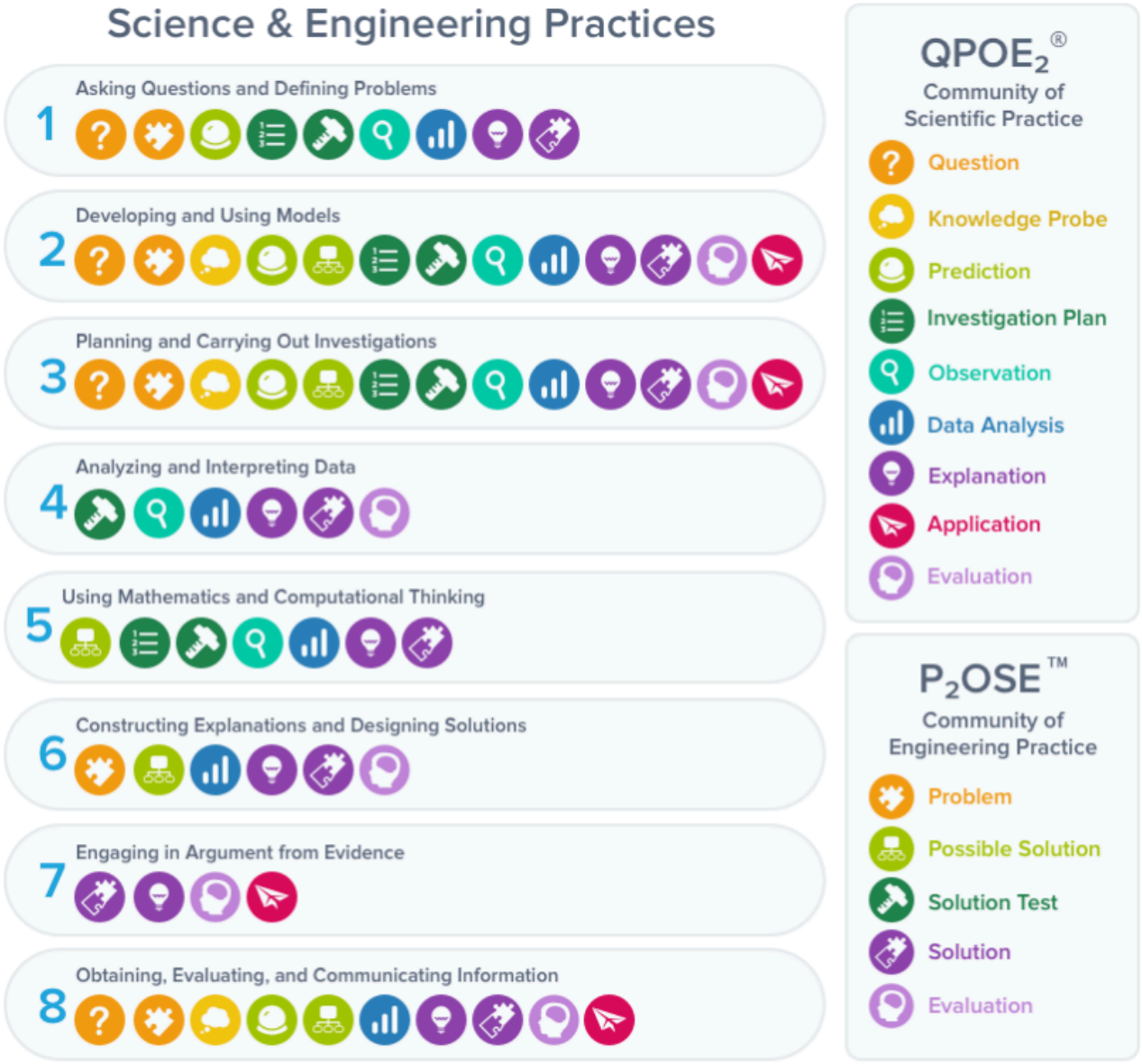
	Students	What does it look like in the classroom?
1	**Asking questions (for science) and defining problems (for engineering)**	Students respond to “What was the question the scientists were trying to answer with this experiment?” Students respond to “What question would you like to answer that could be answered through experimentation?” Students answer “What problem needs to be solved?” “How can you solve it?” Students articulate “What do I need to know?” before an investigation. Students generate questions to drive the unit.
A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and which can be empirically tested.		
2	**Developing and using models**	Students create drawings, diagrams, flow charts, graphs, spreadsheets, or physical replicas that demonstrate science principles. Students manipulate computer simulations, physical models, and math equations that are based on scientific principles.
A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.		
3	**Planning and carrying out investigations**	Students design procedures and data tables. Students conduct controlled experiments using the appropriate equipment.
Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters.		
4	**Analyzing and interpreting data**	Students use the correct tools for analyzing and representing data. This may include graphs, math formulas, photographs, or statistics to show trends and patterns that are present. Students identify uncertainty and errors in the collected data.
Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data. Scientists identify sources of error in the investigations and calculate the degree of certainty in the results. Modern technology makes the collection of large data sets much easier, providing secondary sources for analysis.		
5	**Using mathematics, information and computer technology, and computational thinking.**	Students use mathematics and statistics to analyze data and determine relationships between variables. Students use mathematics to create appropriately scaled models. Students use and represent measurements appropriately by using the correct measurement tools, magnitude, and conversions.
In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a		

range of tasks such as constructing simulations; statistically analyzing data; and recognizing, expressing, and applying quantitative relationships.		
6	**Constructing explanations (for science) and designing solutions (for engineering)**	Students are able to explain data using scientific principles. Students are able to propose plausible solutions to problems.
The products of science are explanations and the products of engineering are solutions.		
7	**Engaging in argument from evidence**	Students are able to support and refute opposing claims using evidence. Students present their finding to their peers and defend their claim with evidence.
Argumentation is the process by which explanations and solutions are reached.		
8	**Obtaining, evaluating, and communicating information**	Students are able to present and defend their findings using lab reports, poster presentations, roundabouts, whiteboards, and technology (ie. Google Docs/Presentations, Spiral) . Students are able to provide feedback to peers that is constructive.
Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity.		



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