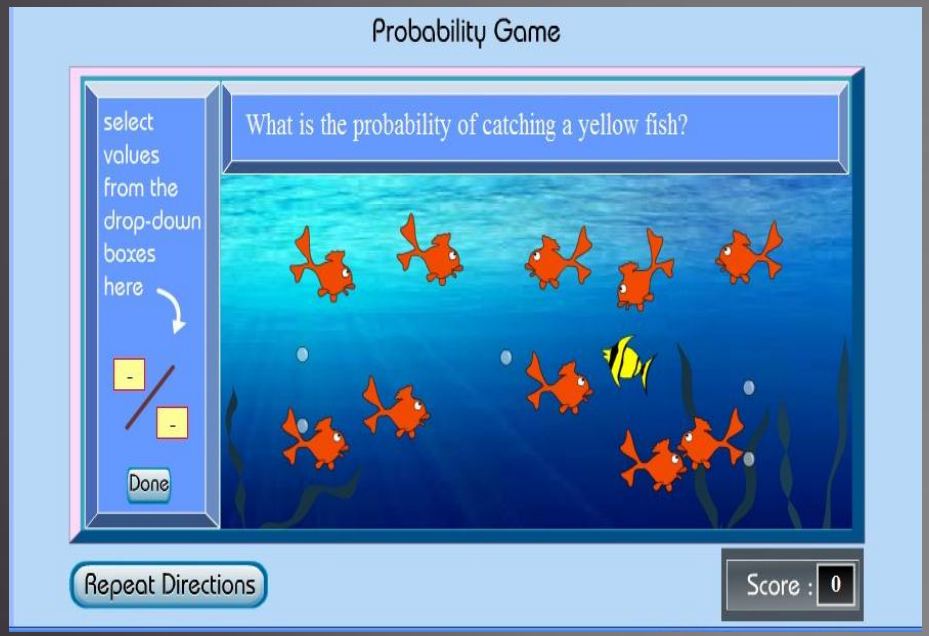




MODELING & GUIDED PRACTICE USING VIRTUAL MANIPULATIVES





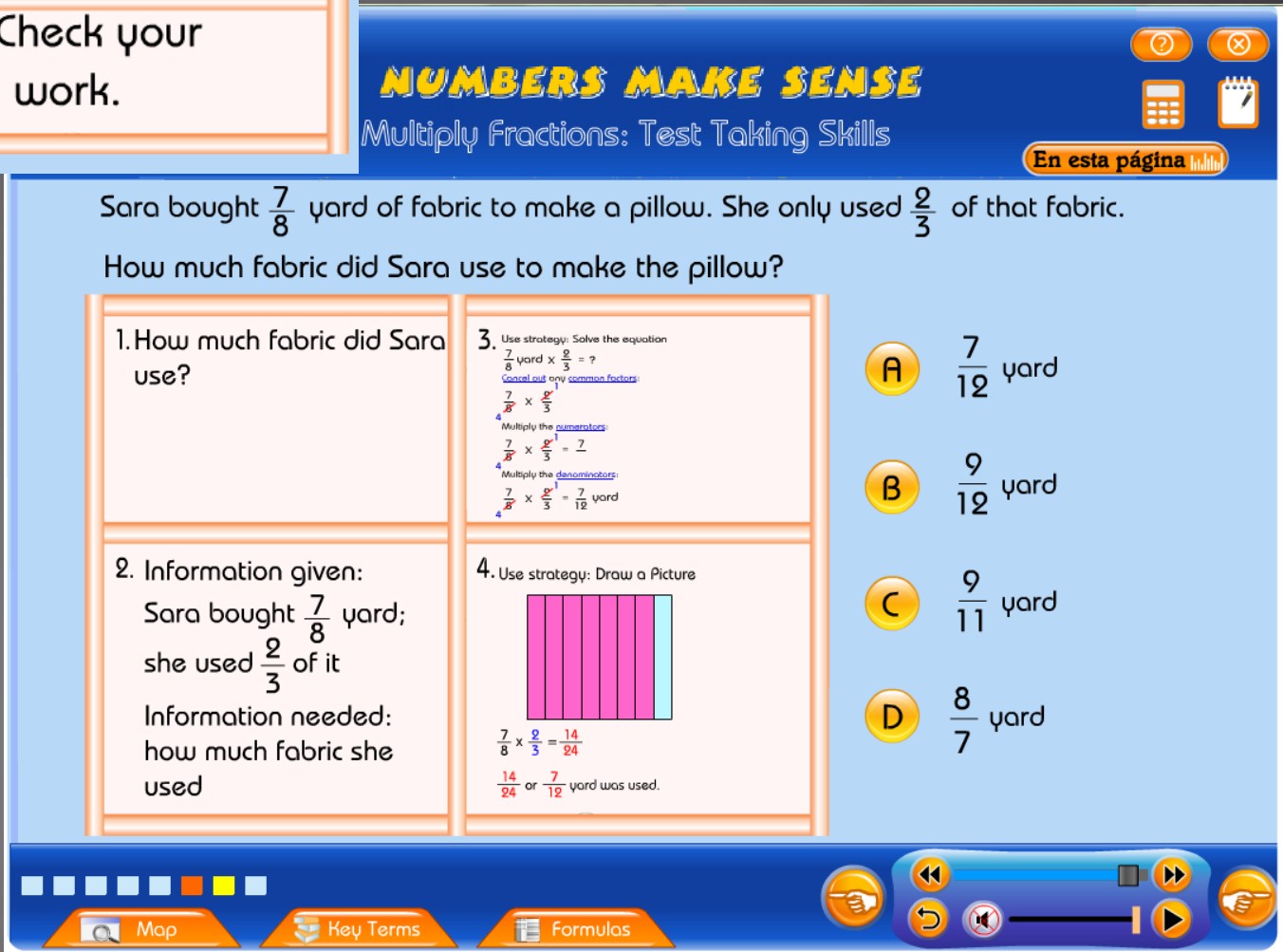


