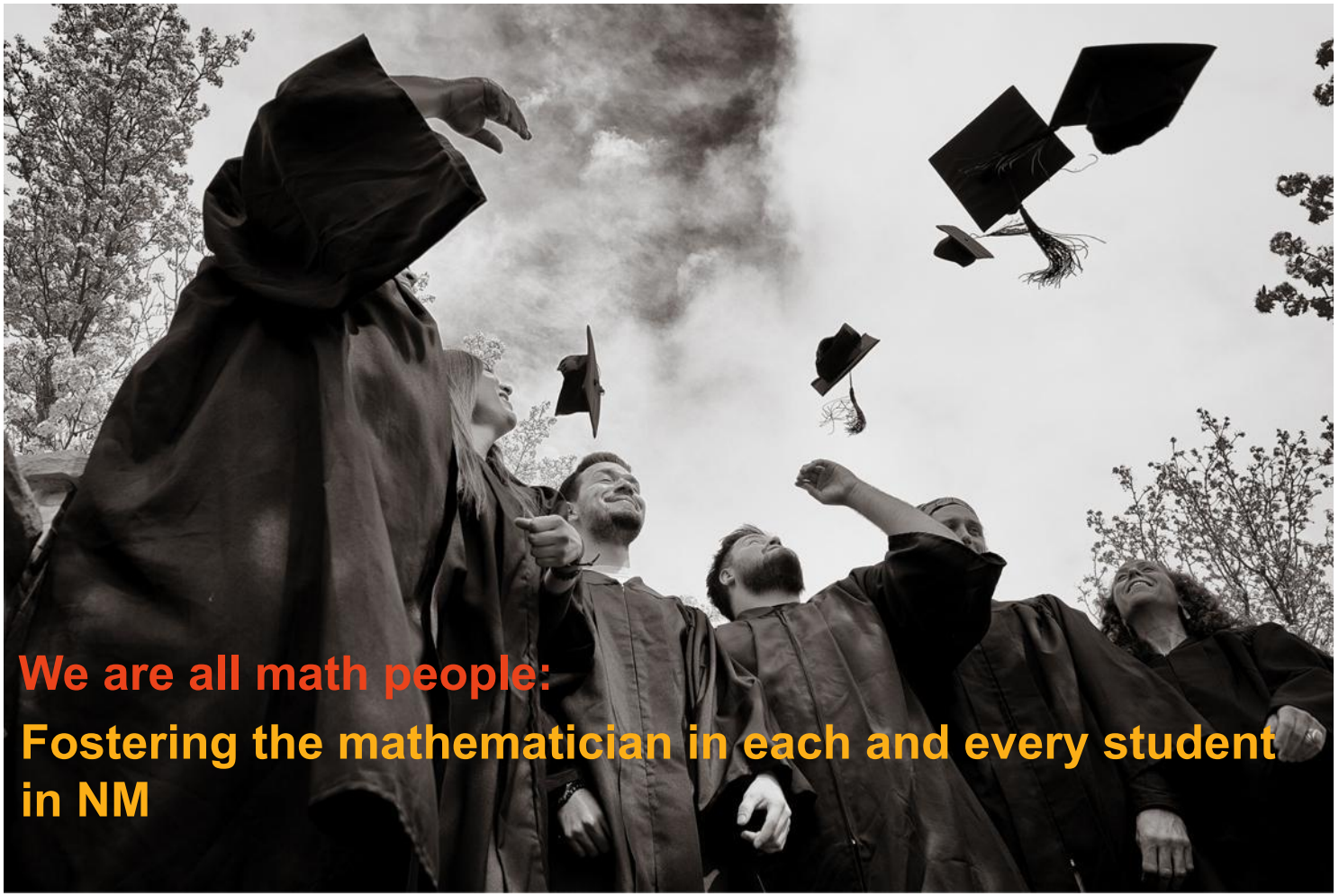

LANL FOUNDATION
Investing in Learning & Human Potential

NM Legislative Education Study Committee
July 26, 2023
Kersti Tyson, Ph.D.
Director of Research and Evaluation

Math outcomes are a product of the opportunities we provide students [and teachers] to DO mathematics

What is being learned?

Where is the joy?

