Culturally Responsive Math Interventions

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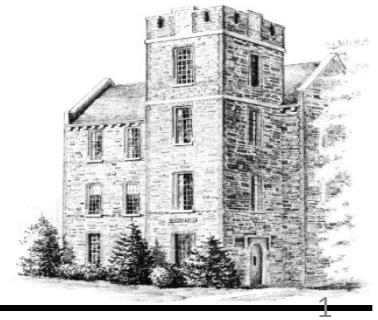

MARIST

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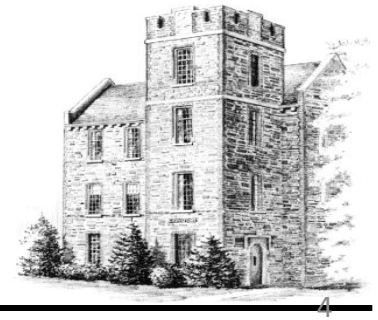
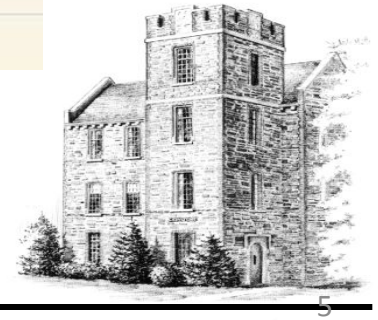
Learning Objectives

Learning Objectives

- Reflect on how school districts currently view the mathematics curriculum.
- Introduce culturally responsive mathematics interventions (English Language Learners).
- Explore the influences of culture, language, gender, and educational mindset on the mathematics performance of diverse student populations.
  - Adapt schools' approaches to instruction.



The Big WHY?

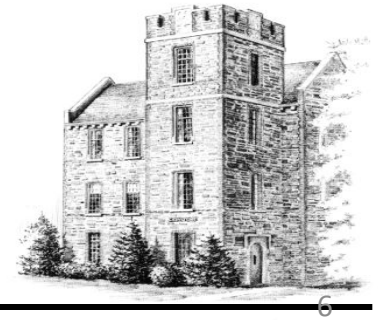


The Big WHY?

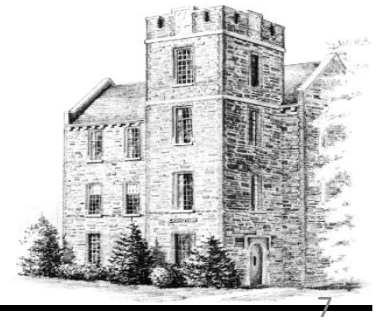
- Part of our NASP-Approved Coursework we created a handbook that:
  - Provide resources to help school psychologists advocate in schools.
  - *Especially* Culturally Linguistically Diverse (CLD) students.

- CLD students have limited access to resources and support in school.

- Provide research-based interventions.
  - Support CLD students and English Language Learners in learning mathematics.



Terminology and Background



Terminology Overview

Cultural Responsiveness

Culturally and Linguistically Diverse (CLD)

Linguistically and Culturally Responsive Mathematical Teaching (LCRMT)

Curriculum Based Measures (CBM)

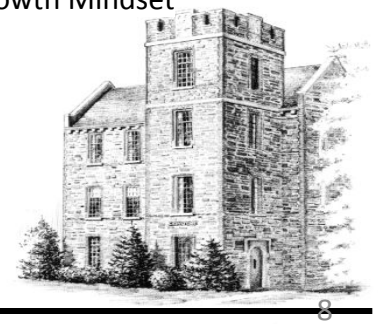
AIMSWeb

Equity

Equality

Stereotype Threat

Growth Mindset



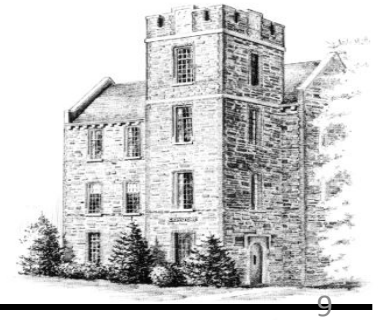
Terminology

<u>Culturally Responsive Teaching:</u> incorporating the child's native language and including the students cultural into all aspects of learning.

- There is also an aspect where the teachers should be aware of their own culture and how that may impact their perspective and knowledge can students learning (Moore et al., 2021).

<u>Culturally and Linguistically Diverse (CLD):</u> is defined as a students who are enrolled in an education programs who are either non-English proficient (NEP) or limited-English proficient (LEP).

- **student who come from and environment where language other than english is spoke and whose cultural values differ from mainstream cultures.**

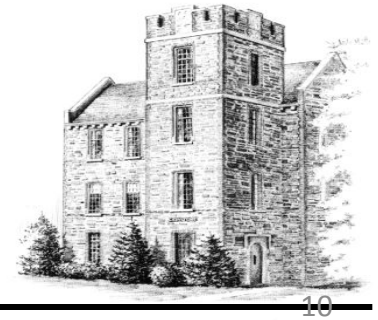


Terminology

Linguistically and Culturally Responsive Mathematical Teaching (LCRMT): leverages the strengths that students from diverse backgrounds bring to the classroom to make learning more relevant and effective.

CBM: curriculum based measures, how students are progressing in the areas of reading, writing and math.

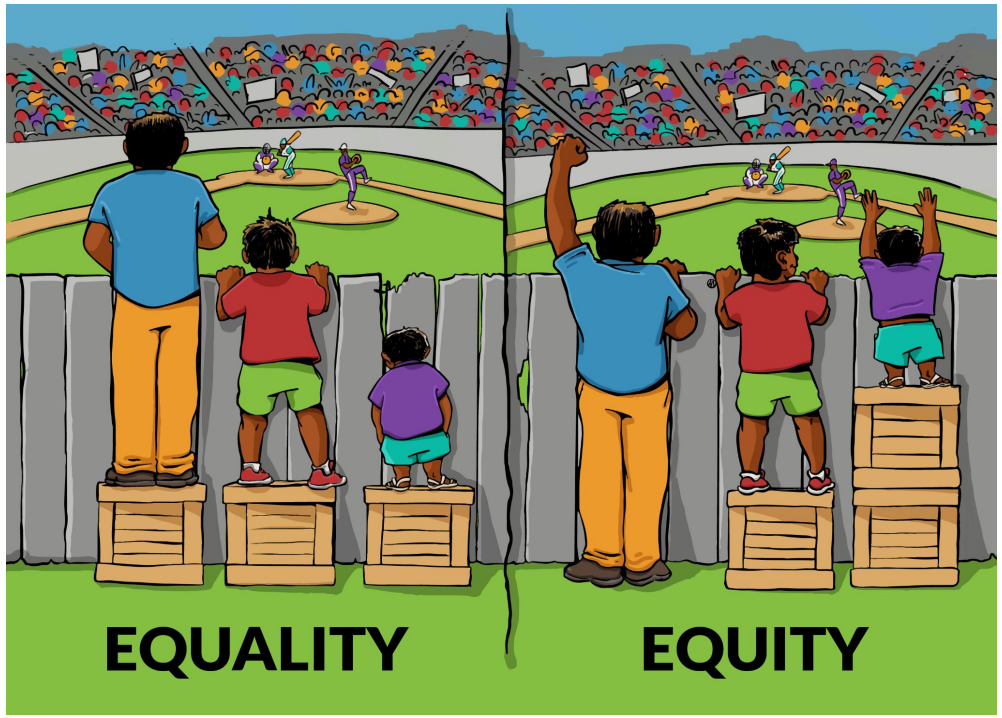
easyCBM: web resource containing information for CBMs in math, reading, and writing, provides information for progress monitoring .