With clear instructions

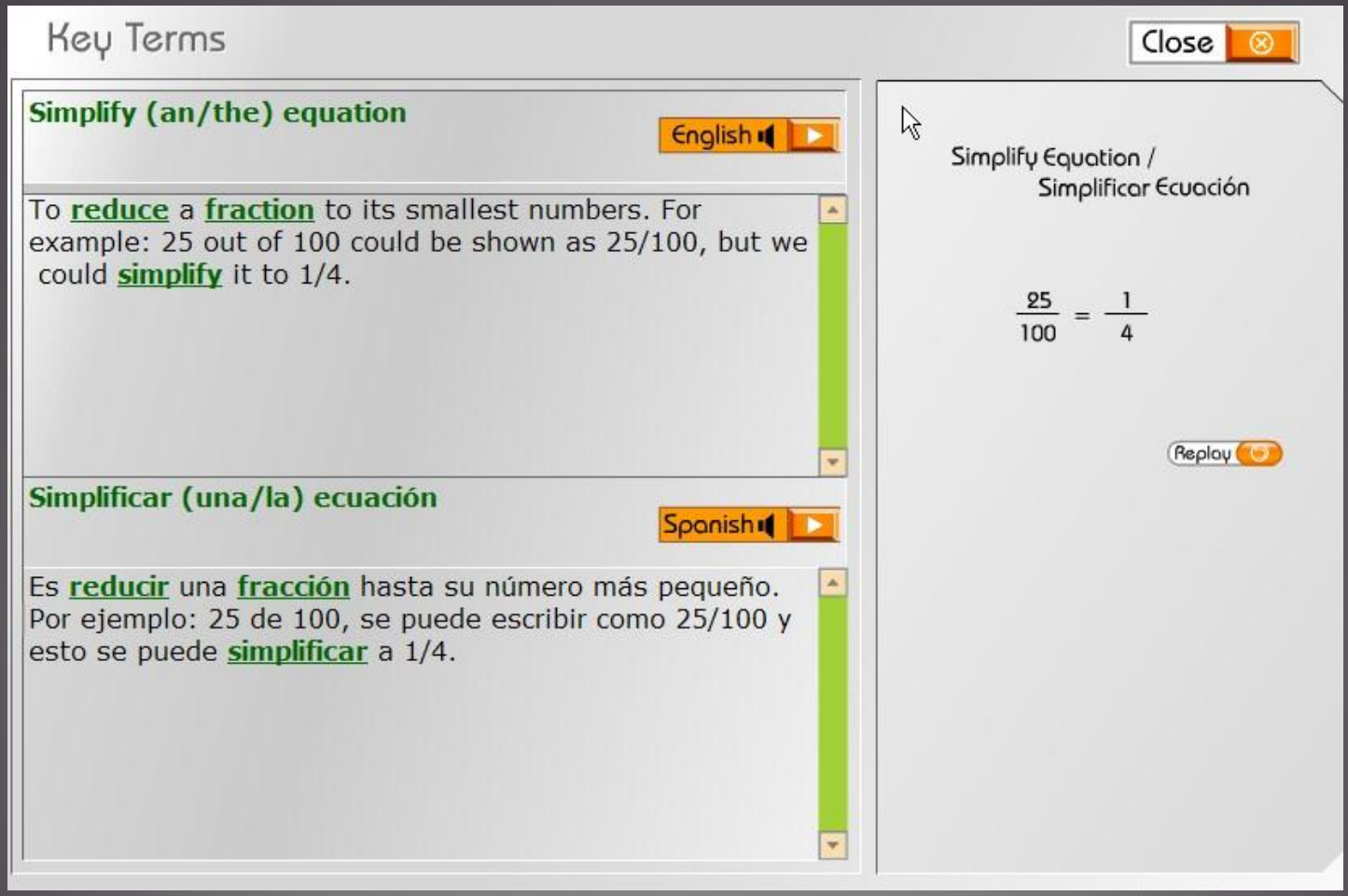
AN INTERESTING WAY OF THINKING AND LEARNING

PROBLEM SOLVING CAPABILITIES & UNDERLYING STRUCTURE

