Equity, Science, and Universal Design for Learning: Ensuring that ALL Students are Ready to Learn

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Today's Discussion

- Project Overview
- NGSS for ALL Students
- UDL Overview
- Our Evolving Vision of Equity
- Theory into Practice

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Our mission: Enrich lives and strengthen communities through the power of public media

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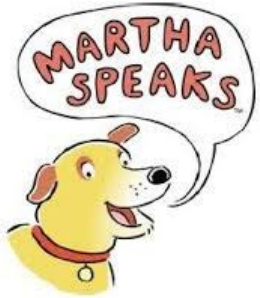
Ready to Learn



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Hero Elementary (working title)

- Ready to Learn
  - School readiness
  - Science and Literacy
  - Children in grades K-2 who are underserved:
    - Low income families
    - English language learners
    - Special needs

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Physical Science

Earth and Space Science

Writing Informational Texts

Science & Engineering Practices

Crosscutting Concepts

Speaking & Listening

Life Science

Engineering Design

Understanding Informational Texts

TV

Outreach programming

Digital games

Family Science App

Digital Science Notebook

Analog games

Hands-on activities

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Hero Elementary: Learning Environments

Afterschool Summer In School	• Content units organized in PLAYLISTS • Professional development • Educator portal • Digital + hands-on, multimodal
Home	• Family Science App • Home activities • TV
Online	• Games and Apps • Video streaming

Hero Elementary: TV

- 40 episodes
  - 80 11-minute animated stories
- Kids who have super powers
  - Variety of racial, ethnic, cultural backgrounds
- Using science & engineering practices
  - To make the world a better place

Hero Elementary: Playlists

- Thematic Units for programs to use
  - TV stories
  - Games
  - Hands-on activities
  - Digital Science Notebook
  - eBooks

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Hero Elementary: Outreach Programming

- Community-based partners
- Afterschool and summer programming
- Thematic units (PLAYLISTS)
- PD training and support

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Hero Elementary: Family Science App

- Have fun with science at home
  - Ask questions
  - Investigate
  - Play and learn together
- Co-design with parents and their children

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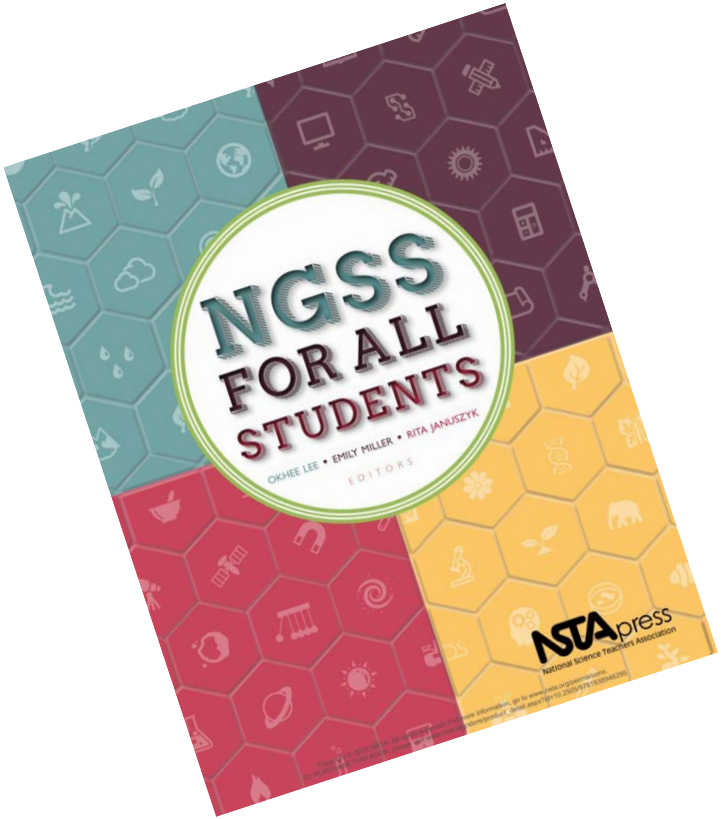
NGSS for ALL Students



- Appendix D of NGSS
- Case studies
- "What teachers *can do*"
- Research based recommendations