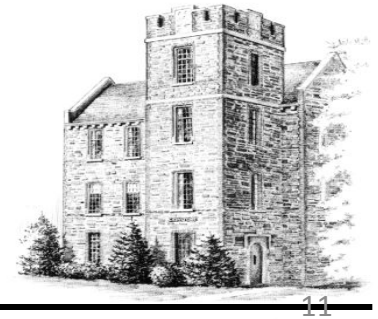


Terminology

Equity: everyone is given different resources and opportunities in order to reach an equal outcome due to individual differences.

Equality: everyone is given the same resources and opportunities.



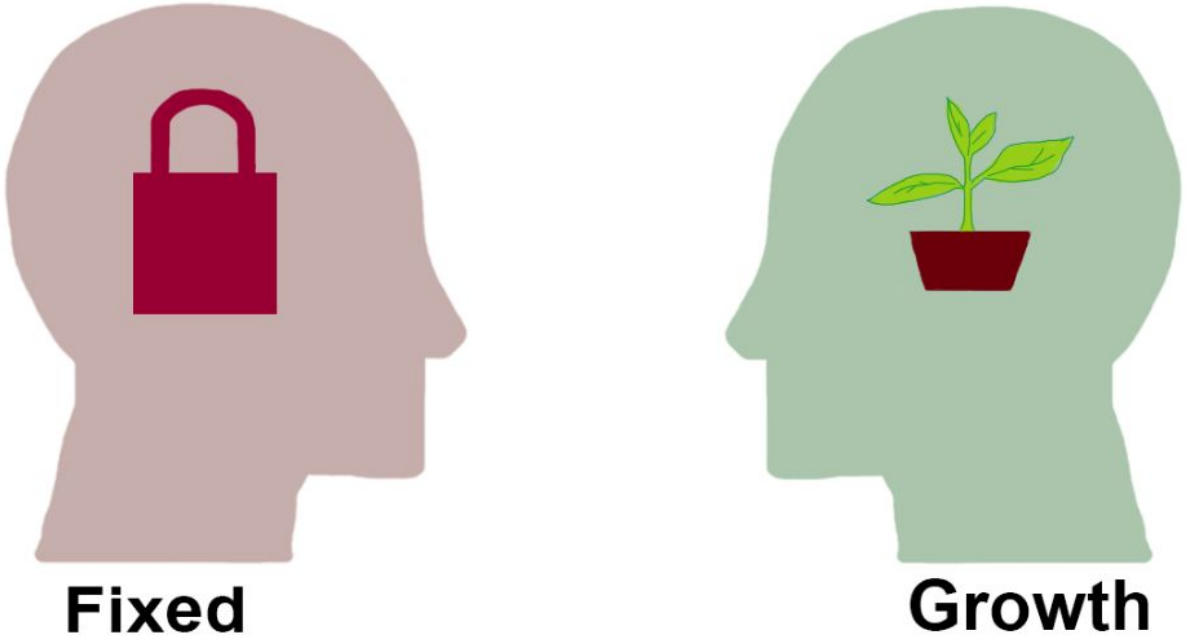


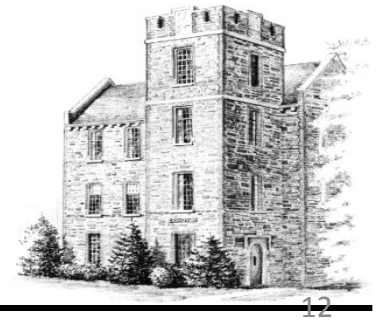
"Interaction Institute for Social Change | Artist: Angus Maguire."

Terminology

Stereotype Threat: Individual may feel at risk to perpetuate a negative stereotype that exists about a cultural group with which they identify.

Growth Mindset: The perception that an individual can change and improve their skills.





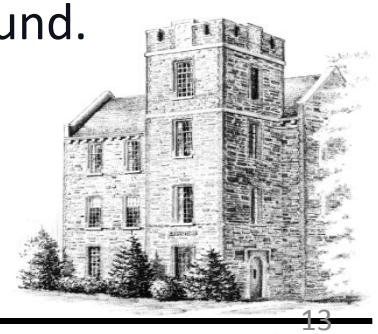
Background Statistics

There is a growing amount of culturally diverse students in schools as research as found for 2021.

According to New York State Education Department there were:

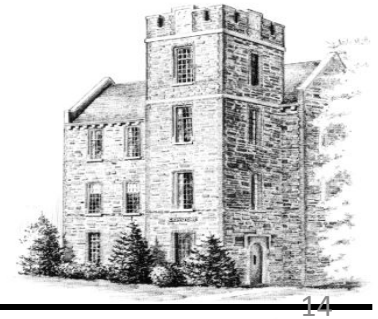
- 16% increase of Black or African American student in schools
- 28% increase of Hispanic or Latino students in schools
- 10% increase of Asian or Native Hawaiian/Other Pacific Islander students in schools
  - which is compared to 41% of students being White that consisted in schools

As previously mentioned, it is important to consider the cultural implications for students because there is more than half of the K-12 public school students in New York coming from a diverse background.



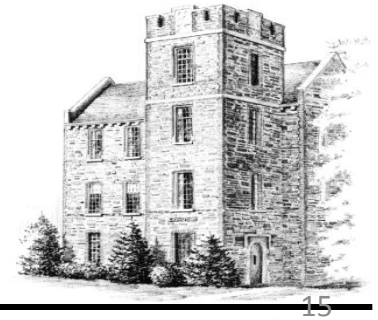
Background & Literature Review

- Culturally responsive teaching involves including the student's culture into all areas of learning (Moore et al. 2021).
- Culturally responsive teaching where the teachers should be aware of their own culture and how that may impact their students as well.
- There is a strong need for training programs to teach candidates about the importance of culturally responsive teaching.
- The research has shown that there is evidence that utilizing a Linguistically and Culturally Responsive Mathematical Teaching (LCRMT) training model will likely increase teacher's use of this pedagogy in the classroom (Song & Coopersmith, 2020).



