



SCIENCE | TECHNOLOGY | ENGINEERING | MATHEMATICS

Ready!



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Implementing the NM STEM Ready! Science Standards

Science and Engineering Practices - Engaging in Argumentation from Evidence

Sense making requires students to be engaged in understanding the world by generating, using, and extending scientific knowledge around a phenomenon (Schwarz et al., 2017) through explanations. When classrooms focus science education on application [phenomenon] then students are motivated to explain and the focus of learning shifts from *learning about* a topic to *figuring out* why or how something happens. *A Framework for K–12 Science Education* emphasizes eight practices that scientists and engineers use in their profession and that students utilize in their K–12 science education. Engaging in argumentation from evidence, one of the eight practices, is the process where students listen to, compare, and evaluate competing ideas and methods based on merits to reach evidence-based conclusions.

Engaging In Argumentation from Evidence

Students are revising old ideas, leading to the production and critiquing of those ideas to produce the strongest, evidence based answer to a question. In this process, students understand scientific knowledge is revisable – a key shift with the NM STEM Ready! Science Standards. Explaining ideas are not the only place students engage in argumentation around. Argumentation can help students identify which investigation will result in the most relevant data or which model best represents the phenomenon studied. Thus, argumentation encompasses all the science and engineering practices.

Argumentation requires three components (1) supporting a claim, (2) evaluation and critique of the claim, and (3) moving towards reconciliation (Schwarz et al., 2017). Supporting a claim involves the idea and supporting that idea with reasoning or evidence or both. Evaluation and critiquing a claim can be through questions, counter-arguments, comparisons, or evaluative statements students ask each other. Moving toward reconciliation has students evaluating all claims with gradual shifts in understanding towards those aligned with their current understanding of the evidence.

Classroom Practice

Students should treat scientific knowledge as something that can improve, as new evidence is gathered, then used to explain and investigate phenomenon. Ask “why” questions when engaging with students ideas to build the expectation of supporting claims. Students should make sure the evidence they have gathered supports their claims. During the school year, provide students for students to work in small groups to come to consensus by creating a shared product (e.g., explanation, model).

References:

Schwarz, C.V., Passmore, C., & Reiser, B.J. (2017). *Helping students make sense of the world using next generation science and engineering practices*. Arlington, VA: NSTA Press, National Science Teachers Association.



Reach out to the [Math and Science Bureau staff](#) with questions or for more information.

Did You Know?

[STEM Teaching Tools Brief 17](#)

provides supports for classroom argumentative talk about investigations.



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