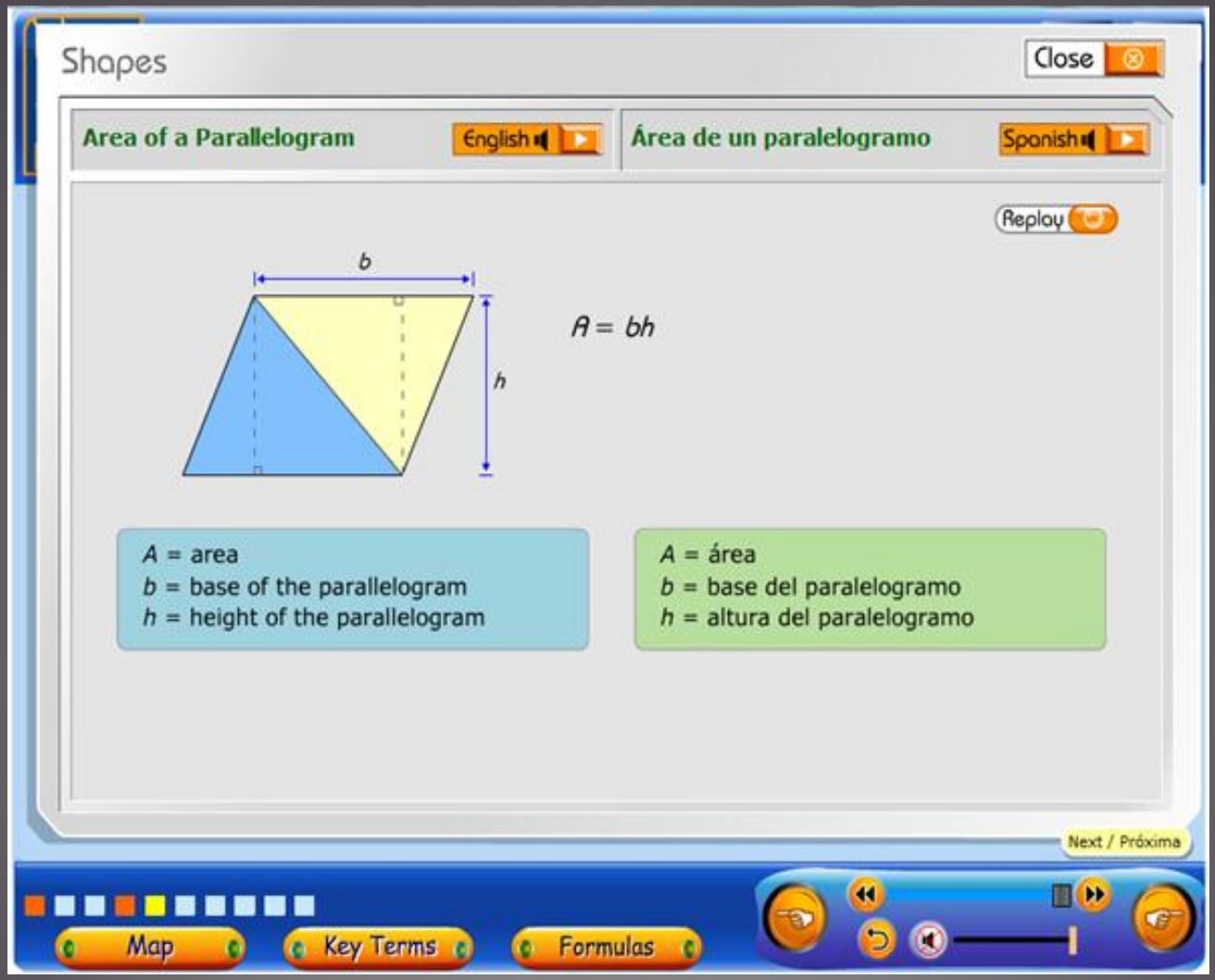
1. Restate the question.	3. Solve the problem.
2. Organize the information.	4. Check your work.