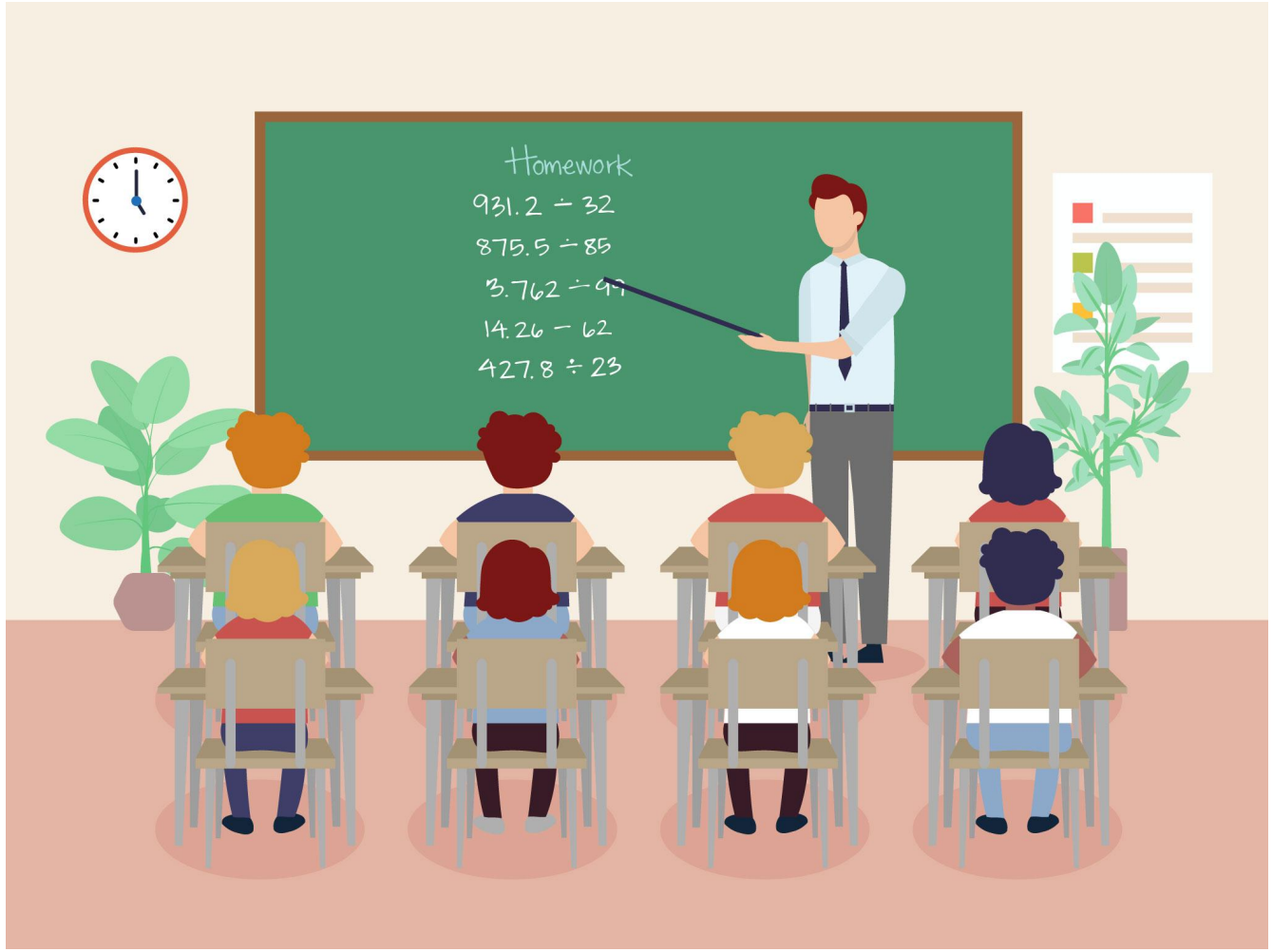
Background & Literature Review *Continued*

- There is a need for culturally responsive math interventions, there is also a need for equity in math instruction.
- Most of the research points to adapting culturally responsive strategies rather than having a specific curriculum to follow.
- The research points to three areas that are needed to close the racial equity gap: race-conscious teaching, awareness of racial dynamics in math classrooms, and humanizing math pedagogy (Ching & Roberts, 2021).
- Even if math curriculum is culturally responsive, it does not mean that it is necessarily equal.
- There should be instruction that is conscious of the different backgrounds of students in the classroom as well as extra support for these students.

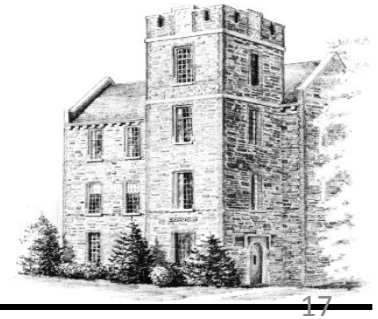


Let’s Get Moving!

A Day in the Life of a Math Student



https://create.kahoot.it/preview/5f41cfcd-e14f-4156-bf40-6740fee9cef7



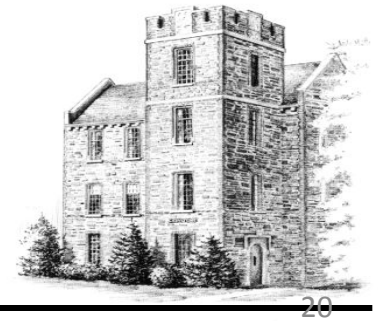
What Equity Teaches Us:

If everyone's needs are different, instruction can't all be the same!

Coach Cards

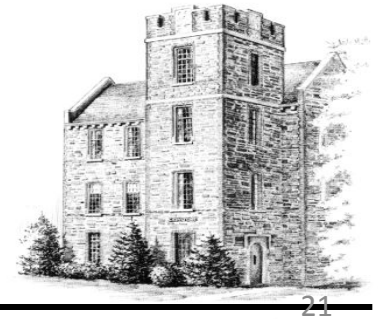
Paraphrasing Intervention and Problem-Solving Accuracy: Generative Procedures

- Students rephrase questions in their own words and identify relevant information that can be manipulated to solve the problem
  - The student will work with a tutor and receive explicit and direct instruction
  - Student will solve practice problems and receive feedback
  - Lessons of the intervention will increase in number of sentences and irrelevant information
- Lessons include 4 phases: warm up, modeling, guided practice, independent practice
- Targets skills involved with computation, reading comprehension, use of linguistic information, identifying relevant information, and constructing the appropriate problem statement
- 30-minute period twice a week for 10 weeks, total of 20 lessons
- Progress Monitoring: Wechsler Individual Achievement Test (Test of Math Abilities) or easyCBM.
- Target Age: 3rd grade



Example

Dave is working to improve the yard at his house. He asked his cousin for some advice on what to buy. Dave bought packs of seeds to plant around his yard. Each pack of pumpkin seeds costs $8 and each pack of tomatoes costs $5. What is the total cost for 3 packs of tomato seeds and 4 packs of pumpkin seeds?