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SAMPLES OF EFFECTIVE STRATEGIES ACROSS DIVERSE STUDENT GROUPS

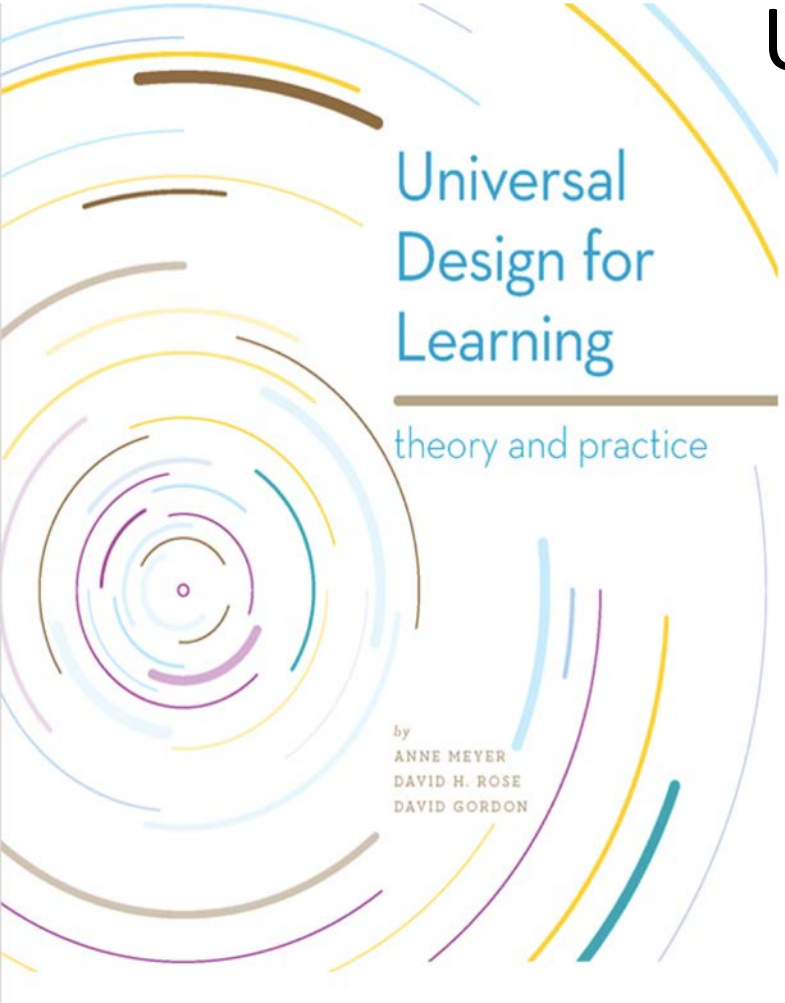
From NGSS for ALL Students

Demographic Group	Student Engagement	Classroom Support Strategies	School Support Systems	Home and Community Connections
Economically Disadvantaged Students	Students' sense of place	Project-based learning	School resources and funding	Students' funds of knowledge
Racial and Ethnic Groups	Multimodal experience	Multiple representations; culturally relevant pedagogy	Role models and mentors	Community involvement; culturally relevant pedagogy
Students with Disabilities	Accommodations and modifications	Differentiated instruction; UDL; RTI	Accommodations and modifications	Family outreach
English Language Learners	Discourse practices	Language and literacy support	Home language support	Home culture connections

SAMPLES OF EFFECTIVE STRATEGIES ACROSS DIVERSE STUDENT GROUPS

From NGSS for ALL Students

Demographic Group	Student Engagement	Classroom Support Strategies	School Support Systems	Home and Community Connections
Girls	Relevance; real-world application	Curricular focus	School structure	Relevance; real-world application
Students in Alternative Education	Safe learning environment	Individualized academic support	After-school opportunities; career and technology opportunities	Family outreach
Gifted and Talented Students	Strategic grouping; self-direction opportunities	Fast pacing; challenge level	School identification programs	Family outreach



Universal Design for Learning (UDL)

http://udltheorypractice.cast.org/login

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Universal Design for Learning (UDL)

Provide multiple means of
Engagement

Affective Networks
The "WHY" of Learning

Provide multiple means of
Representation

Recognition Networks
The "WHAT" of Learning

Provide multiple means of
Action & Expression

Strategic Networks
The "HOW" of Learning

Expert learners who are...

Purposeful & Motivated

Resourceful & Knowledgeable

Strategic & Goal-Directed

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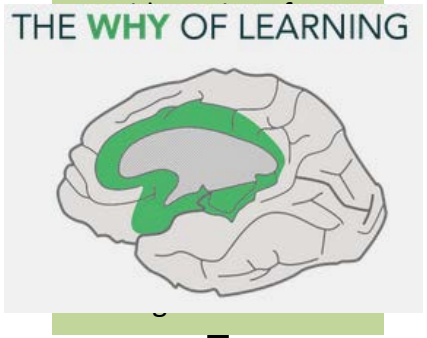
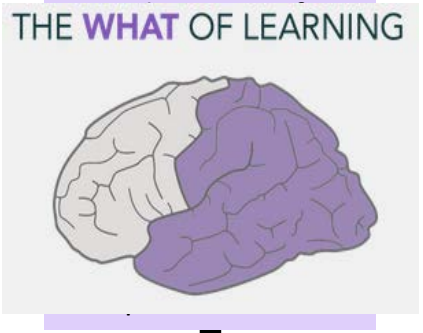
Universal Design for Learning (UDL)

