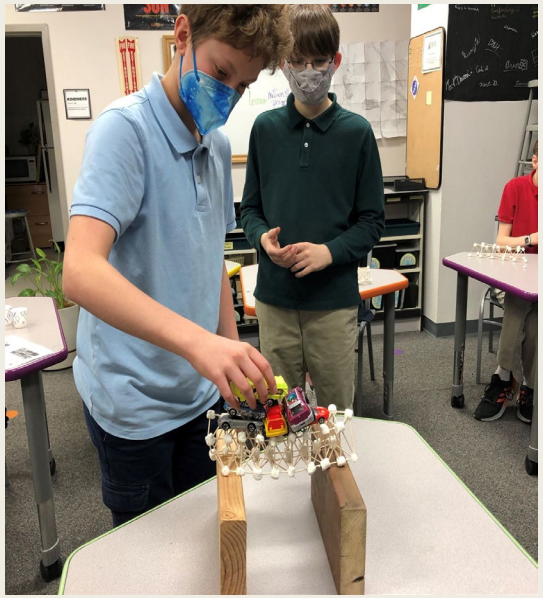
Universally-Designed, Inquiry-Based Science Instruction for Students with Extensive Support Needs



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The University of Kansas

Accessible Teaching, Learning, & Assessment Systems

5E Professional Development in SCIENCE EDUCATION for SPECIAL EDUCATORS

Science Instruction for Students with ESN

- Poll
  - www.menti.com
  - 1361 8906
- Video: Sherri teaches a science lesson

Science Instruction for Students with ESN

(video)

Science Instruction for Students with ESN

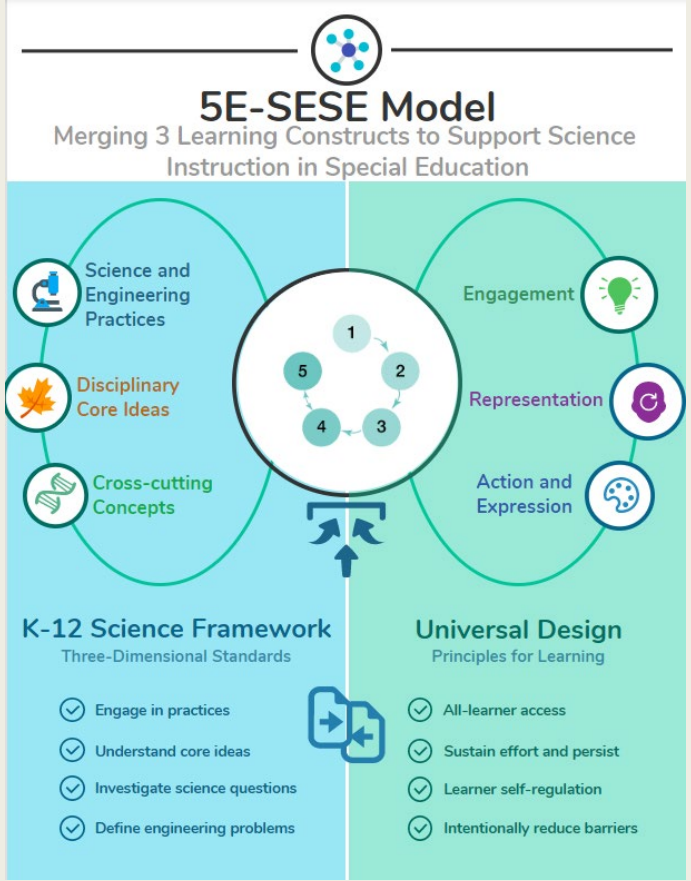
- We want to hear from you!
  - What are your initial reactions after watching the video?
  - What stood out to you after the video?
  - What questions do you have for us after watching the video?
  - What do you want to get out of this session?

Science Instruction for Students with ESN

- Review exemplar lesson plan (physical science)
- Guiding questions
  - How is this lesson plan similar to lesson plans you've created for science? How is it different?
  - What do you like about this lesson plan? What are you unsure about?

The 5E-SESE Project

- 5E Science Education for Special Educators (5E-SESE)
- Why teach this way?
- Three constructs
  - Multidimensional science standards
  - Universal Design for Learning (UDL) framework
  - 5E model of science instruction (inquiry)



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Multidimensional Science

- Students with ESN are taught science incorporating same dimensions as the *K-12 Framework for Science Education* and the NGSS (https://www.nextgenscience.org/)
  - Science and Engineering Practices
  - Disciplinary Core Ideas
  - Cross-Cutting Concepts

Physical Science Example
Grade 5

- Measure and compare weights of substances before and after heating, cooling, or mixing substances to show that weight of matter is conserved.
  - SEP: Analyzing and Interpreting Data
  - DCI: PS1.A - Structure and Properties of Matter
  - CCC: Patterns

Multiple Access Points

- **Measure and compare weights of substances before and after heating, cooling, or mixing substances to show that weight of matter is conserved.**
- Compare the weight of an object before and after it changes from a liquid to a solid and from a solid to a liquid.
- Recognize the change in state from liquid to solid or from solid to liquid of the same material.