Modeling

/ /

- [ ] Tutor or student reads problem out loud
- [ ]
- [ ] Tutor asks, "What is the question?"
- [ ]
- [ ] Tutor asks, "What other information is important?"
- [ ]
- [ ] Tutor states, "The important information is..."
- [ ]
- [ ]
- [ ] Tutor asks, "What should we do to solve the problem?"
- [ ]
- [ ]
- [ ] Problem is solved together
- [ ]

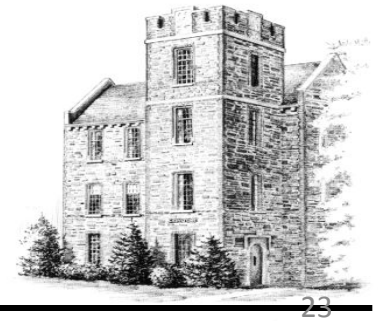
Guided Practice

/ /

- [ ] Tutor or student reads problem out loud twice
- [ ]
- [ ]
- [ ] Tutor states, "Write the important information in your own words"
- [ ]
- [ ]
- [ ] Tutor asks, "What is the question?"
- [ ]
- [ ]
- [ ] Tutor asks, "What other information is important?"
- [ ]
- [ ]
- [ ] Tutor instructs students to solve the problem on their own
- [ ]
- [ ]

Word Problem Solving - Estratégica Dinámica de Matemáticas (EDM)

- Designed to support ELL students in third grade who are at risk for a math disability
- The intervention focuses on building the connection between English and Spanish for math vocabulary
- 17 sessions over a 5 week period, 20-25 minutes each
- Progress monitoring measured by The Batería III Woodcock-Muñoz: Pruebas de Aprovechamiento, Prueba 10: Problemas Aplicados (Muñoz-Sandoval et al., 2005), pre test and post test
  - if this is not available, could use easyCBM to assess fluency and computation
- Phase 1: Pre-teaching Concepts and Vocabulary
- Phase 2: Teaching the Strategies
- Phase 3: Cooperative Learning and/or Student pairing



Example

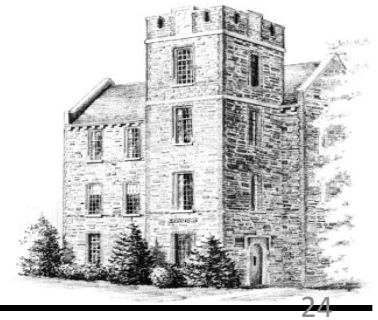
Rosa's mom bought

15 yellow pearls and

24 red pearls.

What is the sum of pearls

that Rosa's mom bought?



Example

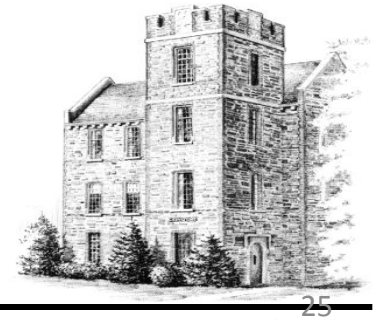
Saberlo (know it): What is the sum of pearls that Rosa's mom bought?

Buscarlo (find it): Rosa's mom bought 15 yellow pearls and 24 red pearls. What is the sum of pearls that Rosa's mom bought?

Muestralo (set it up): 15 yellow pearls, 24 red pearls, what is the sum

Resolverlo (solve it): 15+24=39

Comprobarlo (check it)



Schema Instruction Approach: Word Math Scramble Puzzle

The main focus on why we used the Schema Instruction approach for the ***Word Math Scramble Puzzle*** *intervention* because :

- It would address the big picture, on how Math words problems are presented from Kindergarten to 12th grade, which could create a huge toll on students who are not given the proper support especially English Language Learners (ELL)
    - This can create a domino effect for English Language Learning (ELL) students who were not given the right support for reading comprehension and vocabulary comprehension skills, which will result in students struggling when they face high stake assessments in regard to math words problem (Driver & Powell, 2016).

- This intervention would focus mainly on English Language Learning (ELL) students
    - With the help of Schema Instruction approach, which is to make connections with the students' lives, providing vocabulary instruction, using visual aids, and promoting classroom discussion can help increase math word problem comprehension for ELL students.

Schema Instruction Approach: Word Math Scramble Puzzle

Word Math Scramble Puzzle address (Kindergarten to 8th grade), how the student will work with the instructor in school to break down vocabulary words that are commonly seen in math word problems.

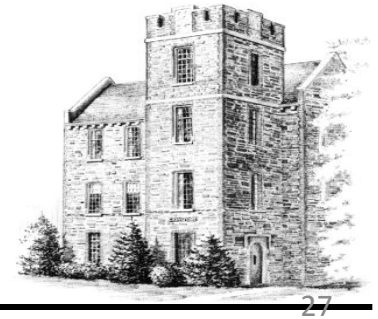
- The student will define the word in there own words, draw a picture that reminds them of the word, and then how the word connect to something in the classroom or at home for the **cultural connection**.

The Quick break down: The student will be given a total of 4 words.

Website for the words to use: https://www.mathsisfun.com/definitions/increase.html

- Day 1: The student will work on 2 words
- Day 2: The students will be working on another 2 words
- Day 3: The student will practice and put the puzzle pieces together. The student will work independently and then switch to small groups created by their teacher. Independently the student will match their own puzzle together, when the students are in a group the student will be working on one classmate's puzzle at a time to match their pieces together. This will allow the student to continue to be exposed to the new math vocabulary

Progress Monitoring: Curriculum Based Assessment (CBA) on math word problems
This assessment is administered to see the students comprehension level when it came to math verbal comprehension (word problem) math tasks.

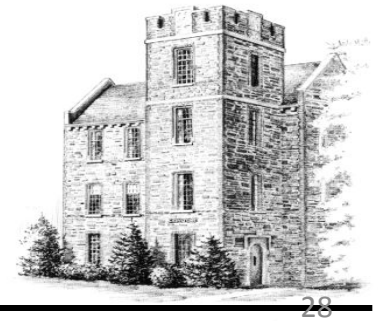


Blank Template

Schema Instruction Approach (Word Problems)

Day 1:

Word	Definition (in your own words)	Picture/ Drawing	Connection to something in the classroom/ home



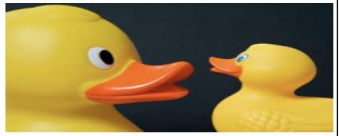
Completed Sample

Schema Instruction Approach (Word Problems)

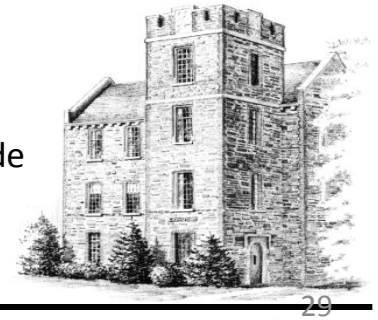
Day 1:

Word	Definition (in your own words)	Picture/ Drawing	Connection to something in the classroom/ home
Increase	Make something bigger (in size or quantity)		
Decrease	Make something smaller (in size or quantity)		