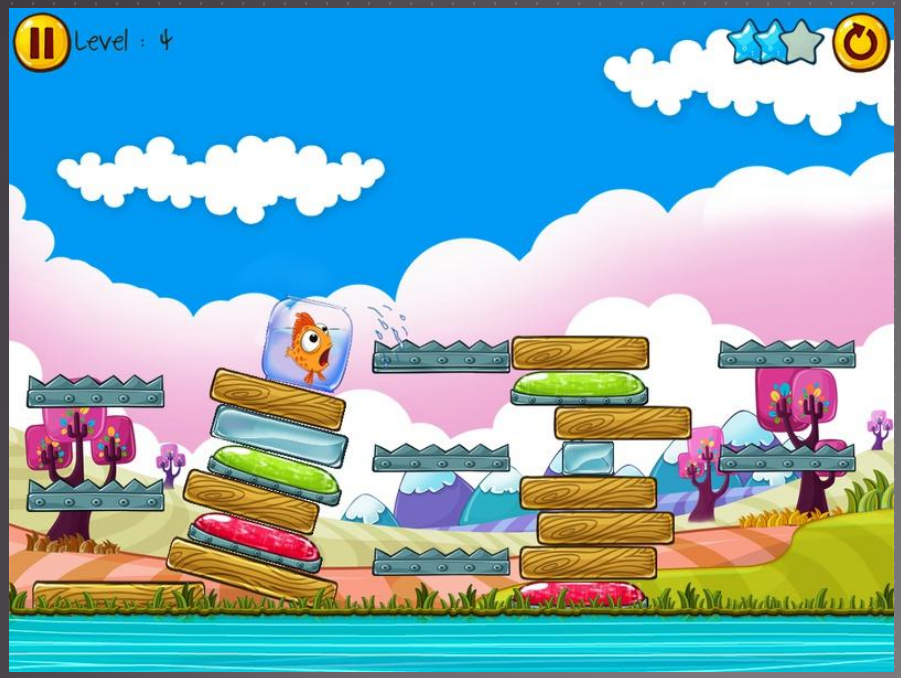
CLEAR LANGUAGE



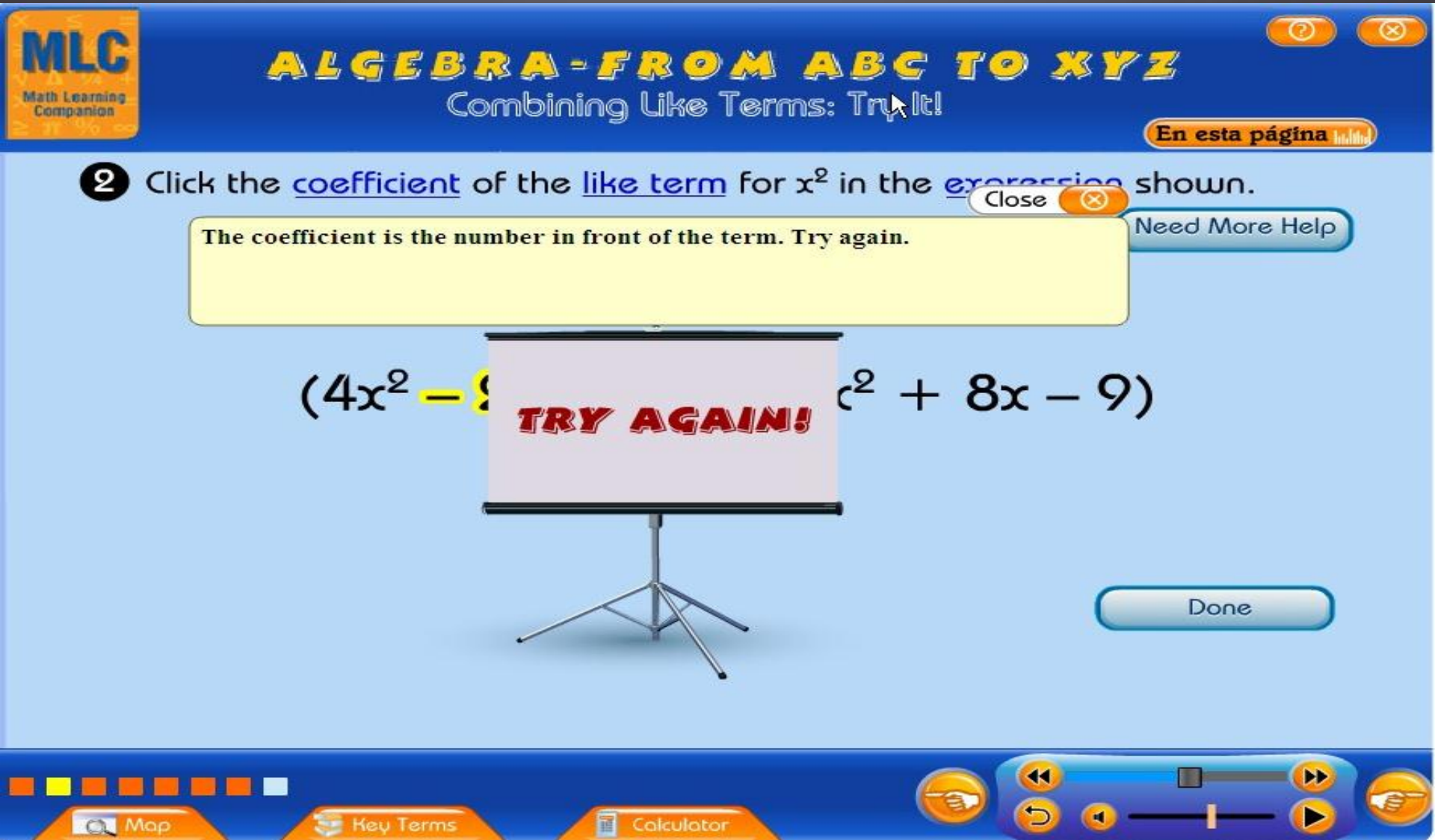
SCAFFOLDS & CLEAR EXPLANATIONS



ENGAGEMENT & MOTIVATION



SYSTEMATIC CORRECTIVE INSTRUCTIONAL FEEDBACK



BELIEVING ALL STUDENTS CAN LEARN AT HIGH LEVELS

MONITORING PROGRESS & USING REPORTS

WHILE MAINTAINING HIGH EXPECTATIONS

HELP MATH

Home | Teacher Profile | Students | Classes | Reports
View Courses | Teacher Resources | Custom Curriculum | Assessments | Help

Back | **Quiz Report** | Log Out

School: [redacted]
Teacher: [redacted]
Class: General Math
Report Date: 10/7/2010

Step 1 Select a Student(s) to narrow the report

[redacted]