Provide multiple means of **Engagement**



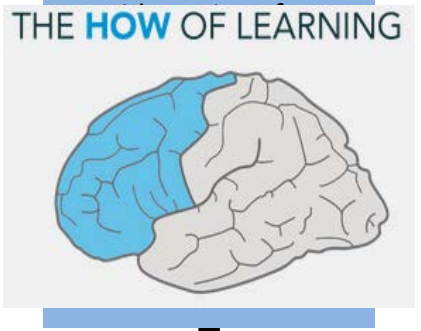
Purposeful, motivated learners

Provide multiple means of **Representation**

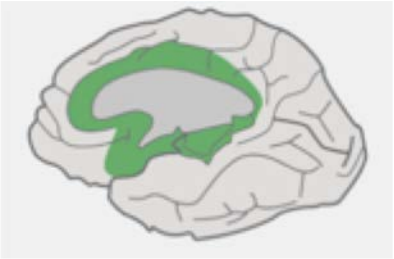


Resourceful, knowledgeable learners

Provide multiple means of **Action & Expression**



Strategic, goal-directed learners



Affective Networks: The **WHY** of Learning

Provide multiple means of **Engagement**

- Provide options for recruiting interest
- Provide options for sustaining effort and persistence
- Provide options for self-regulation

Purposeful, motivated learners

- Relevant, varied science and engineering experiences to engage full spectrum of learners.
- Be aware of sensory stimulation and pacing.
- De-emphasize competition.
- Create a community of learners.
- Encourage perseverance.

Recognition Networks: The **WHAT** of Learning

Provide multiple means of **Representation**

Provide options for perception

Provide options for language & symbols

Provide options for comprehension

Resourceful, knowledgeable learners

- Give plenty of context so students with varied linguistic and cultural backgrounds have equal access to the science.
- Watch out for idioms!
- Emphasize patterns, big ideas, relationships.
- Strike a balance between minimizing distractions and generating excitement.

Strategic Networks: The **HOW** of Learning

Provide multiple means of **Action & Expression**

- Provide options for physical action
- Provide options for expression and communication
- Provide options for executive function

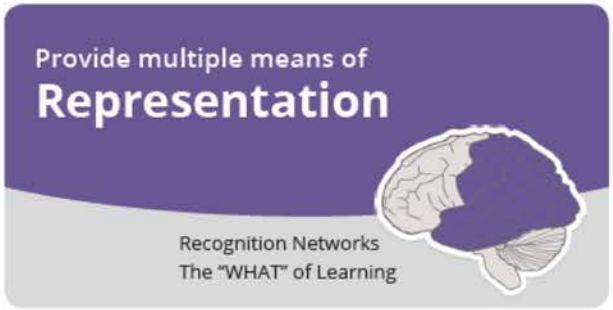
Strategic, goal-directed learners

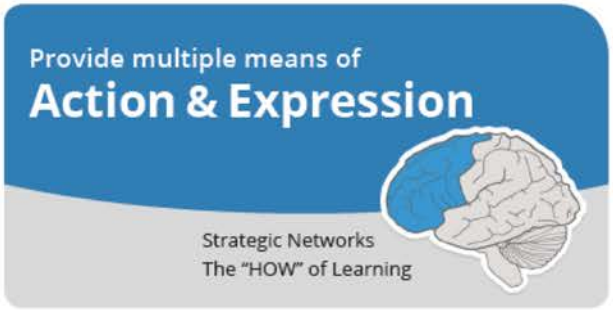
- Offer different ways of interacting physically with science activities; get the body involved.
- Use different media, materials and tools for science investigations, engineering, and communicating.
- Support age-appropriate planning and organizing for investigations and problem solving.

Universal Design for Learning (UDL)

- **Let's talk:**

  How does this play out in **your** practice?