Day 2

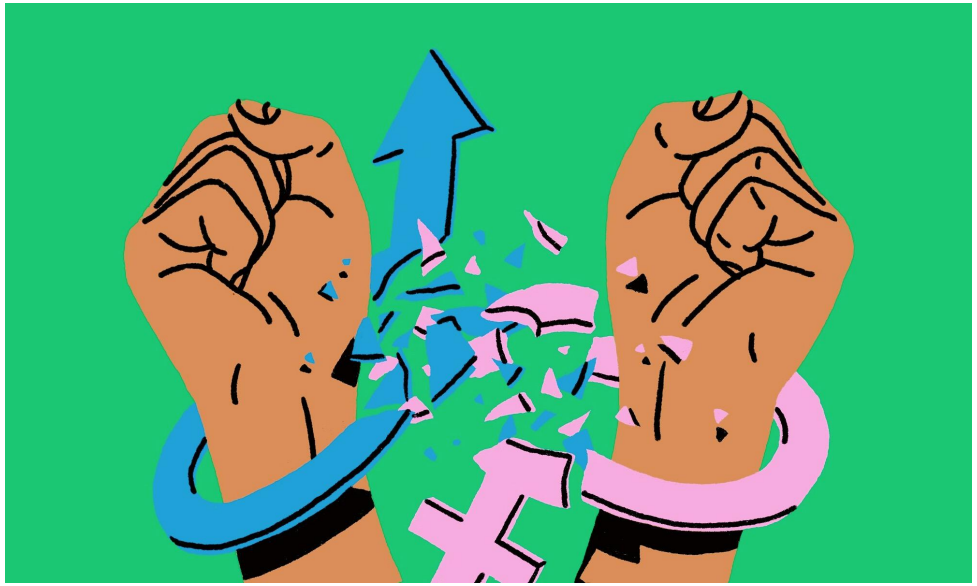
Word	Definition (in your own words)	Picture/ Drawing	Connection to something in the classroom/ home
Less Than	The Symbol < means less than (smaller)	The duck on the right is smaller, less than 	
Greater Than	The Symbol > means greater than (bigger)	The duck on the left is bigger, greater than 	

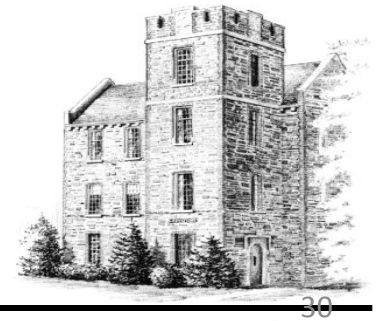
For more Information on how to conduct this intervention in your classroom, please view out handbook that we will provide instruction at the end of our presentation on how to locate it.



Growth Mindset & Defying Gender Stereotypes

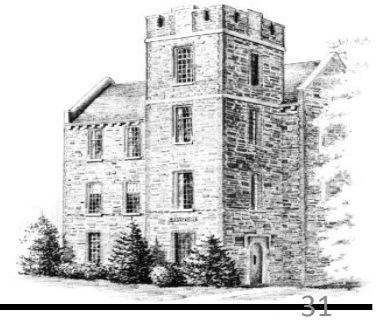
- Stereotypes regarding gender-identity and mathematics proficiency: (Elementary Level)
  - Cultural stereotypes (‘‘Math is for boys’’)
  - Gender identity (male, female, non-binary)
  - One’s self-concept in regards to math (‘‘Math is not for me’’)
- 8 Lessons (once a week) that target both growth mindset and gender stereotype threat.
  - Centered around mathematics
  - Students are able to express themselves through writing, drawing, and group discussion



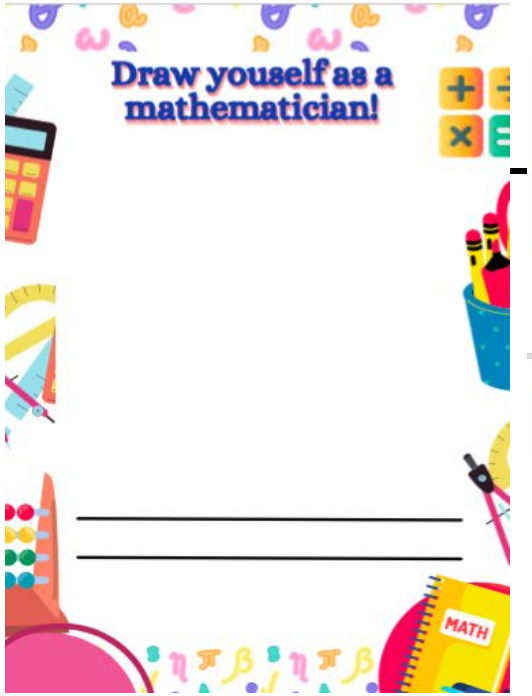


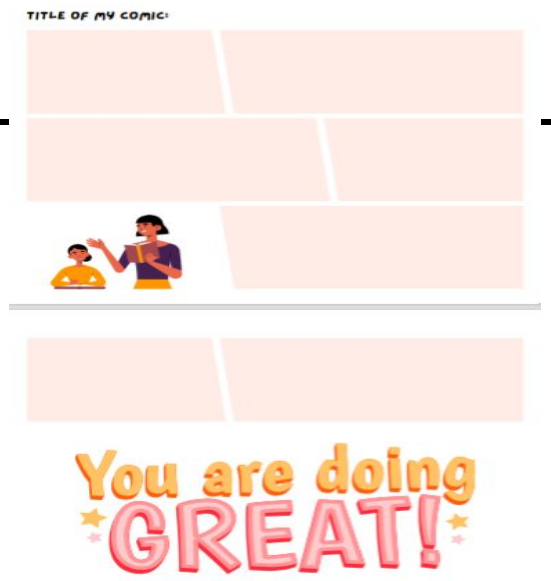
Growth Mindset & Defying Gender Stereotypes

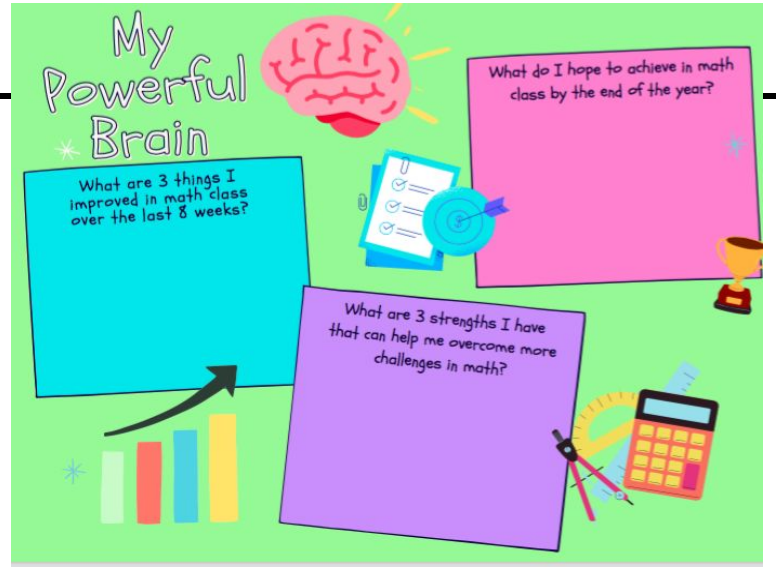
- Progress Monitoring
  - Likert Scale Survey
    - Stereotype beliefs, self-efficacy and growth mindset, perseverance, motivation
  - Optional Measures
    - Attendance, number of assignments turned in, test anxiety, academic performance (median scores)
- Cultural Responsiveness
  - Addressing bias
  - High expectations



