ANALYZING RIGOR IN STANDARDS

Analyzing the rigor in the skills and concepts in standards is essential for ensuring that students are adequately challenged and prepared for higher levels of learning. When we scrutinize the rigor embedded in standards, we can more effectively align our instruction with the cognitive demands required for students to achieve mastery. This process helps us identify whether our instructional strategies are promoting surface-level understanding or fostering deeper, more complex thinking. By focusing on rigor, we can ensure that students are not only able to recall facts and procedures but also apply, analyze, and create new knowledge based on what they have learned.

Rigorous standards are critical for preparing students to meet the challenges of college, career, and beyond. In today's rapidly changing world, students must be equipped with the ability to think critically, solve complex problems, and adapt to new situations. This approach to teaching and learning also supports equity in schools and classrooms by ensuring that all students, regardless of background, are held to high expectations and given the opportunity to succeed. Ultimately, analyzing rigor in standards leads to more meaningful and effective instruction, better student outcomes, and a more prepared and resilient generation of learners.

Depth of Knowledge (DOK) Levels 1 and 2 often get a bad reputation because they focus on basic recall and skill application. However, these levels are not "bad" or insignificant; they are fundamental to helping students engage in more complex learning experiences. DOK 1, which involves recall of facts and basic information, and DOK 2, which emphasizes skills like summarizing, explaining, or comparing, provide the necessary foundation for students to advance to deeper levels of thinking. Without a strong grasp of fundamental knowledge and skills, students cannot successfully navigate DOK 3 tasks, which involve strategic thinking and reasoning, or DOK 4 tasks, which require extended thinking and complex problem-solving.

The key is balance. A classroom should not be permanently rooted in DOK 1 and 2, but these levels are crucial steppingstones to higher-order thinking. I once worked with a principal who advised his teachers to only ask DOK 3 and 4 questions, thinking it would promote higher-order thinking in the classroom. However, this was poor advice. Student responses to questions of all DOK levels give teachers valuable insight into their understanding, indicating when it's time to

move on or when more reinforcement is needed at the foundational level. Regular exposure to all DOK levels provides students with a comprehensive learning experience and ensures they have the necessary foundation to engage deeply with complex concepts.

To help us evaluate the rigor of the skills and concepts in standards, consider the Rigor Analysis Table. It combines elements of Hess's Cognitive Rigor Matrices, Bloom's Taxonomy, and cognitive demand to pose questions that can help us identify the level of rigor for each skill and concept in the standard. Rigor levels are categorized by Depth of Knowledge (DOK) levels. The questions are yes or no questions. The more yes answers you have, the more likely the skill and concept match that DOK level.

Rigor Analysis Table				
	DOK 1	DOK 2	DOK 3	DOK 4
Cognitive Complexity	Does the skill and concept require students to recall basic facts or concepts?	Does the skill and concept require students to apply skills or concepts in a familiar context?	Does the skill and concept require strategic thinking or reasoning to solve problems?	Does the skill and concept require extended thinking, planning, or investigation over time?
Bloom's Taxonomy	Does the skill and concept involve lower-order thinking skills? (Remembering, Understanding, Applying)		Does the skill and concept involve higher-order thinking skills? (Analyzing, Evaluating, Creating)	
Cognitive Demand	Does the skill and concept require students to engage in procedural skills (e.g.,	Does the skill and concept require students to demonstrate conceptual understanding (e.g.,	Does the skill and concept require students to engage in problem-solving or critical thinking	Does the skill and concept require students to apply knowledge across disciplines or contexts (e.g.,

	calculations, following steps)?	explaining concepts, making connections)?	(e.g., evaluating evidence, generating solutions)?	interdisciplinary projects, real-world problem-solving)?

COGNITIVE DEMAND & COGNITIVE COMPLEXITY - WHAT'S THE DIFFERENCE?

Understanding the difference between **cognitive complexity** and **cognitive demand** can be tricky because both concepts involve the mental processes required for a task, but they address different aspects of thinking. Cognitive demand focuses on the type and level of thinking (from recall to analysis), while cognitive complexity considers how many interconnected thought processes are required and how deep the thinking goes. In practice, tasks can be high in one and low in the other, which can make it challenging for educators to gauge the true depth of student engagement.

However, the work done around teacher clarity, particularly the development of learning intentions and success criteria, can help teachers navigate this complexity. By clearly defining what students are expected to learn (learning intentions) and how they will demonstrate their understanding (success criteria), teachers can more accurately assess the cognitive demand of a task and determine how complex it is for students. This clarity helps ensure that students are not just engaging with content at a surface level but are also managing multiple layers of thinking in a structured way, leading to more meaningful learning experiences.

Cognitive Demand	Cognitive Complexity
• refers to the type of thinking and effort required to complete a task or solve a problem • focuses on the mental processes involved, such as recall, comprehension, application, analysis, and creation. • tasks can vary in cognitive demand from lower-order thinking skills (such as memorization) to higher-order thinking skills (such as critical analysis or problem-solving).	• refers to the depth and interconnectedness of thinking processes needed to solve a problem or complete a task. • A task can be cognitively complex if it requires multiple steps, the use of different kinds of thinking, or synthesizing information across various domains. • Unlike cognitive demand, which focuses on the specific type of

	thinking required, cognitive complexity considers how various demands interact in a task.
Examples of Cognitive Demand	**Examples of Cognitive Complexity**
Low Cognitive Demand (Recall/Understanding): • *Example*: "List the steps in photosynthesis." This task requires simple recall of facts and does not involve deeper analysis. Moderate Cognitive Demand (Application): • *Example*: "Solve a math problem using a specific formula." The task requires the application of known methods but doesn't demand innovative thinking. High Cognitive Demand (Evaluation/Synthesis): • *Example*: "Compare two scientific theories and evaluate which is more applicable to current climate data." This task requires the student to analyze, synthesize, and evaluate information.	Low Complexity: • *Example*: "Recite the capital cities of 10 countries." This task is simple, linear, and requires memorization without deeper connections. Moderate Complexity: • *Example*: "Analyze a graph showing climate change over time and explain the trend." The task requires interpreting data and making connections between concepts, but it's still relatively contained within one domain. High Complexity: • *Example*: "Develop a solution to an environmental issue that incorporates scientific, economic, and ethical considerations." This task is highly complex because it requires synthesizing information from multiple fields, making connections, and evaluating trade-offs.

Cognitive Demand & Cognitive Complexity Takeaways

- Cognitive Demand is more about the level of thinking required (from simple recall to critical thinking).
- Cognitive Complexity is about the structure and depth of the task, considering how different elements interact and the need to manage multiple types of thinking.
- A task could be low in cognitive demand but high in cognitive complexity if it involves many interconnected steps but requires relatively simple thinking at each

stage (e.g., following a complex procedure step-by-step, such as baking a cake by following a detailed recipe).

- Conversely, a task could be high in cognitive demand but low in cognitive complexity if it requires high-level thinking but is straightforward in structure (e.g., solving a difficult abstract math problem that has a single, focused solution).

Understanding cognitive demand and cognitive complexity can help teachers design tasks that appropriately challenge students, ensuring they engage in both deep thinking and manage interconnected processes.