

Alma Schrage, Naturalist

Alignment with the NGSS Science and Engineering Practices for K-12 Science Classrooms

Practice	Description	Story Example
Asking questions and defining problems	A basic practice of the scientist is formulating empirically answerable questions about phenomena, establishing what is already known, and determining what questions have yet to be satisfactorily answered.	What types of bumble bees live in four field sites? Are any of them rusty patched bumblebees?
Developing and using models	Involves construction of a wide variety of models and simulations to help develop explanations about natural phenomena.	N/A
Planning and carrying out investigations	A major practice of scientists is planning and carrying out a systematic investigation, which requires the identification of what is to be recorded and what are to be treated as the dependent and independent variables. Observations and data are used to test existing theories and explanations or to revise and develop new ones.	The investigation is designed to find rusty patched bumblebees. It involves: Going to a field site and using a net to collect bees and record data about them; putting a Smartphone with an app next to a flower and collecting the frequencies of the sounds of bumblebees. Returning to her lab and using a computer to build a frequency chart; using the chart to identify the kinds of bumblebees that come to the flower.
Analyzing and interpreting data	Scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data.	Conducts coding and analysis of the data collected.
Using mathematics and computational thinking	Scientists use a range of computational devices for data collection and analysis.	See above.
Constructing explanations and designing solutions	Scientists construct explanations of phenomena that incorporate their current understandings and are of consistent with available evidence.	Identifies kinds of bumble bees that live in an area
Engaging in argument from evidence	Scientists defend their explanations, examine their own understandings, examine their own understandings, and collaborate with peers in searching for the best explanation for the phenomenon being investigated.	As a graduate student, shares and discusses findings with other students and professors.
Obtaining, evaluating, and communicating information	Scientists read and write texts and communicate orally.	Communicates via online channels and in person.