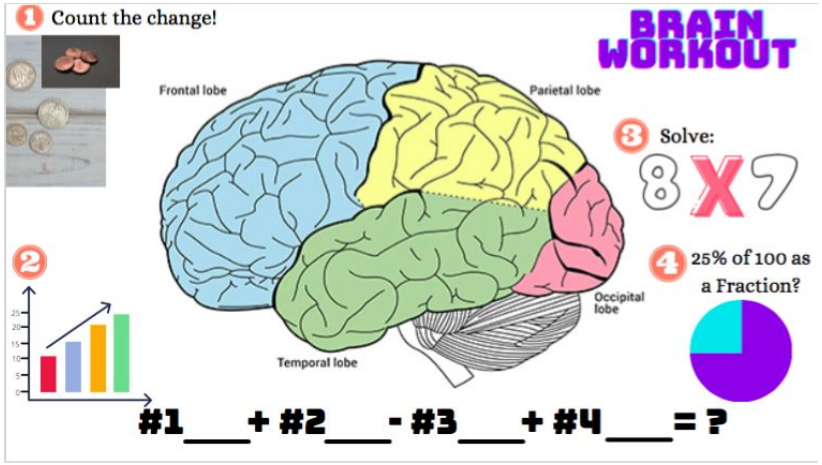
Resources


Draw youself as a mathematician!
MATH

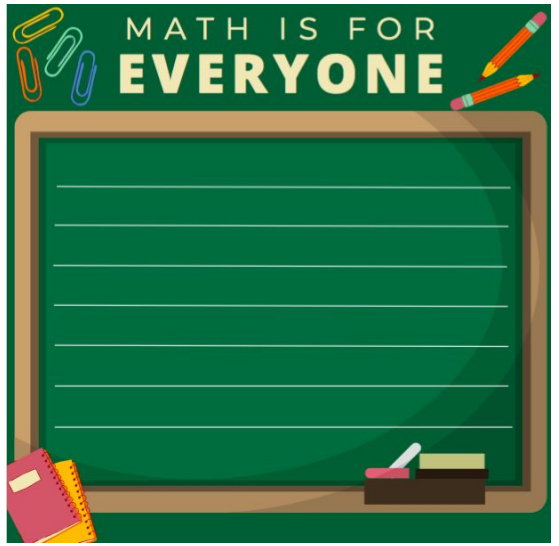

TITLE OF MY COMIC:
You are doing GREAT!


My Powerful Brain
What are 3 things I improved in math class over the last 8 weeks?
What do I hope to achieve in math class by the end of the year?
What are 3 strengths I have that can help me overcome more challenges in math?

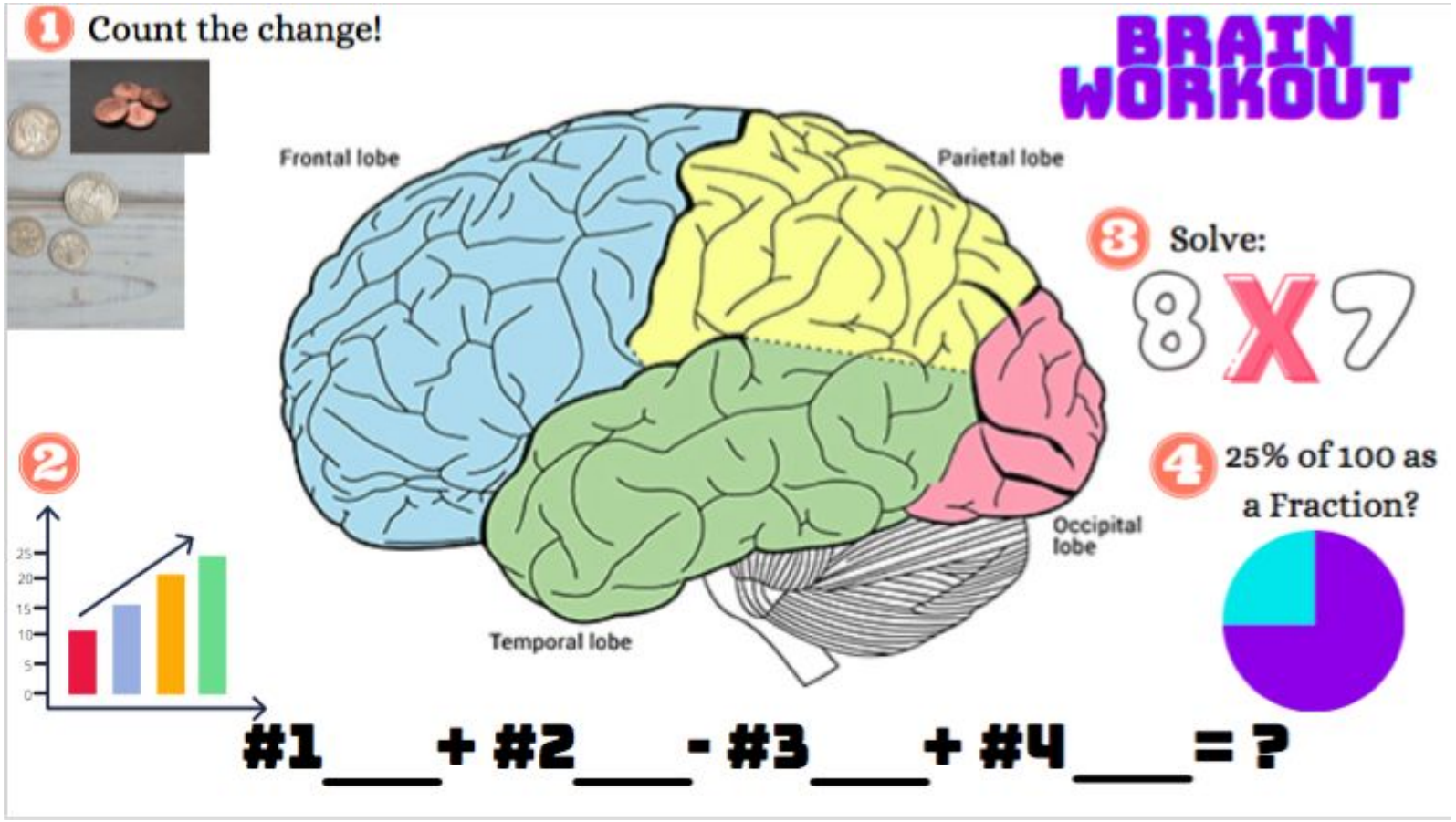

Career Pathway
When choosing a career, it is important to think of all the steps you have to take to get that job! Anyone can follow these steps to do any job they want. Hard work helps us achieve our goals.
Education
STEP 01
STEP 02
Experience
Exams
STEP 03
STEP 04
Certification
Application
STEP 05


1 Count the change!
BRAIN WORKOUT
Frontal lobe
Parietal lobe
Occipital lobe
Temporal lobe
3 Solve:
8X7
2
4 25% of 100 as a Fraction?
#1___+ #2___- #3___+ #4___= ?