Who has access?

LANL FOUNDATION
Investing in Learning & Human Potential

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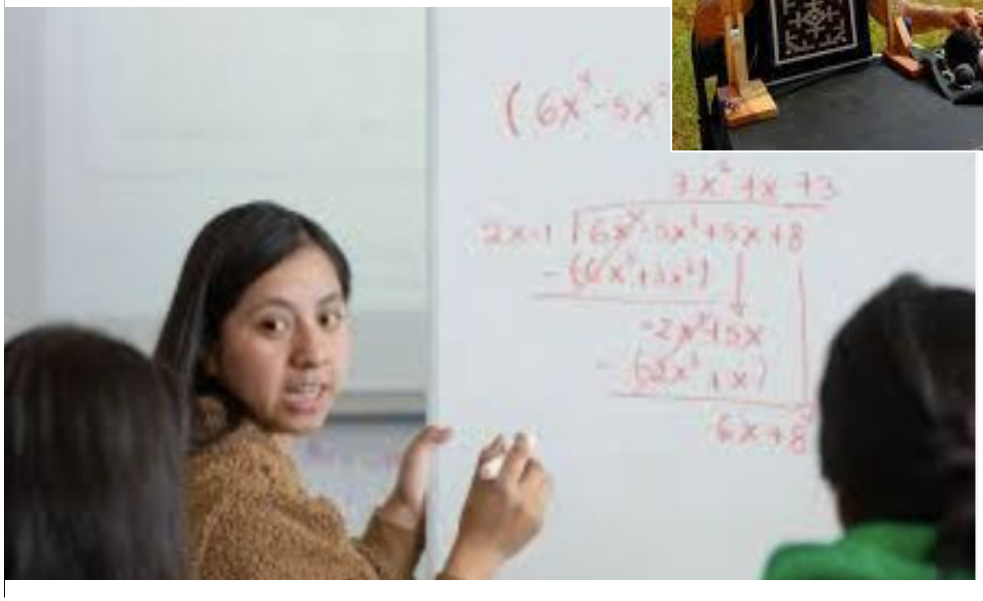
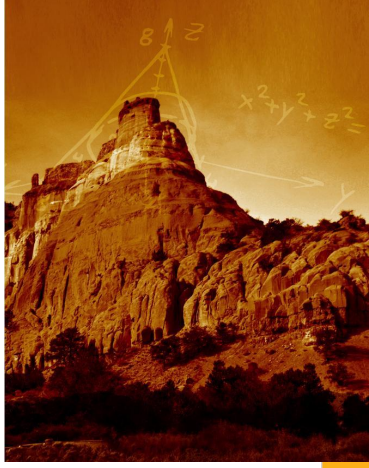


Who has access?

What makes learning mathematics work? Principles of Learning



We are all math people. Humans make sense of the world quantitatively and relationally.

Learning is developmental.

All development is social, emotional cognitive, cultural, linguistic and more:

Learning mathematics is a developmental process. The opportunities we have to learn mathematics involve and inform our identities and ways of being and doing as well as our knowledge and skills.

Children are making sense of their worlds based on the opportunities and experiences to which they have access: This means understanding that students need opportunities to verbalize or show *their* understanding (even when it is emergent) of the mathematics they are learning in the languages and cultural practices that make sense to them [whether oral or written], based on the funds of knowledge they bring to and from our classrooms. *Language and culture are assets in the mathematics classroom.*

Struggle is essential for learning: This means students' need opportunities to struggle and make mistakes. Providing opportunities for students to experience productive struggle and uncertainty is essential for students to develop conceptual and contextual understandings of the mathematics they are learning.