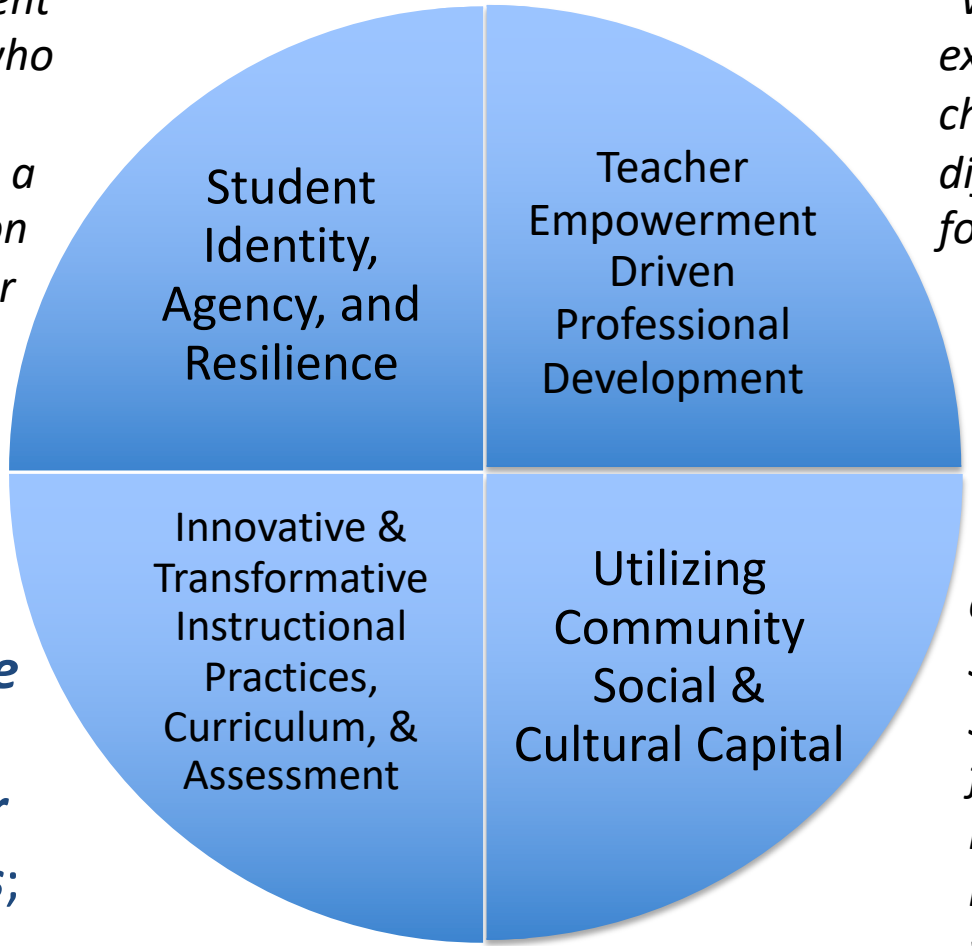


Our Evolving Vision of Equity

- Science is for ALL students!
- Science helps communities!
- History of systemic inequity, barriers to access and opportunity → these still persist today
- Knowledge, tools, and skills help individuals and communities tackle these barriers

"We are competent STEM Learners who use our STEM learning to make a positive impact on ourselves and our communities."

"We are more than content experts, we are agents of changes that make a difference in STEM learning for all students."



Transformative Transmedia Framework for STEM Learners; Roni Ellington

"We draw on the social and cultural capital of diverse STEM communities to foster STEM success & persistence for all students, and give back to these communities in meaningful, sustainable ways."

Guiding Questions

- How can we connect with our students' lived experiences?
- How do Science & Engineering Practices connect to children's home cultures?
- What if we think of Science and Engineering AS Literacy?
- How do our students' STEM identities INTERSECT with the rest of their identities?
- What is a Super Power, really, in our lives?

Letitia Wright as Shuri in *Black Panther* (Marvel)

"I hope it can spark someone to say, 'I'm not a superhero, but I can be a scientist or build the next spaceship, like Shuri.'"

-- Letitia Wright

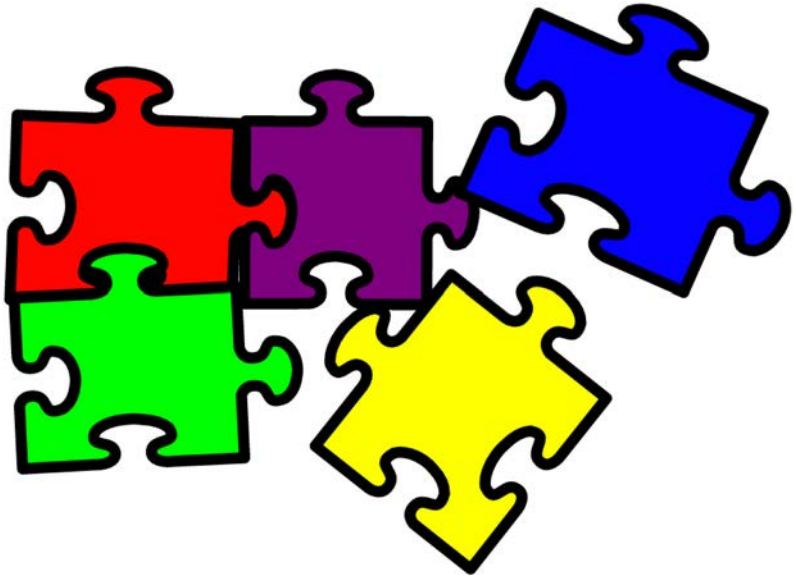
https://verysmartbrothas.theroot.com/another-reason-why-shuri-is-the-greatest-disney-princes-1823136306

Photo by Christine Chew/UPI

“The things that make us different, those are our superpowers...”

