Implementing the NM STEM Ready! Science Standards

Science and Engineering Practices
An instructional shift with the NM STEM Ready! Science Standards centers on students actively seeking solutions, designing investigations, explaining new learning, and asking new questions of their own (Daehler and Folsom, 2016). Student sense making is proactive engagement in understanding the world by generating, using, and extending scientific knowledge (Schwarz et al., 2017) through modeling. 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. Utilizing development and use of models, embedded with content, make science more meaningful for students, shaping their worldview.

Developing and Using Models
Diagrams, drawings, physical objects, mathematical representations, or computer simulations are representations of models. Models in science are not of things in the world; rather models are tools students use to engage in sense making, to reason about phenomenon. A model may represent how parts of a system act in relationship to one another in explaining phenomenon.

Developing and using models are not isolated practices. Refining models leads to new questions to ask and new investigations to carry out to refine a model (see Figure 1). Gathering data from an investigation informs revisions to a model, explaining phenomenon. Comparing, elaborating, and justifying models with other learners is central in argumentation from evidence. Explaining a model tied to the phenomenon leads to constructing explanations.

Classroom Practice
Engaging students in a shared, contextual phenomenon naturally immerses them in sense making to figure out the phenomenon. From the shared experience, students create an initial model to explain the experience. Through discussing what they know and share among their peers, citing evidence from their initial models, students refine their models. A class creates a consensus model together, representing a shared understanding of the phenomenon. From here, students identify unknown information in the model and plan investigations to fill in those unknown pieces of the model.

References:

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