

MATHEMATICAL PERSEVERANCE: INSTILLING A DESIRE TO STRUGGLE IN PROBLEM SOLVING

LONG = Many simple steps
leading to an exciting
solution.

HARD = requiring a great
deal of effort & thought

LONG math problems \neq
HARD math problems

CAN YOU GUESS THE RULE?

CAN YOU GUESS THE RULE?

4, 6, 8

10, 12, 14

→ Guess the rule that applies to both sequences

OR

→ You can guess a set of three numbers you think follows the rule

WHAT IS GRIT?

grit
/grɪt/ 

GRIT: Tenacity; perseverance; the ability to never give up; resilience

HOW DO OUR STUDENTS VIEW GRIT?

[Student Video](#)

WHAT DID YOU NOTICE?

- In groups of 4 people, discuss your reactions:
 - “I saw...”
 - “This made me think about...”
 - “I wonder...”

PERSONAL EXPERIENCES

- Can you think of a situation where grit has contributed to a personal success?
- Where do you think *not* having grit has held you back?
- Does your level of grit vary depending on the setting? (academic/sports/etc)
- How do you think your level of grit has changed over time?
- *Share Out: How did you develop your grit???*

GRIT RESEARCH: OVERARCHING THEMES

- Fixed mindset vs Growth mindset
- Instilling confidence in our students
- Create and monitor controlled frustration

GRIT IN OUR CLASSROOMS

- **Make it the theme of your classroom**
 - **Teach vocabulary/concepts**
 - What is “trying”?
 - Processing time can vary
 - Wrong answers can be useful
 - **Grit test**
 - **“I showed grit when....”**
 - **Share your own personal experiences with students**

GRIT TEST

FIGURE 2: Student Grit Survey

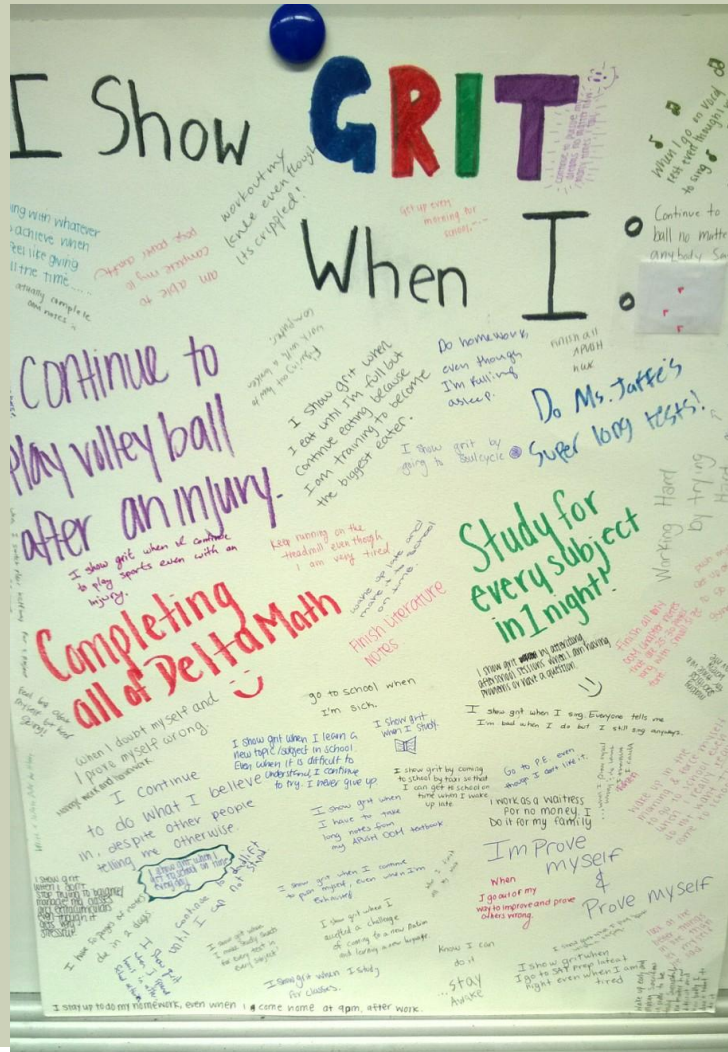
Answering these questions can help you understand how much grit plays a role in your learning. Place a 1 (strongly disagree), 2 (disagree), 3 (not sure), 4 (agree), or 5 (strongly agree) after each item.

1. No matter how difficult a task is, I keep trying. ____
2. I would rather practice something I do well than try to learn something new. ____
3. I am often distracted when things are hard. ____
4. Learning in school should be easy. ____
5. I usually work harder than my classmates. ____
6. It is important to me that I don't make mistakes. ____
7. I would rather get a *B* in a new area of learning than an *A* on something I already know. ____
8. Learning must be fun. ____
9. It's OK if I make a mistake or two while learning. ____
10. If something is difficult, I am sure to devote extra time to it. ____

GRIT IN OUR CLASSROOMS

- **Make it the theme of your classroom**
 - **Teach vocabulary/concepts**
 - What is “trying”?
 - It’s ok to take a longer time to process
 - Wrong answers get you closer to the right answer
 - **Grit test**
 - **“I showed grit when....”**
 - **Share your own personal experiences with students**

GRIT POSTER



GRIT IN OUR CLASSROOMS

- **Make it the theme of your classroom**
 - **Teach vocabulary/concepts**
 - What is “trying”?
 - It’s ok to take a longer time to process
 - Wrong answers get you closer to the right answer
 - **Grit test**
 - **“I showed grit when....”**
 - **Share your own personal experiences with students**