-- Lena Waithe

https://www.upi.com/Entertainment_News/TV/2017/09/18/Lena-Waithe-Donald-Glover-make-history-at-Emmys-in-comedy-categories/1191505736618/



So, how does this all fit together?

http://laoblogger.com/puzzle-and-game-clipart-images.html

Equity and UDL

- “Design to the edges”
- “Providing options for access and learning”
- “Learner variability”

What is ”Learner Variability?”

- **Everybody** varies in **many** ways
  - Physical capabilities and limitations
  - How our brains work

What is ”Learner Variability?”

- Variability of how our brains work:
  - Impact of experiences, both positive and negative
  - Our various cultural ways of knowing and being in the world
    - Including LANGUAGE!

"... the familiar structure of knowledge shapes the person's cognitive and perceptual experiences. Simply said, **different cultures cause us to see and understand the world differently.**"

Using the Universal Design for Learning Framework to Support Culturally Diverse Learners. Chita-Tegmark, Gravel, Serpa, Domings, and Rose

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Options for Access & Learning: Coin of the Realm

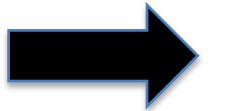
Students' knowledge-seeking behaviors

Currencies

Educator

Options for Access & Learning: Coin of the Realm

Students' knowledge-seeking behaviors



Educator

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Options for Access & Learning: Coin of the Realm

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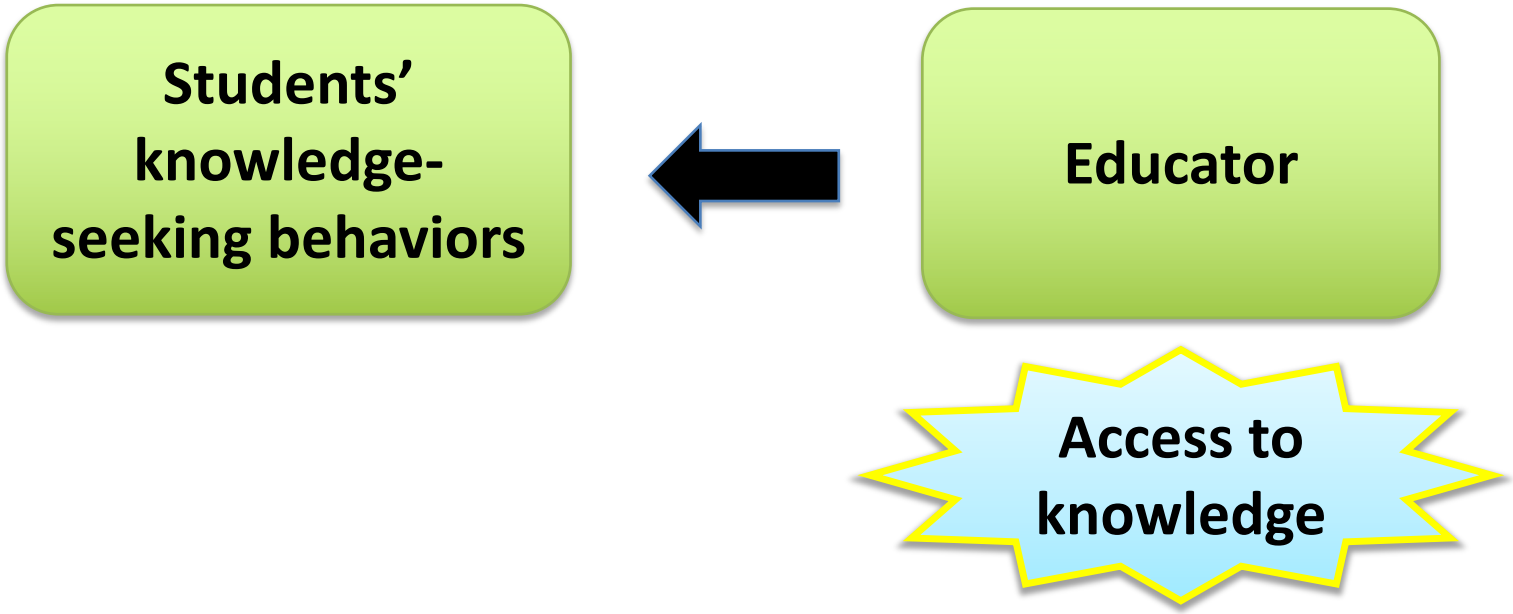