The shifts required for math education transformation based on principles of learning

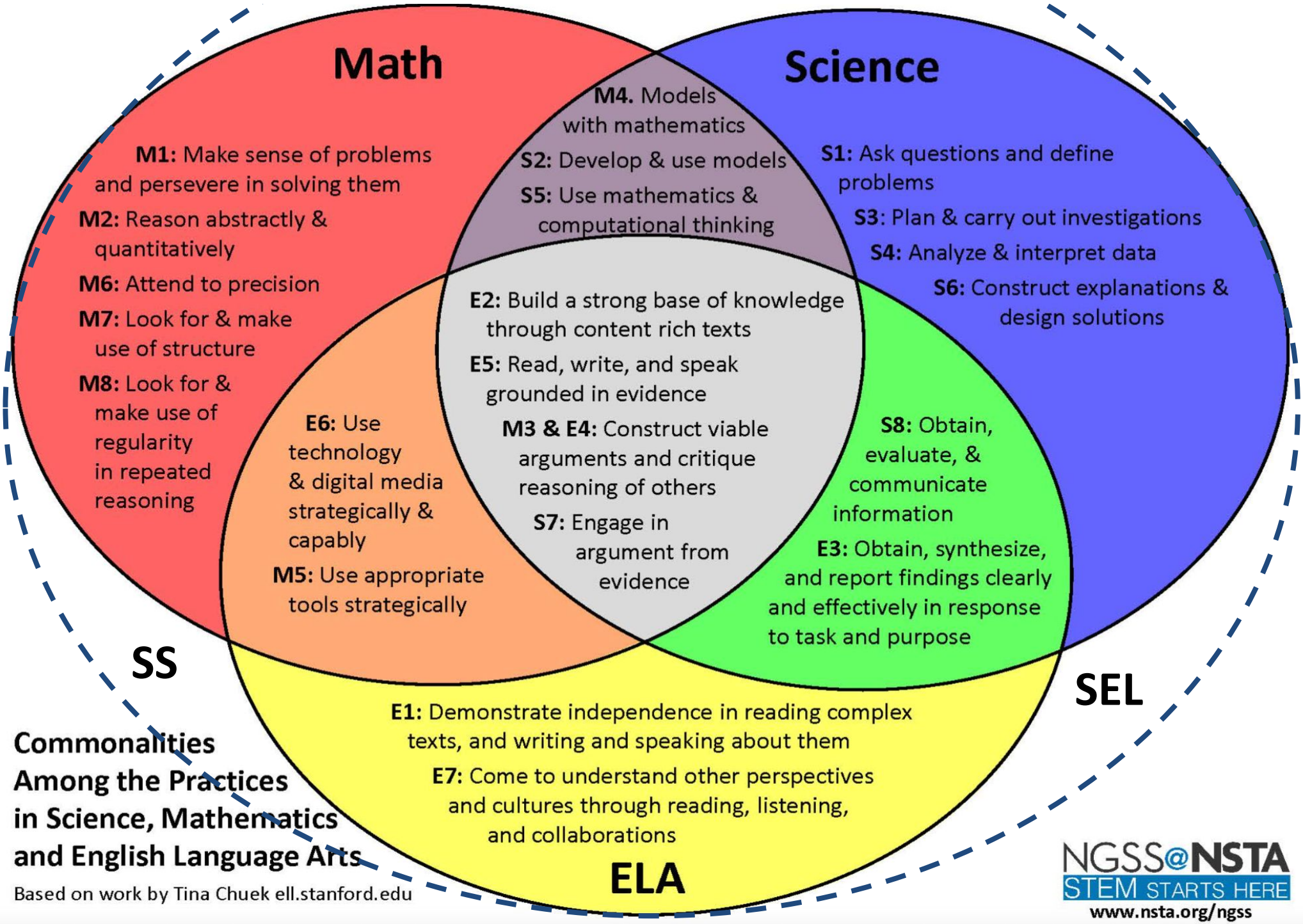
Teaching is a listening profession: This means supporting teachers to shift from telling students how to solve the mathematics they are learning. Beyond listening for right answers, teachers need to listen to students' sense-making about the mathematics they are learning as they solve meaningful tasks/curriculum/problems that center the knowing, being, and doing of the communities we serve.

Teachers facilitate development: *For teachers, the work shifts from doing the math to facilitating* opportunities for students to learn from and with one another through dialogue. *The work of teachers is to understand how their students are understanding the math so that they can support students' mathematical social, emotional, cognitive, cultural, and linguistic development!*

Job embedded professional learning experiences in mathematics education are essential for teachers and leaders. It is important that teachers are afforded opportunities to learn alongside their colleagues, as a part of their every day work, to integrate theses principles into their professional practices and to critically examine their own beliefs about mathematics, teaching, learning, and students.