GRIT IN OUR CLASSROOMS

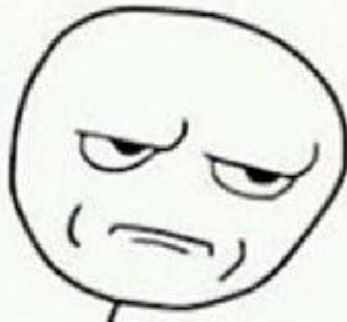
- **Rewards: Make them internal vs external**
- **View failure as a learning opportunity**
 - Applaud wrong answers
 - Ask what can we learn from a mistake

GRIT IN OUR CLASSROOMS

- **Problem Solving Tactics**
 - Long homework problems
 - Rigorous assignments: Delta Math
 - Give them a destination
 - Work independently before group work
 - Counter-intuitive solutions
 - Authentic problems that exist in our world

GRIT IN OUR CLASSROOMS

Math. The only place
where people buy 60
watermelons and no
one wonders why.



GRIT IN OUR CLASSROOMS

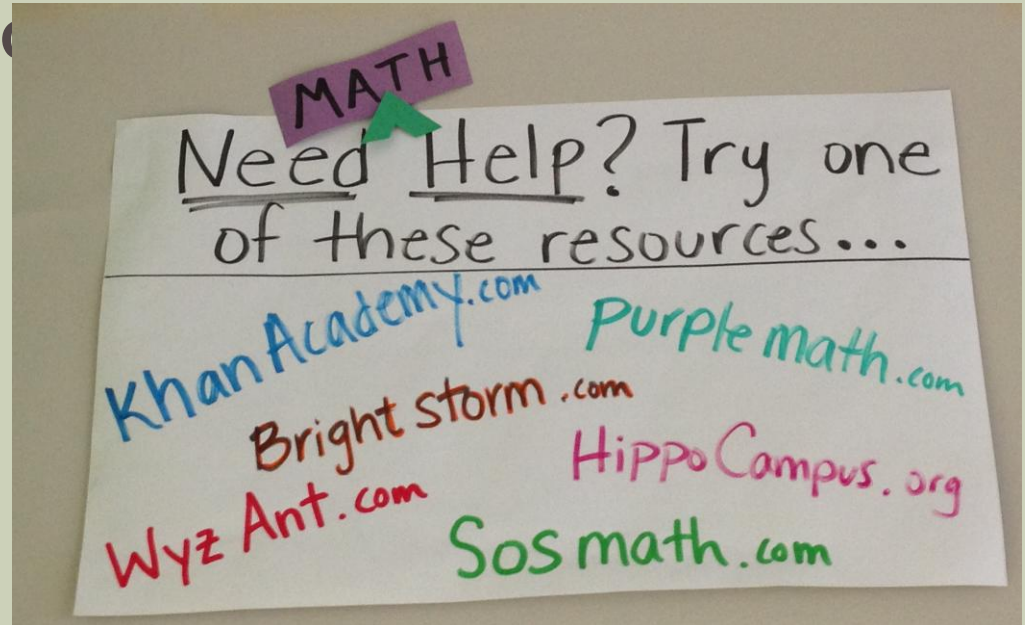
- **Instill confidence**
 - Sense of community
 - Allow struggling students to be leaders
 - Positive reinforcement
 - BCSM: Our own “NCTM” led by students

GRIT IN OUR CLASSROOMS

- **Offering choice**
 - Project presentation method and topic
 - 12-Diamond homework
 - Choice of problems on Exams
 - Students create challenge problems for tests

GRIT IN OUR CLASSROOMS

- Provide support when students are stuck
 - Provide a 1st step
 - List available resources
 - Study Groups



REFLECTION

- What resonated with you?
- What's **1** thing you can implement in Monday's class?

INTERNATIONAL FINDINGS: CHINA

- **Strategies:**
 - Model Grit
 - Psychological Intervention
- **Motivation**
 - Comes from the family
- **Why do they give up?**
 - Students are lazy
 - There is a psychological obstacle
 - Students are afraid

“Habits are created by culture”

INTERNATIONAL FINDINGS: JAPAN

- **Strategies:**
 - Teach *how* to study math
 - Make it a habit to study at home
 - Emphasize checking work
- **Motivation**
 - Sense of achievement
 - Important for university entrance exam
- **How is grit developed?**
 - Home life has the greatest impact
 - Lots of homework
 - Success stories of family members or celebrities

KEY TAKEAWAYS

- Our classrooms should reflect the **Growth Mindset**
- Get students to look at failure as a learning opportunity
- Push students to go outside their comfort zones
- Focus on intrinsic rewards like pride and accomplishment
 - Use extrinsic rewards as a compliment for showing grit

WANT TO READ MORE? CHECK OUT THESE RESOURCES...

Books

- *Mindset* by Carol Dweck
- *How Children Succeed* by Paul Tough
- *Closing the Attitude Gap* by Baruti Kafele
- *The Motivated Student* by Bob Sullo
- *Fostering Grit* by Thomas Hoerr

Articles

- *The Significance of Grit* by Deborah Perkins-Gough
- *Good Failures* by Thomas Hoerr
- *Growing Capable Kids* by Carol Ann Tomlinson
- *Havens of Resilience* by Nan Henderson
- *Getting Beyond "I Hate Math!"* by Lisa Medoff
- *Afraid of Looking Dumb* by Mark Jacobson

Contact us:

Jaffe.elisabeth@bcchsnyc.net

cogan.ruth@bcchsnyc.net

simon.brooke@bcchsnyc.net

wegener.ashley@bcchsnyc.net

Rate this presentation on the conference app!
www.nctm.org/confapp

Download available presentation handouts from
the Online Planner! **www.nctm.org/planner**

Join the conversation! Tweet us using the
hashtag **#NCTMNOLA**