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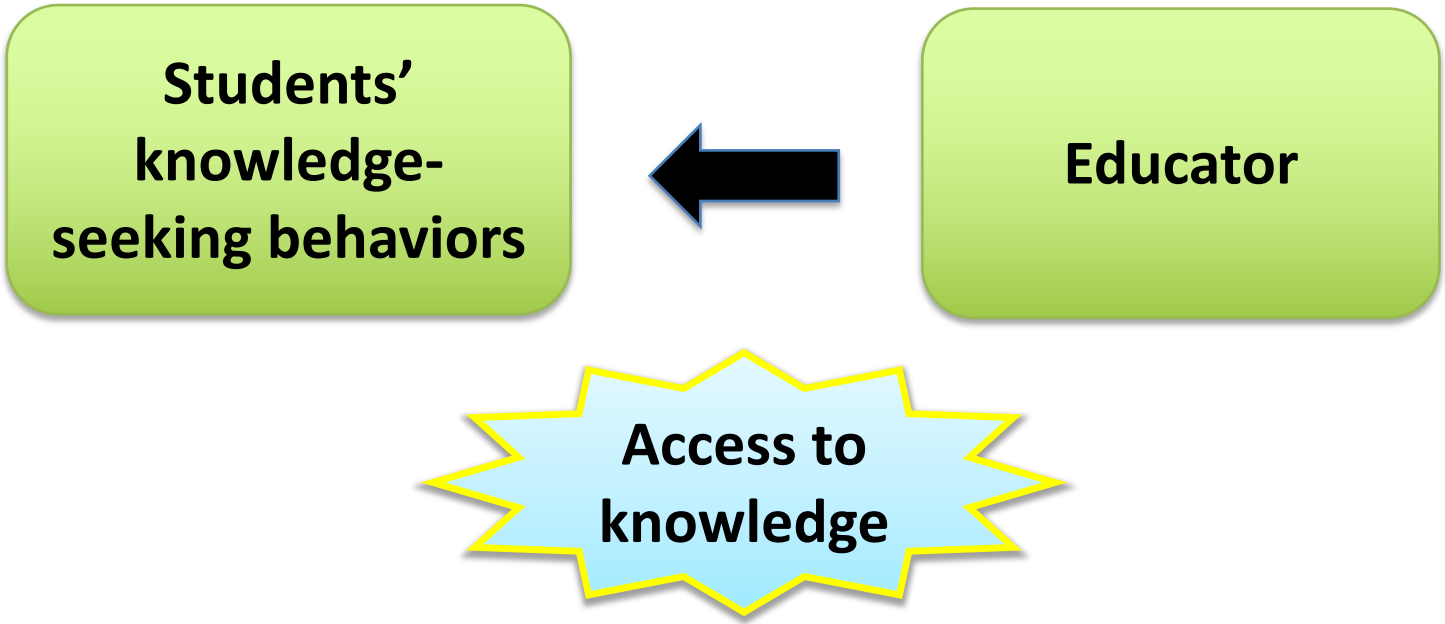

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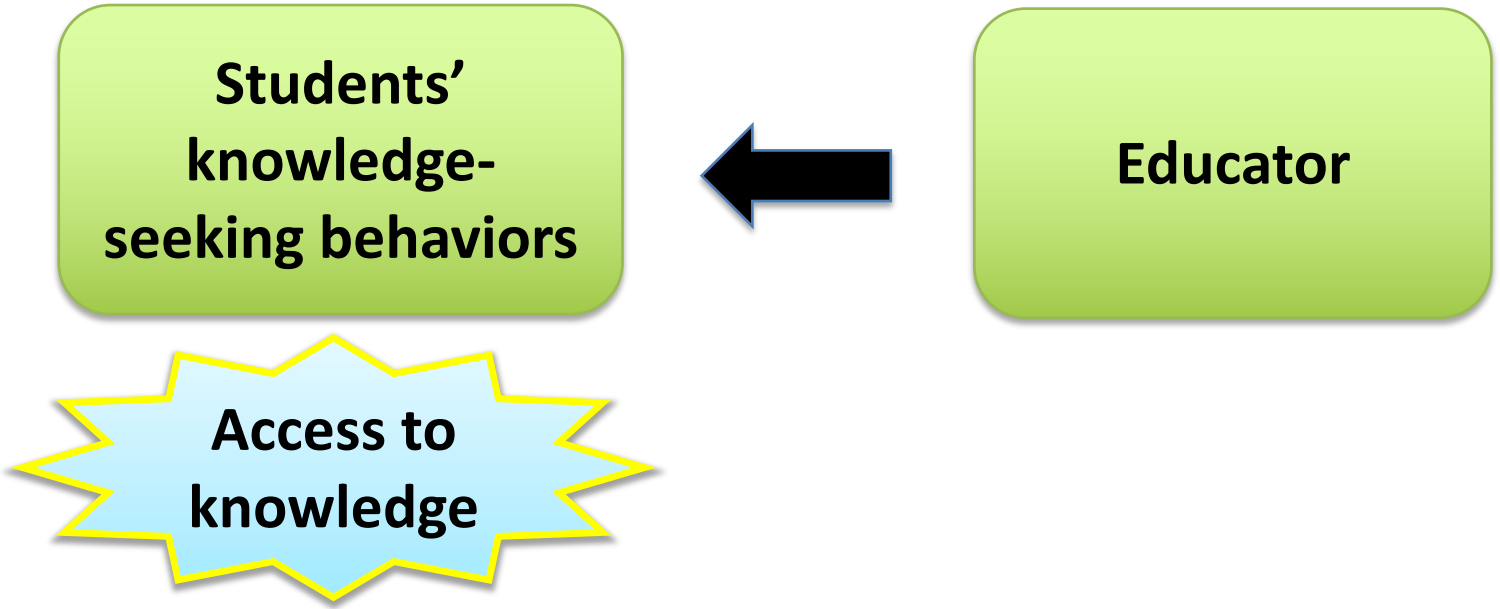