Our work is systemic: Our work with children today, is shaping the teachers - and citizens - of tomorrow. We are shaping the mathematical identities and ways of knowing, being, doing for future teachers and citizens, including diversifying professions like teaching and STEM.

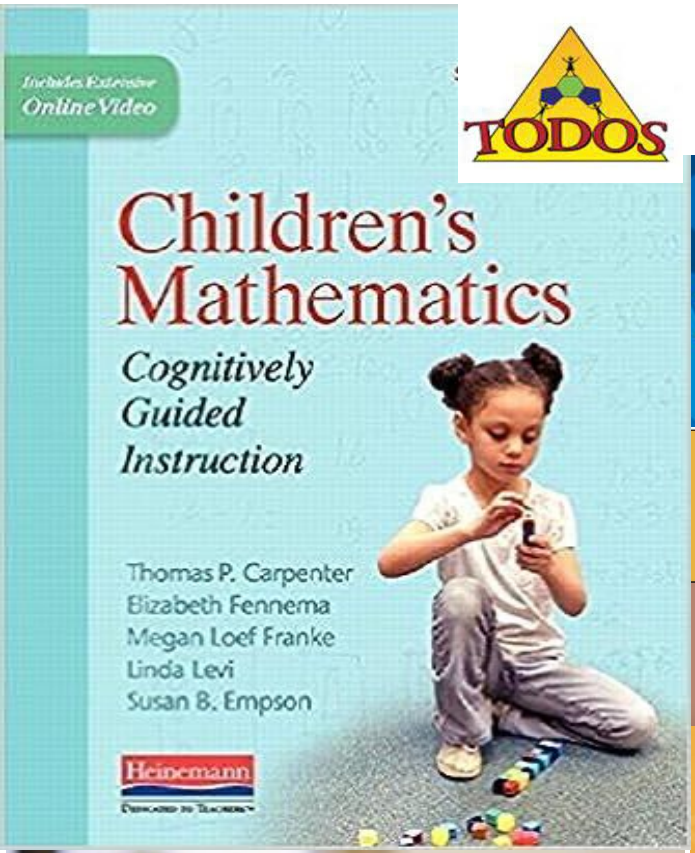
Learning is integrated. We learn content by *doing* practices; practices articulated in the Common Core State Standards, NGSS and more…



Commonalities Among the Practices in Science, Mathematics and English Language Arts

Based on work by Tina Chuek ell.stanford.edu

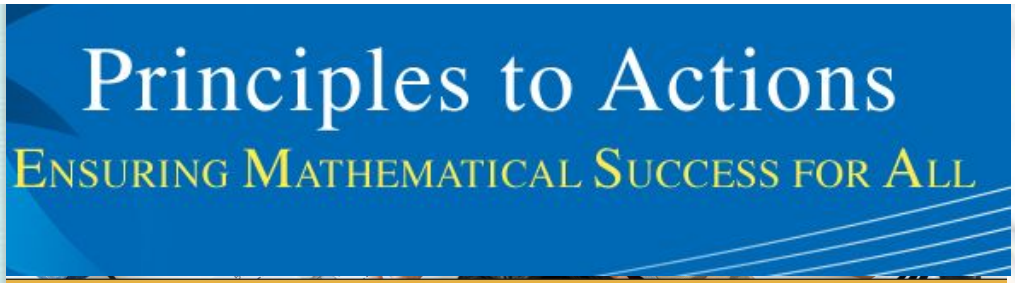
NGSS@NSTA
STEM STARTS HERE
www.nsta.org/ngss