UDL Framework (CAST, 2018)

- Design learning opportunities that all learners can access and meaningfully participate in
- Learner variability as the norm, not the exception
- Three principles
  - multiple means of engagement
  - multiple means of representation
  - multiple means of action & expression

Examples of UDL Guidelines

Engagement	Representation	Action and Expression
• Optimize choice and autonomy • Heighten goal salience • Develop self-assessment and reflection	• Provide options for auditory, visual perception • Clarify vocabulary • Provide background knowledge	• Guide planning, strategy development • Provide access to tools, assistive technology

5E Inquiry Cycle

- 5E Model for Science Instruction (Bybee et al., 2006)
- Five Es = five steps in inquiry-based science teaching
  - Engage
  - Explore
  - Explain
  - Elaborate
  - Evaluate

5E Inquiry Cycle

- **Engage:** Through discussion, students access prior knowledge and make predictions.
- **Explore:** The students investigate their predictions.
- **Explain:** The teacher explains and students synthesize info and/or observations in the previous phases and apply new knowledge.
- **Elaborate:** The student applies the concept to another phenomenon.
- **Evaluate:** The students demonstrate what they learned.

5E-SESE Lesson Plan

- 5E lesson planning model supports science instructional decision-making of what and how to teach

- Includes 3-dimensional science standards, UDL principles and guidelines, and the five phases of the 5E inquiry cycle

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5E-SESE Lesson Plan

- Let's walk through the physical science lesson plan:
  - Multidimensional science standards
  - How to choose a phenomenon
  - How UDL is intentionally considered
  - Teacher and student actions at each 5E phase

Activity: Lesson Plan Puzzle

- **Mr. Erwin:** 5th grade teacher in an inclusive classroom.
  - No training in science instruction for students with extensive support needs
  - Wants to make sure Keith, as student with ESN, can access general education curriculum

- **Keith:** a student with multiple disabilities
  - intellectual disability
  - visual impairment
  - limited use of hands

Need to plan a life science lesson!

Activity: Lesson Plan Puzzle

- Reassemble lesson plan with your small group.

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Activity: Lesson Plan Puzzle

Construct a C-E-R about your understanding:

- I think all students can learn inquiry science.
- I think this because _____ and _____.
- The reason I believe this is I presumed all students are competent and capable of learning about the world around them.

Whole Group Wrap-Up

- Session Recap
  - Revisit learning goals and questions from the beginning of the session.
  - What are your biggest takeaways?
  - What is one idea you learned that you are interested in trying?
- 5E-SESE in this session

Whole Group Wrap-Up

- Thank you for attending!
- Use the first QR code to access the lesson plan. Use the second QR code to access the module.
- For more information on this project:
  - 5E-SESE website

Lesson Plan

Module

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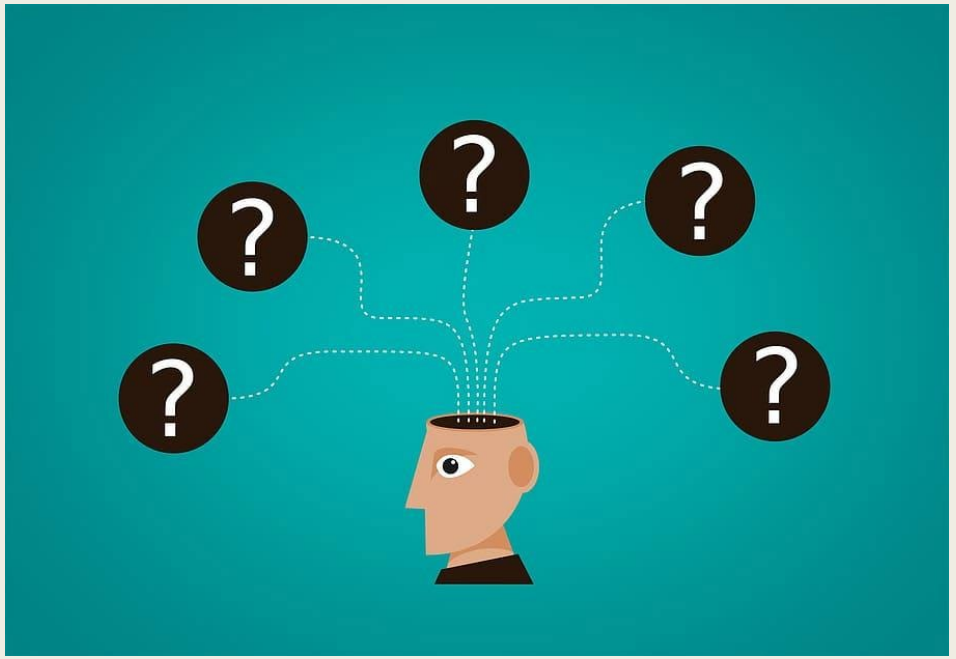

Questions and Comments