

What Does Rigor Look Like?

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

January, 2012

Wisconsin ASCD Meeting, Waukesha, WI

October, 2012

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

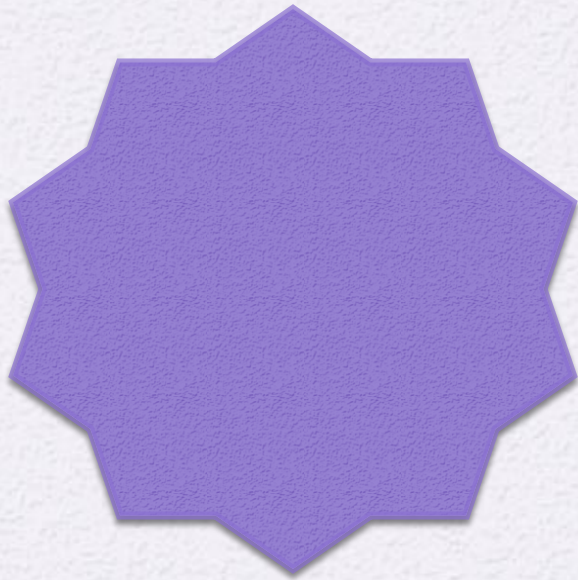
Let's Look at the Smarter Balanced Assessments

- ELA (tan)
- Math (blue)

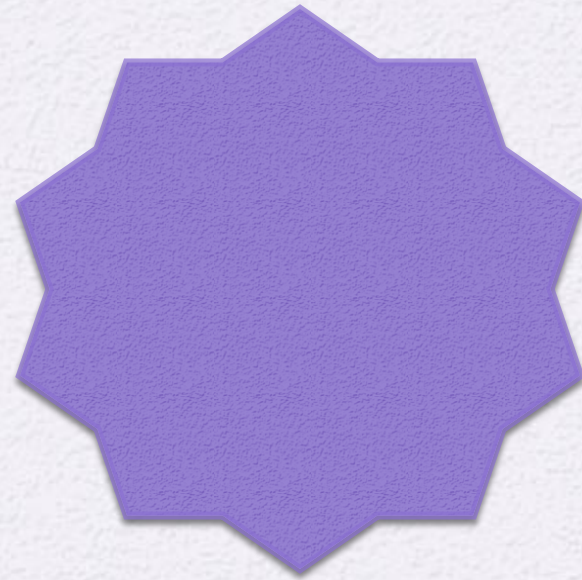


Check your Work

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 your school examine for a range of cognitive rigor?**

Take-aways