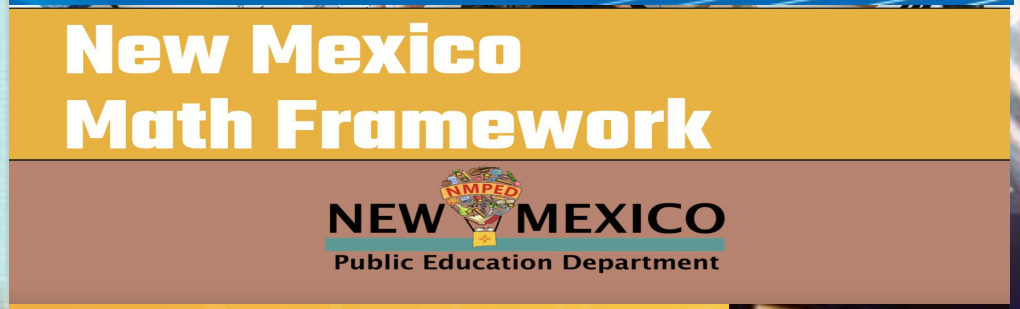

Includes Extensive Online Video
Children's Mathematics
Cognitively Guided Instruction
Thomas P. Carpenter
Elizabeth Fennema
Megan Loef Franke
Linda Levi
Susan B. Empson
Heinemann

