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?
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

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Remember</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define, duplicate, label, list, name, order, recognize, recall</td>
<td>Retrieve from long-term memory, recognize, locate, identify</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comprehension</th>
<th>Understand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classify, describe, explain, identify, indicate, locate, recognize, review, select, translate</td>
<td>Construct meaning, paraphrase, translate, illustrate, give examples, classify, categorize, predict</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Application</th>
<th>Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose, demonstrate, illustrate, interpret, practice, write</td>
<td>Carry out/use a procedure in a given situation (e.g., unfamiliar task)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Analyze</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyze, explain, calculate, categorize, compare, discriminate</td>
<td>Break into constituent parts, determine how parts relate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Synthesis</th>
<th>Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rearrange, assemble, compose, design, write, formulate</td>
<td>Make judgments based on criteria, detect inconsistencies, critique</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>Create</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appraise, argue, assess, choose, compare, defend, estimate, explain, judge, predict, rate, support</td>
<td>Put elements together to form a coherent whole, reorganize into new patterns/structures</td>
</tr>
</tbody>
</table>
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
• 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.
• 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

<table>
<thead>
<tr>
<th>Task</th>
<th>Type of Thinking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collecting data samples over several months</td>
<td>Recall</td>
</tr>
<tr>
<td>Organizing the data in a chart</td>
<td>Skills and/or strategies</td>
</tr>
<tr>
<td>Using the chart to make or justify predictions</td>
<td>Strategic thinking</td>
</tr>
<tr>
<td>Develop a generalized model from the data and applying it to a new situation</td>
<td>Extended thinking</td>
</tr>
<tr>
<td>Depth + thinking</td>
<td>Level 1 Recall &amp; Reproduction</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Remember</td>
<td>-Recall, locate basic facts, details, events</td>
</tr>
<tr>
<td>Understand</td>
<td>-Select appropriate words to use when intended meaning is clearly evident</td>
</tr>
<tr>
<td>Apply</td>
<td>-Use language structure (pre/suffix) or word relationships (synonym/antonym) to determine meaning</td>
</tr>
<tr>
<td>Analyze</td>
<td>-Identify whether information is contained in a graph, table, etc.</td>
</tr>
<tr>
<td>Evaluate</td>
<td></td>
</tr>
<tr>
<td>Create</td>
<td>-Brainstorm ideas about a topic</td>
</tr>
</tbody>
</table>
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*...

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