Step 2 Select a date range and then Apply Filter button

Start Date: Aug 17, 2010 End Date: Aug 17, 2010

Apply Filter
Clear Student Filter

Print Report | Export Report to Excel

Student	Course Name	Lesson Name	Date Taken	Score out of 10	% Score	Time in Task	% Gain	Quiz Review
[redacted]	Math Foundations 1	L3 Multiplication	8/17/2010	6	60%	1.9	0%	Review
[redacted]	Math Foundations 1	L7 Measurement	8/17/2010	6	60%	1.7	0%	Review
[redacted]	Math Foundations 1	L7 Measurement	8/17/2010	9	90%	2.5	30%	Review
[redacted]	Math Foundations 1	L1 Place Value	8/17/2010	6	60%	1.6	0%	Review
[redacted]	Math Foundations 1							
[redacted]	Math Foundations 1							

Untitled Page

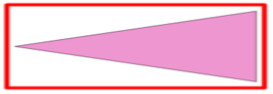
http://www.helpprogram.net/runquiz.aspx?Quiz_url=http://www.helpprogram.net/HELP_COURSES/EL...

Quiz Review Details for the Student: [redacted]

Quiz Review

3 / 10

3. Which triangle appears to be scalene?

A 

Incorrect

C 

B 

D 

Correct

Your Answer: A Correct Answer: D

Next

STUDENT PROGRESS WITHIN CUSTOM CURRICULUM

Adaptive Test Assigned	Pre Test Taken	Date Taken	Score on Pretest
Adaptive G6	G5 PRE Test	8/17/2010 7:09:26 AM	22 / 40 (55%)

Blue Highlighted lesson = Currently working on this lesson
Gold Highlighted lesson =Lessons not completed
Black Highlighted lesson =Lessons completed

Lesson / Course	Lesson Completed	Score on FQ	Date FQ Completed	Total # minutes in lesson	Lessons NOT completed	# of times taking FQ
Math Foundations 1: Lesson 7 Measurement	Yes	9 / 10	8/17/2010	71.2		2
Math Foundations 2: Lesson 2 Fractions & Decimals	Yes	8 / 10	8/20/2010	152.7		4
Math Foundations 2: Lesson 3 Negative Numbers	Yes	8 / 10	8/20/2010	52.8		1
Math Foundations 2: Lesson 4 Addition & Subtraction	Yes	8 / 10	8/20/2010	53.6		1
Math Foundations 2: Lesson 9 Equations	Yes	9 / 10	8/23/2010	49.9		2
Math Foundations 2: Lesson 10 Perimeter & Area	Yes	8 / 10	10/5/2010	58.8		1
Math Foundations 2: Lesson 12 Geometry	Yes	9 / 10	10/7/2010	72.6		3
Math Foundations 3: Lesson 4 Number Lines		/ 10		32.6	X	0
Math Foundations 3: Lesson 5 Add & Subtract Negative Numbers		/ 10			X	0
Math Foundations 3: Lesson 8 Add & Subtract Fractions		/ 10			X	0
Math Foundations 3: Lesson 9 Geometry		/ 10			X	0
Geometry - Go Figure: Lesson 11 Transformations		/ 10			X	0
Data Analysis - How Likely!: Lesson 1 Data Collection &		/ 10			X	0
Data Analysis - How Likely!: Lesson 2 Representing Data		/ 10			X	0
Data Analysis - How Likely!: Lesson 4 Interpret Data		/ 10			X	0
Data Analysis - How Likely!: Lesson 5 Probability (Simple &		/ 10			X	0
Data Analysis - How Likely!: Lesson 6 Estimate the Probability of		/ 10			X	0