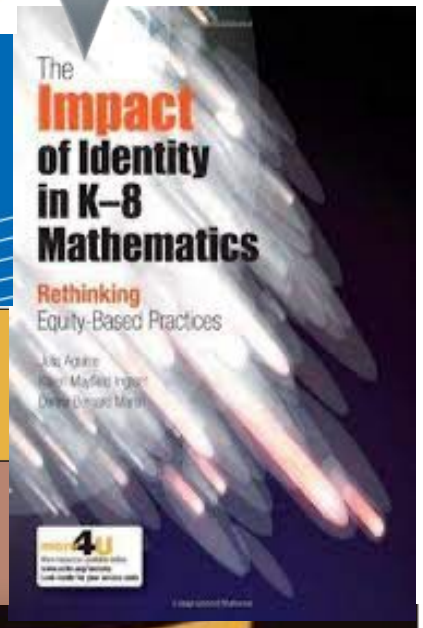
TODOS

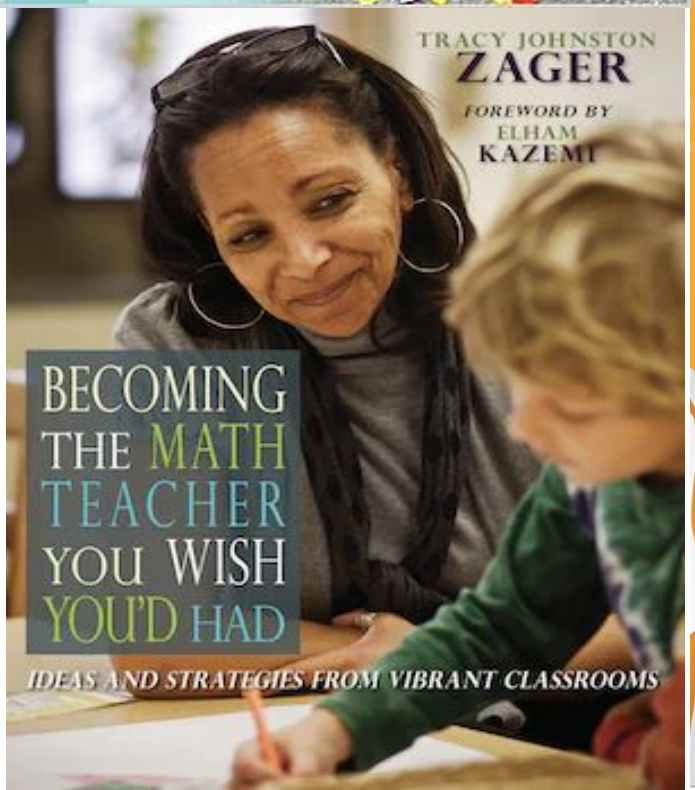

NCTM
NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS

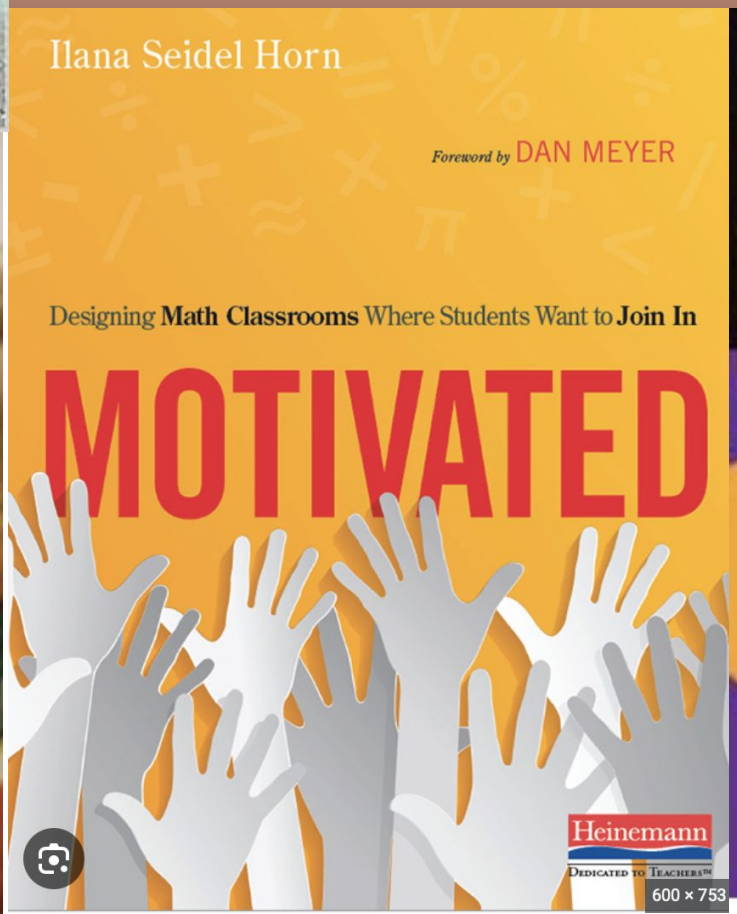

AMTE

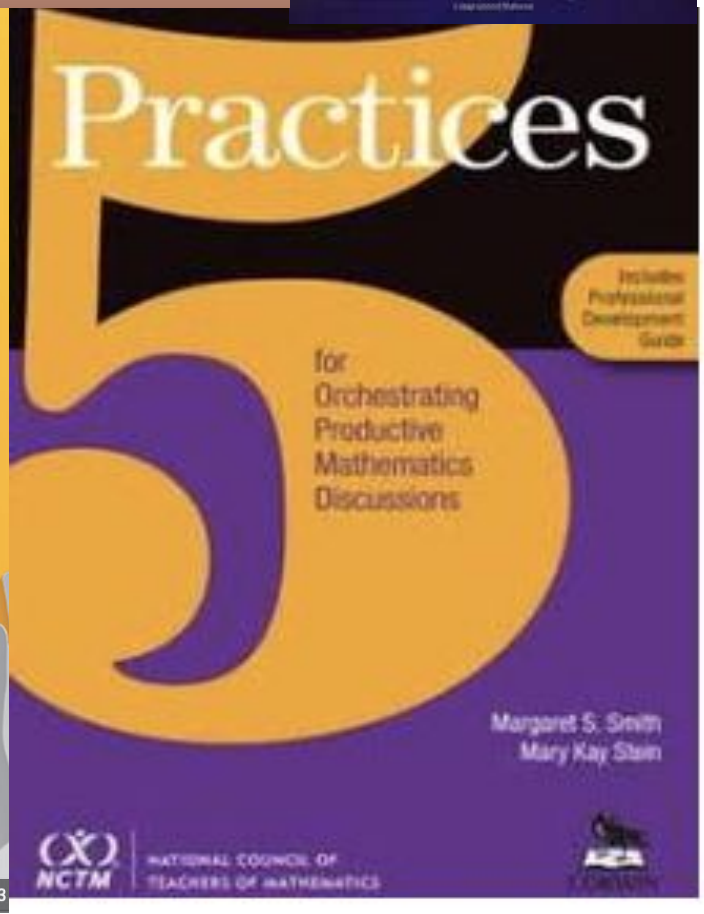

Principles to Actions
Ensuring Mathematical Success for All


New Mexico
Math Framework
NEW MEXICO
Public Education Department


The Impact of Identity in K–8 Mathematics
Rethinking Equity-Based Practices


TRACY JOHNSTON ZAGER
FOREWORD BY ELHAM KAZEMI
BECOMING THE MATH TEACHER YOU WISH YOU'D HAD
IDEAS AND STRATEGIES FROM VIBRANT CLASSROOMS


