STEM-Centered Learning Newsletter

STEM-centered learning focuses student thinking and discussion around real-world phenomena, problems, issues, or events across all content areas with the purpose of students collaborating in order to make sense of the world and persevere in solving problems.

Making Sense of the World Around Us

Scientists and engineers utilize specific practices to investigate problems and build models. In K-12 education, these practices are known as the *Science and Engineering Practices, Mathematical Practices,* and *English Language Arts Practices* (listed below). Our hope is that students will actively engage in these practices to make sense of the world around them. STEM-centered learning incorporates these practices (i.e. developing and using models, analyzing and interpreting data, and constructing explanations, etc.) to help students visualize and connect understandings to current learning.

In a sensemaking approach to STEM-centered learning, students use the practices to consider classmate's ideas and interpret evidence. Deeper learning happens when we include, consider, and clarify the various perspectives that students bring to making sense of the world. It is important to support students as they develop a shared understanding of the different perspectives in their class. Students should engage in the sensemaking practices to deepen their understanding of core ideas. As educators, it is critical to provide sufficient time for students to explore concepts in depth, allow students to represent their thinking in different formats, and make connections between various concepts. Implementation and utilization of these practices will further STEM-centered learning in Davis School District and prepare students for successful futures.

Science and Engineering Practices

1. Asking questions and defining problems
2. Developing and using models
3. Planning and caryying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explainations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Mathematical Practices

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

English Language Arts Practices

1. Demonstrate independence
2. Build strong content knowledge
3. Respond to the varying demands of audience, task, purpose, and discipline
4. Comprehend as well as critique
5. Value evidence
6. Use technology and digital media strategically and capably
7. Come to understanding other perspectives and cultures

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STEM Indicator of the Month

As students' question, teachers guide them to gather and use evidence collaboratively with peers to make sense of their wonders and observations. Students will engage in exploratory inquiries, gain an understanding of gathered information, and assign meaning to perceived randomness. Additionally, students will focus on patterns for prediction to understand phenomenon and problems.

An effective sensemaking strategy is the use of facilitated discussions. These discussions should relate to the current phenomenon or problem being studied. Discussions should have a defined purpose and include what students observed, how they evaluated their findings, and their explanation or solution. Students should verbalize their proposed solutions, receive feedback, and make connections between their understanding the real-world the phenomenon or problem being studied.

Recommended Actions to Promote Sensemaking

Revised From: Miller, Emily, et al. "How Can I Promote Equitable Sensemaking by Setting Expectations for Multiple Perspectives?" StemTeaching-Tools, Institute for Science + Math Education , Mar. 2017, http://stemteachingtools.org/brief/47.

- **Routinely solicit lingering questions or areas where groups did not reach consensus**. Let students know that if they did not reach consensus on everything, they were likely being responsive to their group members and taking ideas seriously. Model ways to compare ideas after they are shared, such as asking, "How are those ideas different?" and "What do those ideas have in common?"
  - » **Remote Tools:** Zoom Break-Out Rooms, OneDrive Shared PowerPoint, CANVAS Discussion Thread or Group
- **Offer students the opportunity to change** their mind with phrases like, "How does that idea make sense?" Support students in taking the stance that all ideas offered in the group are reasonable and should be understood, considered, and evaluated by evidence.
  - » **Remote Tools:** Peer Reviews in CANVAS, Brainstorm Pages in CANVAS, Nearpod Share-Outs, MentiMeter Share-Outs, Flipgrid Share-Outs
- **Use small group strategies to surface the various perspectives.** Introduce strategies that ensure that everyone has a chance to speak before another person speaks again, such as passing around a 'talking object.' Be aware that some students may not share, and some students may be socialized to resist voicing dissent in a group.
  - » **Remote Tools:** Zoom Break-Out Rooms, OneDrive Shared PowerPoint, CANVAS Discussion Thread or Group, Random name selector
- **Ask groups to highlight interesting disagreements that took place around ideas, processes, or interpretations.** Each student could place a sticky note on their group's argument, explanation, or model to highlight something they are not sure about or do not agree with. You can highlight these differences in full-class conversation. Set the expectation for all students to have areas with which they are not in total agreement or have further questions**.** Validate students who persist in questioning the group's thinking and bring up stories of scientists who famously questioned prevailing thought.
  - » **Remote Tools: Create a** Norms for Discussion Video, Nearpod Dropzones, Flipgrid Share-Outs, Padlet Share-Outs

STEM Professional Learning Opportunities

- 12/8/20- 4th Grade Science Forum
- 12/10/20- 3rd Grade Science Forum
- 12/10/20- Computer Science Prep Specialist Share-a-Thon
- Ongoing- Utah Science with Engineering Education (SEEd) Standards K-12 Online Course tinyurl.com/OnlineSEEdPD