Capital of the Classroom
(science & engineering)

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“**We all have preferences** for styles of behavior, communication, and relationships. We all have notions of what is worth knowing.

These preferences are **what we use to impart value to the currencies we use and accept in the classroom**.”

Never Work Harder Than Your Students. Robyn R. Jackson

Just because students come to us with **alternate forms of intellectual and cultural currency** does not mean that they are less capable... **they have skills** that may be **un-recognized** in the classroom context...

Or... they do not yet **see enough value in classroom capital** to expend the effort it takes to acquire it... we should **reshape our approach to instruction so that we capitalize on students' currencies** rather than overriding or negating them.

Never Work Harder Than Your Students. Robyn R. Jackson

Let’s Talk

- What are some currencies you see students using to gain knowledge?
- How do you support those currencies?
- How do you capitalize on those currencies?
- How can you help students find value in “classroom capital” of science and engineering?

Equity and UDL

- “Design to the edges”
- “Providing options for access and learning”
- “Learner variability”

Plan ways to include and support children who live in communities that have been marginalized

Equity and UDL

- “Design to the edges”
- “Providing options for access and learning”
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Cultural ways of knowing, funds of knowledge

Equity and UDL

- “Design to the edges”
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Connect to children’s home languages and home cultures

Ready To Learn

PBS KIDS Science Learning Framework

Modified by TPT, for Literacy/ELA integration

Science and Engineering Practices

Crosscutting Concepts

Life Science | **Earth & Space Science** | **Physical Science**

Engineering & Technology

Literacy and the English Language Arts

PBS Kids Ready to Learn Framework

Provide multiple means of **Representation**

Provide options for comprehension

Resourceful, knowledgeable learners

TV	Games + Activities
...support comprehension of science concepts including on-screen discussions that model scientific thinking, provide key background knowledge about science, and highlight crosscutting concepts.	...support learning of science concepts by students with differing cognitive and cultural backgrounds. Link to critical background knowledge, highlight critical features and main points, and provide concept maps.

PBS Kids Ready to Learn Framework **IN PRACTICE!**

Provide multiple means of **Representation**

Provide options for comprehension

Resourceful, knowledgeable learners

TV	Games + Activities
• Superhero kids model science & engineering practices and concept development • Balance simplicity, complexity, and clarity vs. distractions and excitement • Superhero kids make connections • Co-viewing options	• Hands-on activities provide shared background knowledge and connect to real-life • Graphic organizers in Notebook • eBooks have built in scaffolding • Game levels build on previous conceptual patterns and practices