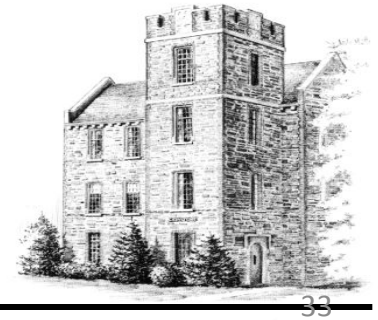

LETTER TO A FRIEND
Math Advice
YOU CAN DO IT!


MATH IS FOR EVERYONE

Example!

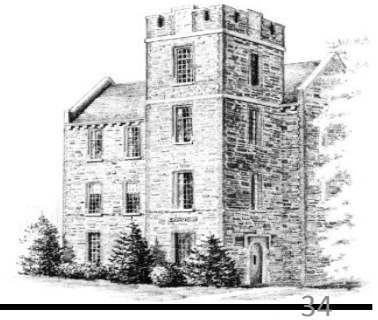


Wordle



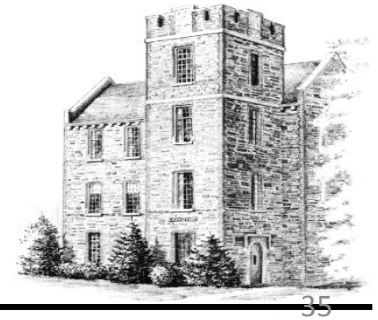
Peer Tutoring

- Peer-tutoring is a strategy that allows students to work collaboratively and engage in learning and teaching.
  - This gives students an opportunity to review the previously-taught classroom material.
  - It can also increase the students' self-efficacy if they are able to successfully help their peers understand the material, or if they are able to make improvements with the “tutor’s” guidance.
- Students can take the role of the tutor, or the tutee; it is common for students to change roles as well.
  - Friday Game Day!

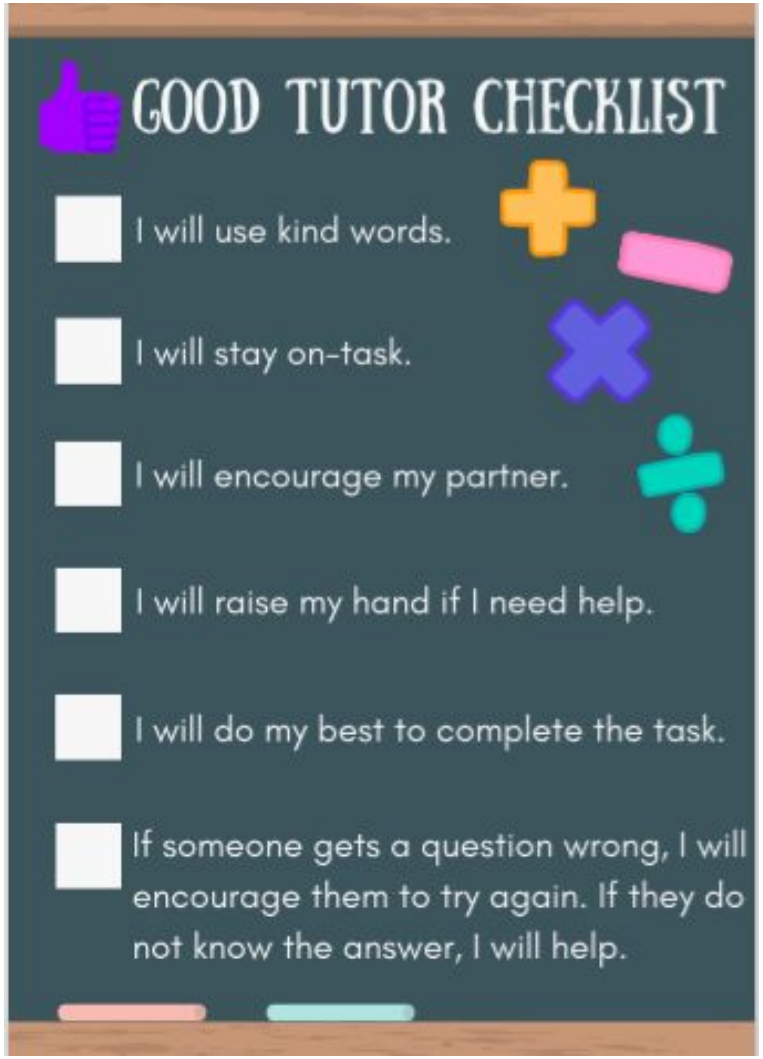


Peer Tutoring

- Progress Monitoring
  - Pre and post tutoring math facts assessment
    - 50 math facts/1 minute (operation corresponds with flashcards)
  - Weekly mixed-operation worksheet (60 math facts/2 minutes)
    - Test-taking and cognitive switching
  - Optional Measures: Sense of belonging and joy (Likert scale)
- Culturally Responsive Strategy
  - Minimize dynamics of power and control in the classroom
  - Socialization and opportunities to practice language
  - Individualization



Example!



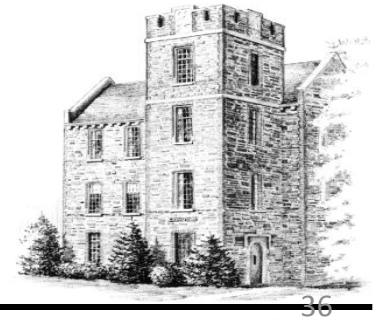
Student 1: “What is 5 times 3”

Student 2: “12!”

