What Does Rigor Look Like?

The bulk of this presentation was taken from two presentations by Karin Hess Wisconsin ASCD Meeting, Madison, WI

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Our Objectives

- Develop a shared understanding of the concept of cognitive rigor
- Apply DOK to instructional tasks, questions and assessments
- Begin a conversation about where this fits with pre-service teachers

Before we begin…

- **Take a minute to write your personal definition of "cognitive rigor" as it relates to instruction, learning, and/or assessment.**

Now let's apply your rigor definition

Your class has just read some version of *Little Red Riding Hood.*

- **What is a basic comprehension question you might ask?**

- **What is a more rigorous question you might ask?**

Developing the Cognitive Rigor Matrix

There are different models to describe cognitive rigor. Each addresses something different.

- **Bloom** –What type of thinking (verbs) is needed to complete a task?

- **Webb** –How deeply do you have to understand the content to successfully interact with it? How complex is the content?

Bloom's Taxonomy

(1956)	(2005)
Knowledge: Define, duplicate, label, list, name, order, recognize, recall	Remember: Retrieve from long-term memory, recognize, locate, identify
Comprehension: Classify, describe, explain, identify, indicate, locate, recognize, review, select, translate	Understand: Construct meaning, paraphrase, translate, illustrate, give examples, classify, categorize, predict
Application: Choose, demonstrate, illustrate, interpret, practice, write	Apply: Carry out/use a procedure in a given situation (e.g., unfamiliar task)
Analysis: Analyze, explain, calculate, categorize, compare, discriminate	Analyze: Break into constituent parts, determine how parts relate
Synthesis: Rearrange, assemble, compose, design, write, formulate	Evaluate: Make judgments based on criteria, detect inconsistencies, critique
Evaluation: Appraise, argue, assess, choose, compare, defend, estimate, explain, judge, predict, rate, support	Create: Put elements together to form a coherent whole, reorganize into new patterns/structures

Webb's Depth-of-Knowledge Levels

- **DOK-1 – Recall & Reproduction** - Recall of a fact, term, principle, concept, or perform a routine procedure
- **DOK-2** - **Basic Application of Skills/Concepts** - Use of information, conceptual knowledge, select appropriate procedures for a task, two or more steps with decision points along the way, routine problems, organize/display data, interpret/use simple graphs
- **DOK-3** - **Strategic Thinking** - Requires reasoning, developing a plan or sequence of steps to approach problem; requires some decision making and justification; abstract, complex, or non-routine; often more than one possible answer
- **DOK-4** - **Extended Thinking** - An investigation or application to real world; requires time to research, problem solve, and process multiple conditions of the problem or task; non-routine manipulations, across disciplines/content areas/multiple sources

DOK 1

- **Emphasis is on facts and simple recall of previously taught information. This also means following simple steps, recipes, or directions.**
- **Can be difficult without requiring reasoning.**
- **At DOK 1, students find "the right answer," and there is no debating the "correctness," it is either right or wrong.**

DOK 1 Examples

- Define the term ***raku***
- Name the main character
- Describe physical features of Greece
- Determine the perimeter or area of rectangles given a drawing or labels
- Identify elements of music using musical terminology
- Identify the basic rules for participating in bowling

DOK 2

- **Requires comparison of two or more concepts, finding similarities and differences, applying factual learning at the basic skill level.**
- **Requires deeper knowledge than just the definition**
  - **Main idea**
- **Students must explain "how" or "why" and often estimate or interpret to respond.**

DOK 2 Examples

- **Compare/contrast health benefits of 2 different forms of exercise**
- **Identify and summarize the major events, problem, solution, conflicts in literary text**
- **Explain the cause-effect of historical events**
- **Categorize paintings into the correct artistic period**
- **Classify plane and three dimensional figures**
- **Describe various styles of music**

DOK 3

- **Students must reason or plan to find an acceptable solution to a problem.**
- **More than one correct response or approach is possible.**
- **Requires complex or abstract thinking, and application of knowledge or skill in a new and unique situation.**

DOK 3 Examples

- **Explain, generalize or connect ideas, using supporting evidence from a text or source**
- **Analyze or evaluate the effectiveness of the concept of 'groove' in a musical composition**
- **Solve a multiple-step problem and provide support with a mathematical explanation that justifies the answer**

DOK 4

- **At this level, students typically identify a problem, plan a course of action, enact that plan, and make decisions based on collected data.**
- **Usually involves more time than one class period.**
- **Multiple solutions are possible.**
- **Students often connect multiple content areas to come up with unique and creative solutions.**

DOK 4 Examples

- **Gather, analyze, organize, and interpret information from multiple (print and non print sources) to draft a reasoned report**
- **Analyzing author's craft (e.g., style, bias, literary techniques, point of view) across multiple texts**
- **Specify a problem, identify solution paths, solve the problem, and report the results**

DOK is about complexity—not difficulty!