Ilana Seidel Horn
Foreword by DAN MEYER
Designing Math Classrooms Where Students Want to Join In
MOTIVATED
Heinemann
600 × 753


5 Practices
for Orchestrating Productive Mathematics Discussions
Margaret S. Smith
Mary Kay Stein
NCTM

The Question of Algebra 2 is a Systems Question

All students are capable -

- **Learning algebra starts with elementary math.**
- **Number sense, fraction sense and relational thinking are vital for thriving in Algebra – and beyond.**
- **Mathematics is a 21st Century Literacy**

Access is vital –

- **Who Needs What Math When?**
- **Currently, Algebra 1 & 2 are barriers, how can they help students open doors?**
- **NM's participation in the Launch Year's Initiative (UT's Dana Center)**

How can we create a P-20 STEAM Eco-system that ensures students have the opportunities needed to make sense of the world through and with mathematics?

How is Algebra taught?

- **Math is a tool for making sense of our ever changing worlds.**
- **Data Science is an essential tool for 21st living, and can go hand in hand with Algebra.**

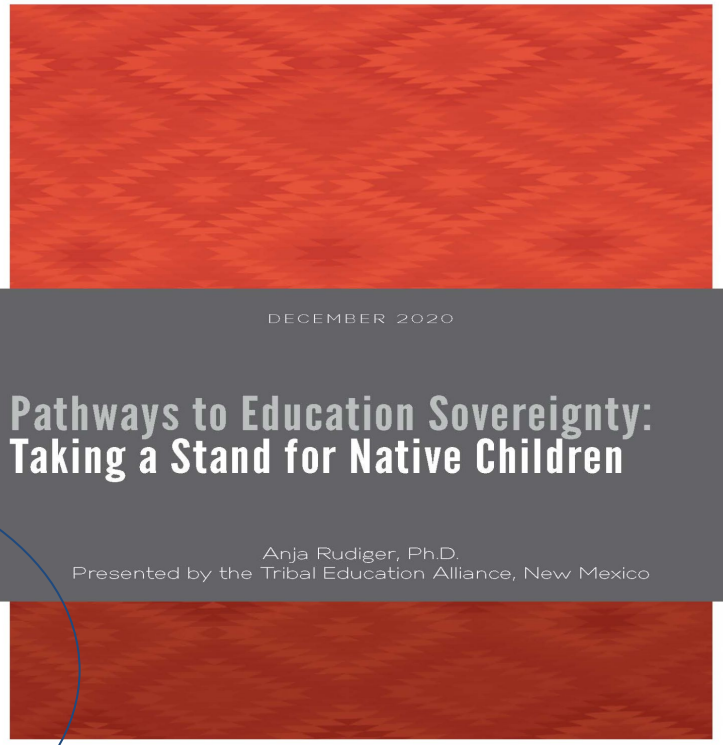
What does the 21st Century call for?
New literacies