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Example: Maps and Landforms

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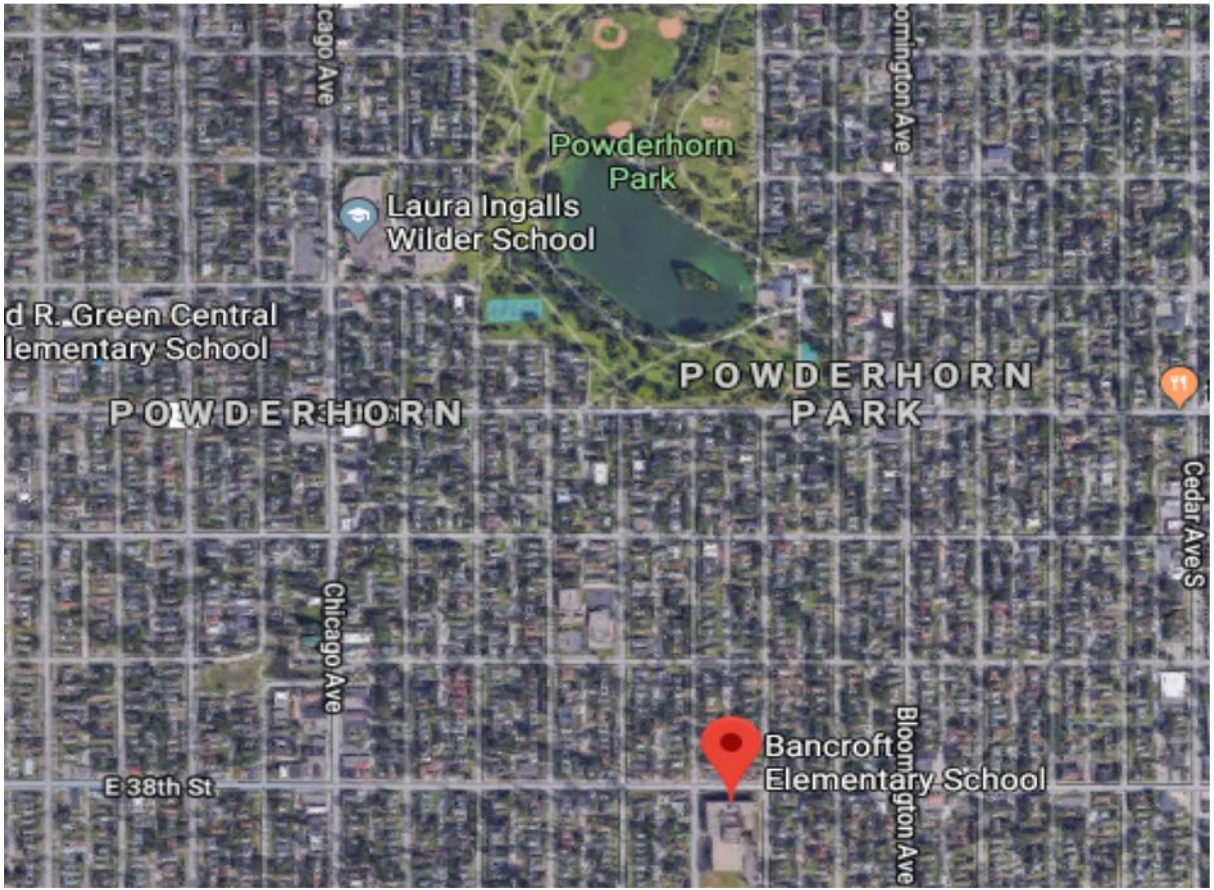

Example: Maps and Landforms

Theory into Practice

- **Let's talk**

  How do you—or how will you—connect Equity, Science, and UDL in your everyday practice?

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“Fantastic Stan” (working title)

- One of 4 main superhero kids in the show
- African American
- Has autism
  - Uses noise-canceling headphones
  - Takes things very literally
- *Loves* superheroes—and *studies* them!
- Superpower: Can project his thoughts, visually
- Superpower: Can create super-gadgets

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Stan has some awesome abilities—and I'm not just talking about his superpowers.

She's referring to my Autism. That's what Em calls my REAL power.

That's 'cause it is. It's what makes you YOU. So what if you do things a little differently. Hey, in our school, there are kids who can climb up walls or shoot laser beams from their eyeballs, so we're all different in one way or another, right?

Em really understands me.

And Stan really understands Superheroes. AND he knows how to make the coolest gadgets. So when Stan and I work together, I feel like the sky's the limit.

That makes no sense. How can the sky be the limit? It just keeps going all the way up to space.

Resources

- Using the Universal Design for Learning Framework to Support Culturally Diverse Learners: https://pdfs.semanticscholar.org/43bd/7049a325deec4ec27856aef97cde744c37cc.pdf
- UDL Guidelines website: http://udlguidelines.cast.org/
- UDL Theory and Practice: http://udltheorypractice.cast.org/login
- NGSS for ALL Students: https://www.nsta.org/store/product_detail.aspx?id=10.2505/9781938946295
- Never Work Harder Than Your Students: http://www.ascd.org/publications/books/109001.aspx
- Inclusive Education—Universal Design for Learning: http://inclusive.tki.org.nz/guides/universal-design-for-learning/
- Five Steps to Get Started Using UDL: http://guide.swiftschools.org/sites/default/files/documents/Five%20Steps%20to%20Get%20Started%20Using%20UDL.pdf
- Promoting the Educational Success of Children and Youth Learning English: https://www.nap.edu/catalog/24677/promoting-the-educational-success-of-children-and-youth-learning-english

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THANK YOU!

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