- The intended student learning outcome determines the DOK level. What mental processing must occur?
- Don't rely on the verbs, it is *what comes after the verb* that is the best indicator of the rigor/DOK level.

DOK is About Complexity

- **Level 1 requires students to use simple skills or abilities.**
- **Level 2 includes the engagement of some mental processing beyond recalling.**
- **Level 3 requires some higher level mental processing like reasoning, planning, and using evidence.**
- **Level 4 requires complex reasoning, planning, developing, and thinking over an extended period of time**

Even though level 4 emphasizes extended time, this alone is not the distinguishing factor

Task	Type of Thinking
Collecting data samples over several months	Recall
Organizing the data in a chart	Skills and/or strategies
Using the chart to make or justify predictions	Strategic thinking
Develop a generalized model from the data and applying it to a new situation	Extended thinking

The Hess Cognitive Rigor Matrix Applies Webb's DOK to Bloom's Cognitive Process Dimensions

Depth + thinking	Level 1 Recall & Reproduction	Level 2 Skills & Concepts	Level 3 Strategic Thinking/ Reasoning	Level 4 Extended Thinking
Remember	-Recall, locate basic facts, details, events	Not appropriate at this level		
Understand	-Select appropriate words to use when intended meaning is clearly evident	-Specify or explain relationships -summarize -identify central idea	-Explain, generalize, or connect ideas using supporting evidence (quote, example…)	-Explain how concepts or ideas specifically relate to other content domains or concepts
Apply	-Use language structure (pre/suffix) or word relationships (synonym/antonym) to determine meaning	-Use context to identify meaning of word -Obtain and interpret information using text features	-Use concepts to solve non-routine problems	-Devise an approach among many alternatives to research a novel problem
Analyze	-Identify whether information is contained in a graph, table, etc.	-Compare literary elements, terms, facts, events -analyze format, organization, & text structures	-Analyze or interpret author's craft (literary devices, viewpoint, or potential bias) to critique a text	-Analyze multiple sources -Analyze complex/abstract themes
Evaluate			-Cite evidence and develop a logical argument for conjectures	-Evaluate relevancy, accuracy, & completeness of information
Create	-Brainstorm ideas about a topic	-Generate conjectures based on observations or prior knowledge	-Synthesize information within one source or text	-Synthesize information across multiple sources or texts

Practice using the Cognitive Rigor Matrix

- **Handout #1:** *Little Red Riding Hood (pink)*
- **Handout #2:** CRM template for ELA & math (green)

Your sample questions - basic and more rigorous. Where do they fit on the matrix?

The CR Matrix: A Reading Example

Back to *Little Red Riding Hood*…

Depth + thinking	Level 1 Recall & Reproduction	Level 2 Skills & Concepts	Level 3 Strategic Thinking/ Reasoning	Level 4 Extended Thinking
Remember	-Recall facts			
Understand	-Identify characters, setting, etc.	-Retell or summarize…		
Apply				
Analyze		-Compare-contrast		-Analyze multiple texts/sources & using text evidence for support
Evaluate			-Justify judgments using details/evidence from text	
Create		-Develop a creative summary		

Some general rules of thumb

- **If there is only one correct answer, it is probably level DOK 1 or DOK 2**
  - DOK 1: you either know or you don't
  - DOK 2 (conceptual): apply one concept, then make a decision before going on *applying a second concept*
- **If more than one solution/approach, requiring evidence, it is DOK 3 or 4**
  - DOK 3: Must provide supporting evidence and reasoning (not just HOW solved, but WHY – explain reasoning)
  - DOK 4: all of "3" + use of multiple sources or texts

Let's Practice

- **Locate your Sample Performance Tasks… (other side of orange) and use your CRM to rate**

  - **Sam the Slippery Spider**
  - **Charlotte's Web**
  - **Max's Pen**

DOK is About Complexity

- **The intended student learning outcome determines the DOK level.**
- **Assessments, oral questions and class activities can all be assigned a DOK level.**
- **Instruction and classroom assessments must reflect the DOK level of the objective or intended learning outcome.**

As you think about instructional activities, ask…

- What is its purpose?
- What is the implied/intended rigor?
- When in the (lesson/unit) could this be used?
- Which standard(s) does it align with?
- Will student responses tell a teacher what to do next?

