NGSS Science & Engineering Practices Grades 3-5: Self-Assessment

Indicate how strongly you focus on each item in your current teaching (1 = not at all; 4 = very strong focus)

Practice / Indicator	1	2	3	4	NOTES
Asking questions and defining problems in 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships.					
Ask questions about what would happen if a variable is changed.					
Identify scientific (testable) and non-scientific (non-testable) questions.					
Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.					
Use prior knowledge to describe problems that can be solved.					
Define a simple design problem that can be solved through the development of an object, tool, process, or system that includes several criteria for success and constraints on material, time, or cost.					
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.					
Identify limitations of models.					
Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regular occurring events.					
Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution.					
Develop and/or use models to describe and/or predict phenomena.					
Develop a diagram or simple physical prototype to convey a proposed object, tool, or process.					
Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.					
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that <u>control variables</u> and provide evidence to support explanations or design solutions.					
Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials is considered.					
Evaluate appropriate methods and/or tools for collecting data.					
Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.					
Make predictions about what would happen if a variable changes.					
Test two different models of the same proposed object, tool, or process to determine which better meets criteria for success.					
Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.					
Represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) to reveal patterns that indicate relationships.					
Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.					
Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.					
Analyze data to refine a problem statement or the design of a proposed object, tool, or process.					
Use data to evaluate and refine design solutions.					

Adapted from Brunsell E, Kneser D, Niemi K (2014), Introducing Teachers and Administrators to the NGSS. NSTA Press: Arlington, VA

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Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.					
Decide if quantitative or qualitative data are best to determine whether a proposed object or tool meets criteria for success.					
Organize simple data sets to reveal patterns that suggest relationships.					
Describe, measure, estimate, and/or graph quantities (e.g., area, volume, weight, time) to address scientific and engineering questions and problems.					
Create and/or use graphs and/or charts generated from simple algorithms to compare alternative solutions to an engineering problem.					
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.					
Construct an explanation of observed relationships (e.g., the distribution of plants in the back yard).					
Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design solution to a problem.					
Identify the evidence that supports particular points in an explanation.					
Apply scientific ideas to solve design problems.					
Generate and compute multiple solutions to a problem based on how well they meet criteria and constraints of the design solution.					
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).					
Compare and refine arguments based on an evaluation of the evidence presented.					
Distinguish among facts, reasoned judgment based on research findings, and speculation in an explanation.					
Respectfully provide and receive critiques from peers about a proposed procedure, explanation, or model by citing relevant evidence and posing specific questions.					
Construct and/or support an argument with evidence, data, and/or a model.					
Use data to evaluate claims about cause and effect.					
Make the claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of a problem.					
Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.					
Read and comprehend grade-appropriate complex texts and/or other reliable media to summarize and obtain scientific and technical ideas and describe how they are supported by evidence.					
Compare and/or combine across complex texts and/or other reliable media to support the engagement in other scientific and/or engineering practices.					
Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.					
Communicate scientific and/or technical information orally and/or in written formats, including various forms of media and may include tables, diagrams, and charts					

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