Cognitive Demand Levels		**Scientific Practices** (e.g., argumentation and investigation)	**Science Content** (i.e., scientific body of knowledge)	**Integration of Content and Practices**
5	DOING SCIENCE TASKS			**Doing Science (DS)** Engaging in practices to make sense of content and recognize how scientific body of knowledge is developed
4	TASKS INVOLVING GUIDANCE FOR UNDERSTANDING			**Guided Integration (GI)** Guidance for working with practices tied to a particular content
3		**Guided Practices (GP)** Being guided for understanding practices	**Guided Content (GC)** Being guided for understanding particular content	
2	TASKS INVOLVING SCRIPTS	**Scripted Practices (SP)** Following a script to work on practices	**Scripted Content (SC)** Following a script about a content	**Scripted Integration (SI)** Following a script to work on practices tied to content
1	MEMORIZATION TASKS	**Memorized Practices (MP)** Reproducing definitions/ explanations of practices	**Memorized Content (MC)** Reproducing definitions, formulas, or principles about particular content	

Tekkumru-Kisa, M. Stein, M.K., & Schunn, C. (2015). ***A Framework for Analyzing Cognitive Demand and Content-Practices Integration: Task Analysis Guide in Science*. Journal of Research in Science Teaching, 52(5), pp. 659-685.**

	Low Cognitive Demand		**High Cognitive Demand**	
	Tasks	*Teacher Actions*	*Tasks*	*Teacher Actions*
Experimentation	Students— • follow a **highly specified** procedure. • do not make choices about what data to collect or how to collect it. • are not engaged in being critical about the data collection procedure.	The teacher— • does not help students understand that data collection is occurring in the service of answering a question. • introduces the experiment after she/he has already provided didactic information on the underlying concepts.	Students— • must **make decisions** about **what** data to collect and/or **how** to collect it. • **compare/contrast or critique** experimental protocols, considering issues such as reliability and "fit" between data gathered and the underlying question driving the experiment.	The teacher— • ensures that students understand how their data collection must help them achieve the goal of answering a particular question.
Data Representation, Analysis, and Interpretation	Students— • follow specific instructions about how to transform (e.g., calculate the mean temperature) and/or represent data (e.g., draw a bar graph). • answer specific questions about the data (e.g., In which city is the average monthly temperature highest?).	The teacher— • accepts only very specific representation types or strategies. (i.e., multiple solutions or strategies are not possible). • does not press for students to justify their answers using the data representations.	Students— • **seek to describe general** (e.g., the S-shaped growth curve of Fast Plants) and specific (e.g., trematode infection is 4–5 times higher in Charles, Emerald, and Baker ponds than in other ponds) **patterns** that are evident in the data. • **select** what data to represent and/or **how** to represent it. • **compare/contrast** various representations, considering issues such as the ease with which various patterns or relationships can be visualized.	The teacher— • provides opportunities for students to share and discuss a variety of data representations. • requires students to provide a rationale for the choices they have made related to transforming or representing data. • requires students to identify specific data or elements of data representations that provide evidence for the patterns/trends they've identified.
Explanation	Students— • **provide explanations without justification** or specific connection to data. • **repeat factual knowledge** previously learned.	The teacher— • **requests** discrete answers to questions without justification (e.g., *What causes a solar eclipse?* [answer] *The Moon blocking the Sun.*)	Students— • **provide explanations** with justification. • are engaged in **developing new explanatory knowledge.** • are critical of the explanations offered by others, requesting clarification and supporting evidence when appropriate. • **draw upon a variety of representational tools** (e.g., diagrams, tables, simulations) to communicate with peers.	The teacher— • presses students to provide explanations and to justify their assertions. • provides opportunities for students to share and critique one another's explanations. • • encourages students to use a variety of tools to communicate.

Carter, J.L., Smith, M.S., Stein, M.K., & Ross, D.K. (2013). *5 Practices for Orchestrating Productive Task-Based Discussions in Science*. Reston, VA: National Council of Teachers of Mathematics.