Some implications for applying rigor to unit design:

- What are the overall learning goals & expectations (and cognitive demand) of the unit?
- Does the cognitive demand of the assessments match the stated learning expectations?
- Do the learning activities in the unit have the coherence & increasing cognitive rigor to get students there?

DOK can also be applied to the questions we use

- Often struggling students are denied access to higher level questions because they still have difficulty with skills.

- However, higher level thinking questions are sometimes easier for level 1 & 2 students to answer because open-ended questions have more entry points and require more “think time” by the rest of the class.

DOK ????

- **Questions at lower levels are usually more appropriate for:**
  - Evaluating students' preparation and comprehension
  - Diagnosing students' strengths and weaknesses
  - Reviewing and/or summarizing
- **Usually questions at upper DOK levels are appropriate for:**
  - Encouraging students to think deeply and critically
  - Problem-solving
  - Encouraging discussions
  - Stimulating students to seek information on their own

You Can Ask Higher DOK Questions

- Require students to **manipulate prior information**
  - Why do you suppose……?
  - What can you conclude from the evidence?
- Ask students to state an idea or definition **in their own words.**
- Ask questions that **require a solution to a problem.**
- Involve students in **observing and describing** an event or object
  - What do you notice? Tell me about this. What do you see?
- Ask students to **compare or contrast**

Take-Away Message: Cognitive Rigor & Some Implications for Assessment

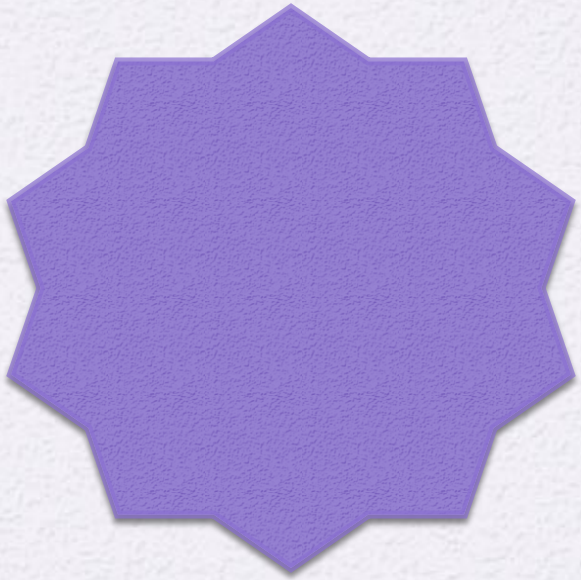
- Assessing only at the highest DOK level will miss opportunities to know what students do & don't know – go for a range; end "high" in selected/prioritized content
- Performance assessments can offer varying levels of DOK embedded in a larger, more complex task
- Planned formative assessment strategies and tools can focus on differing DOK levels

Let's Look at the Smarter Balanced Assessments

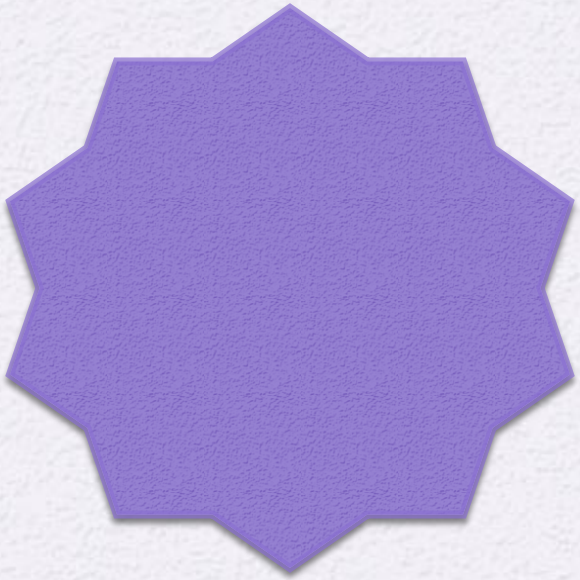
- ELA (tan)
- Math (blue)

Check your Work

Math



ELA



Reflect on your learning…

- Revisit your definition of rigor – has it changed or been refined? How?
- What is one way you might apply these ideas to your work with preservice teachers?
- How might you shift your classroom instructional or assessment practices?
- What existing curriculum/assessment materials could you school examine for a range of cognitive rigor?

Take-aways