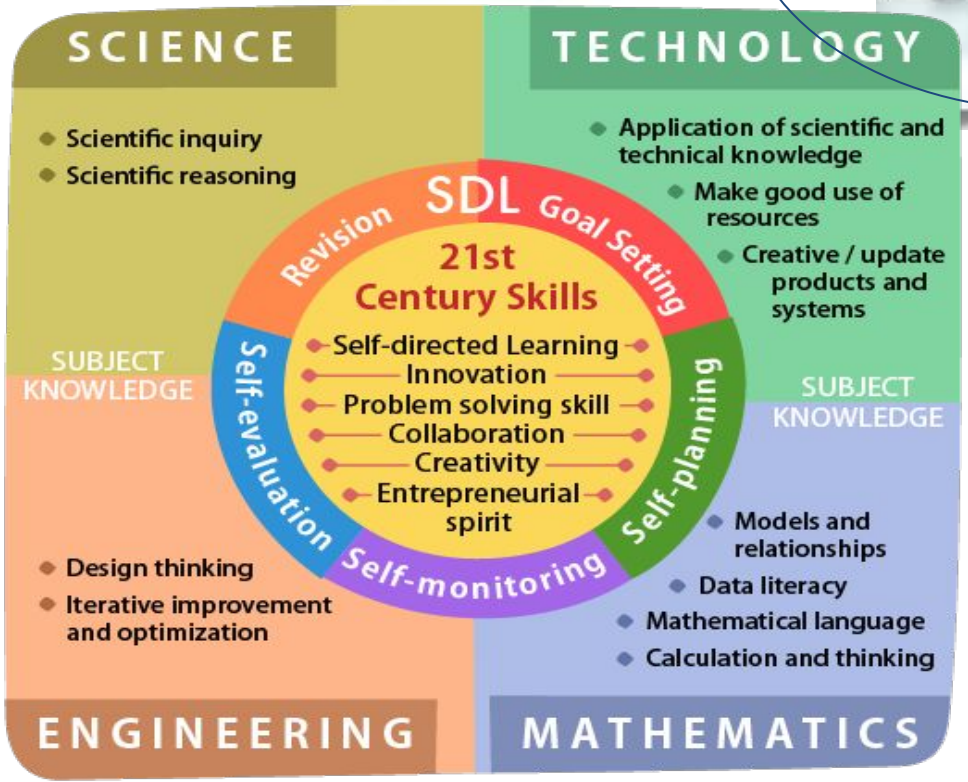
- **Data Science**
- **Statistics**
- **Quantitative Reasoning**
- **Computer Science**

It is not that our students need math, it is that mathematics needs our students
– Nasir & Cobb

Are our children and youth well?

Bringing Frameworks Together to Support Students' Success and Well-Being





NEW MEXICO
Public Education Department

Comprehensive Strategic Plan

2022

21st Century Working
21st Century Living
21st Century Learning

Workplaces & Communities of tomorrow need the imaginative work of educators today.

Students need access to 21st Century Education that is global, place-based & inquiry-based.

Teacher Preparation Matters

How we teach mathematics today needs to look different from how it was taught/learned in the past – a matter of simultaneous renewal.

- Ensure that ALL teacher prep pathways require teachers to take a mathematics methods course that is aligned to *AMTE's Standards for Preparing Mathematics Teachers.*
- Ensure Residency Programs and Student Teaching Experiences align practices so that pre-service teachers experience and practice the methods they learn in their methods courses in their co-teachers' classrooms.

Ensure ALL teachers (who teach math) in NM have access to on-going job embedded collaborative professional learning that grows and deepens their professional (mathematics) teaching practices.

- Empower the already existing Elementary Math Specialist Certificate holders to be the math leaders we need (i.e. Literacy & Bilingual Ed Coaching Models; Project ECHO math pilot).
- Support master's level programs to prepare the math coaches we need. (i.e. NMSU's Master's in Elementary Math and Science)
- Support leaders to support mathematics education transformation in their schools and districts. (i.e. LANL's Math and Science Academy)

RECOMMENDATIONS

Build on the work and structures in place

- Support Cognitively Guided Instruction for Elementary Teachers (i.e. Florida & Washington)
- Build on PED's Science & Math Bureau initiatives & Framework: Fostering Positive Math Identities, Algebra & Launch Years (with HED)).
- Lean on the Math and Science Advisory Council (MSAC).
- Support PD efforts already happening, (i.e. MC2, Indigenous Mathematics & Science Curricula, Project ECHO)
- Require Students Take Four Years of Mathematics based on their needs, interests & aspirations (Washington & California)
- Expand how students can demonstrate what they know and can do in mathematics (i.e. Project Based Learning; Capstone Projects)

Support a STEM Learning Network: Create the leadership and structures we need to grow the STEM ecosystems necessary for 21st Century Learning

A collaborative entity that provides supports to schools and communities to transform children's learning opportunities in STEM (mathematics and beyond).

- Ensure every child has access to inquiry learning opportunities every day (i.e. CGI, Math Talk & the 5 Practices)
- Ensure every child has access to STEAM learning opportunities outside of school weekly (i.e.K-12+)
- Ensure all children have annual opportunities to learn about the STEAM assets in our state (From National Labs to National Forests to Explora)
- Ensure youth have access to mentorships, internships, WBL and Career Pathways in high school. (Innovation Zones)

Gracias
Ahéhee'
Thank you

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