STUDENT PROGRESS TIME-IN-TASK AND QUIZ RESULTS

Course	Lesson	Section	Time in Task	Score on FQ	Percentage Score	Mastery Level	Date Completed	Number of times in section
Math Foundations	Lesson 3 Multiplication	Real World	17.3				8/23/2010	2
Math Foundations		Vocabulary	13.5				8/23/2010	2
Math Foundations		Instruction	40.5				8/23/2010	2
Math Foundations		Try It	6.6				8/23/2010	2
Math Foundations		Games	9.1				8/23/2010	2
Math Foundations		Test and Skills	8.2				8/23/2010	2
Math Foundations		Final Quiz	1.8	9/10	90.0%	80%	8/23/2010	2
Math Foundations		Introduction	0.2				8/23/2010	1
Math Foundations	Lesson 7 Measurement	Real World	3.5				8/23/2010	1
Math Foundations		Vocabulary	2.2				8/23/2010	1
Math Foundations		Instruction	65.1				8/23/2010	1
Math Foundations		Try It	7.8				8/23/2010	1
Math Foundations		Games	3.1				8/23/2010	1
Math Foundations		Test and Skills	12.8				8/23/2010	1
Math Foundations		Final Quiz	6.9	10/10	100.0%	80%	8/23/2010	1
Math Foundations	Lesson 3 Negative Numbers	Real World	3.0				8/24/2010	1
Math Foundations		Vocabulary	4.6				8/24/2010	1
Math Foundations		Instruction	21.4				8/24/2010	3
Math Foundations		Try It	6.2				8/24/2010	2
Math Foundations		Games	3.9				8/24/2010	1
Math Foundations		Test and Skills	7.3				8/24/2010	1
Math Foundations		Final Quiz	3.4	8/10	80.0%	80%	8/24/2010	2
Math Foundations	Lesson 5 Multiplication	Real World	13.6				10/12/2010	1
Math Foundations		Vocabulary	20.9				10/12/2010	2
Math Foundations		Instruction	20.0				10/12/2010	1
Math Foundations		Try It	11.9				10/12/2010	1
Math Foundations		Games	6.2				10/12/2010	1
Math Foundations		Test and Skills	6.5				10/12/2010	1

THOUGHTFUL INTEGRATION OF TECHNOLOGY & RTI CAN HELP UNLOCK THE POTENTIAL OF ALL STUDENTS

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- Echevarria, J., & Hasbrouck, J. (2009). Response to intervention and English learners. *CREATE Brief*.
- Fuchs, L. S. Mathematics intervention at the secondary prevention level of a multi-tier prevention system: Six key principles. *RTI Action Network*, Retrieved from www.rtinetwork.org.
- Gersten, R., Beckmann, S., Clarke, B., Foegen, A., Marsh, L., Star, J. R., & Witzel, B. (2009). Assisting students struggling with mathematics: Response to intervention (Rtl) for elementary and middle schools. *IES Practice Guide*.
- Gersten, R., Compton, D., Connor, C. M., Dimino, J., Santoro, L., Linan-Thompson, S., & Tilly, W. D. (2009). Assisting students struggling with reading: Response to intervention (Rtl) and multi-tier intervention in the primary grades. *IES Practice Guide*.
- Johnson, E., & Pesky, L. How to develop an effective tier 2 system. *RTI Action Network*, Retrieved from www.rtinetwork.org.
- Kukic, S. (2012). TCU ANSERS Institute Webinar Series, Rtl: Importance of Precise Planning.
- Images, Math Programs: HELP Math, Emantras, BBC Maths, Kahn Academy, A Maths Dictionary for Kids, Aha!Math, Coolmath4kids

Implementation of RTI in Math

HELP Math meets the following recommendations for RTI in Math from the *IES* and the *RtI Action Network:*

Focus on ensuring mastery of foundation skills	HELP Math delivers comprehensive instruction in all foundation skills of math; whole numbers, fractions and decimals, concepts and skills, number sense, operations, as well as rational numbers for higher grades. Emphasis is placed on key math milestones: counting, adding, subtracting, grouping, place value, properties of operations, measuring (lengths, time, money), shapes and patterns, and magnitude.
Explicit and systematic instruction	HELP Math provides explicit and sequential instruction throughout the lessons, ensuring identification and remediation of any skills deficits. Concepts are broken down into small learning "chunks," enabling increased comprehension.
Provide models of problem solving, guided practice, constant feedback, frequent review	A variety of scaffolds and descriptive feedback loops are available in HELP Math, along with built-in review checks. Concept and skill development progresses from easy to more difficult.
Use visual representations	As HELP Math is built around sheltered instruction strategies, all math concepts are represented visually and auditorily.
Fluent retrieval of facts (rec. 10 min/day)	Fluency practice is built into all HELP Math lessons.
Frequent progress monitoring	HELP Math provides teachers with diagnostic tests to determine students' and class mastery and skills deficits, as well as pro-actively notifying teachers when students continue to struggle and recommending further targeted interventions.
Include motivational strategies in tier 2 and tier 3 interventions	HELP Math utilizes a variety of engaging strategies to deliver instruction and ensure mastery, using a range of virtual manipulatives and tools, such as timelines, fraction wheels, place value charts, hundreds charts, protractor, calculator, thermometer, and includes learning games in each lesson.