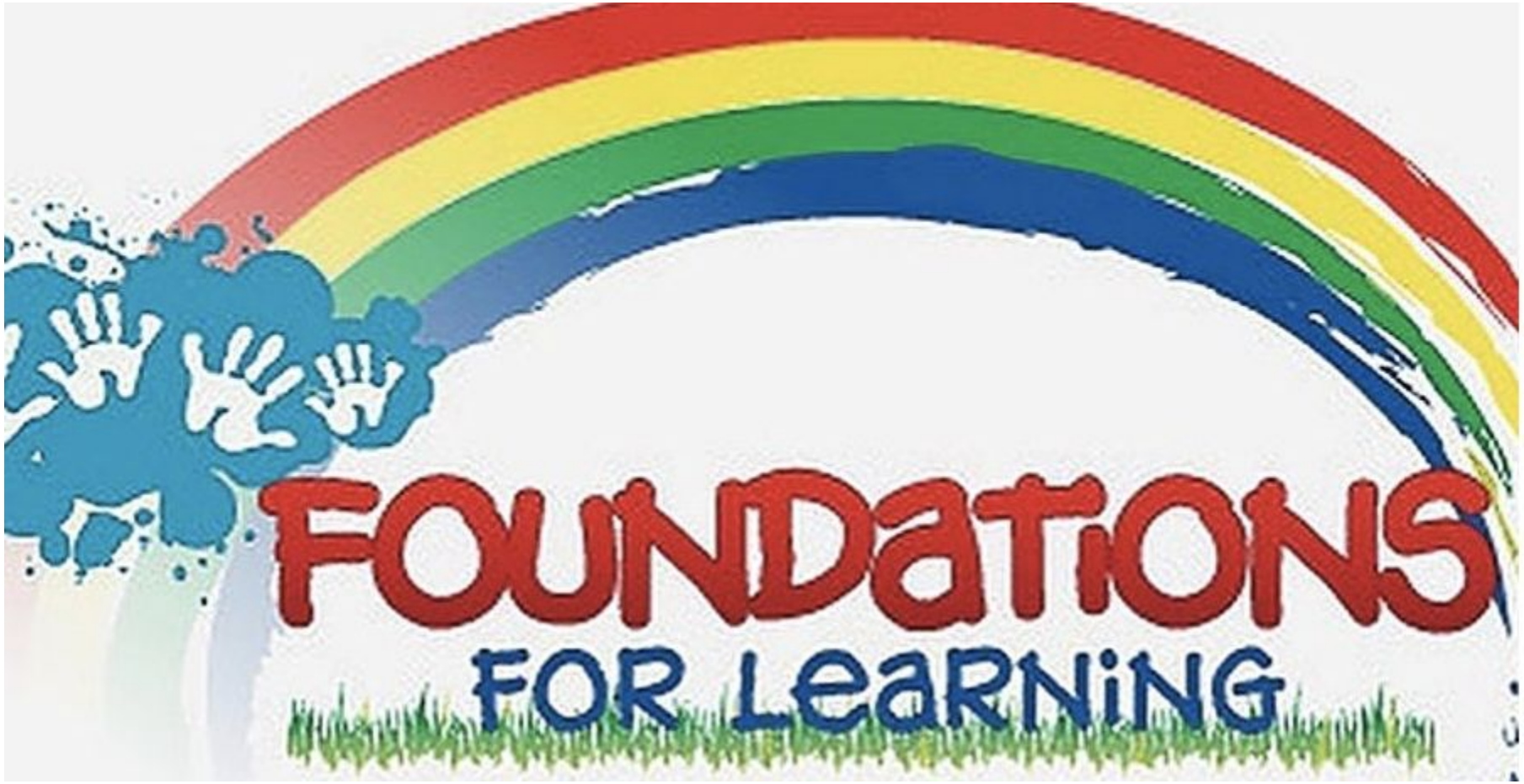
Student 1: “That was a good try! Try it one more time.”

Student 2: “Is it 16?”

Student 1: “You’re so close! The answer is 15. You can try it again later.”



Website and Additional resources

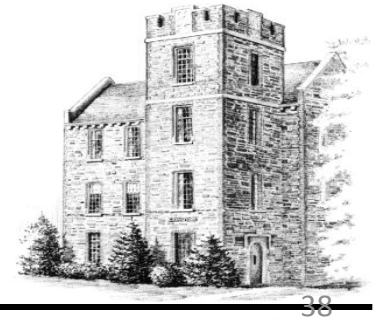


Websites

A Pathway to Equitable Math Instruction

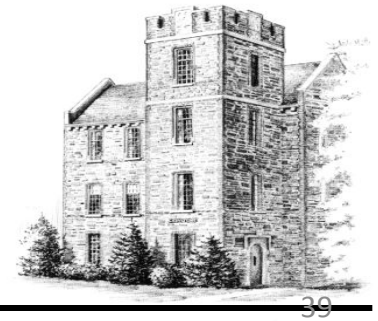
Resources and guidance to support Black, LatinX, and Multilingual students to thrive in grades 6-8

citizen math



Websites

¡Colorín colorado!



Websites

Curriculum Associates | i-Ready

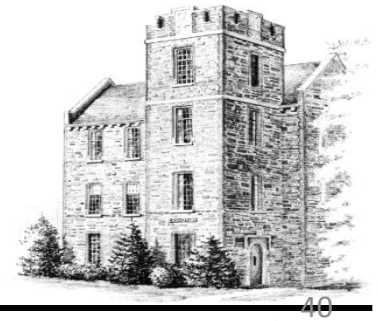
Prodigy

INTERVENTION hero

HOME MTSS Academic Interventions Behavior Accommodations Solution Map 504 Mentorship More

WINNING AT RESEARCH-BASED STRATEGY APPLICATION IN

Schools with free easy-to-use tools



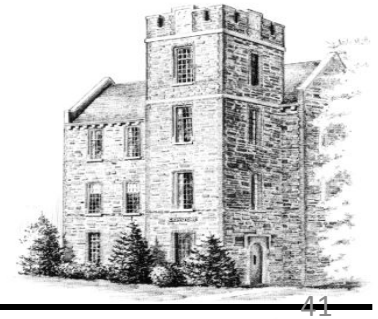
Where to Find Our Handouts and Additional Resources

Behavioral Interventions & Strategies to Assist Students With Traumatic Brain Injuries: A Resource Handbook for Educators

Our School Website: https://instructionalconsultation.weebly.com

Password: systems101

There will also be a section that will be easy to access on the NYASP website on where to locate out presentation and additional resources!




Questions
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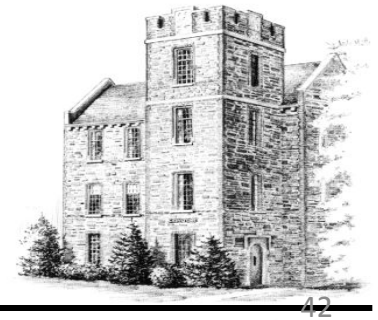

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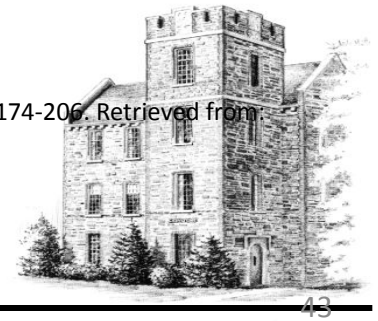

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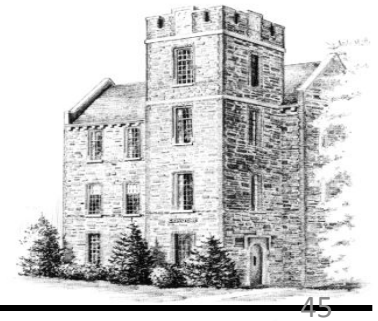

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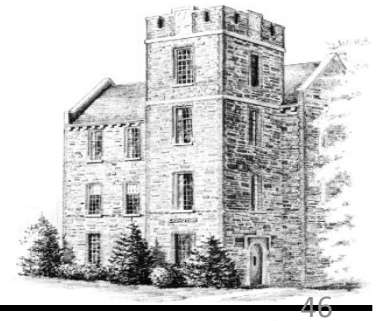

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