A New Lens for Examining Cognitive Rigor in Standards, Curriculum, & Assessments

What are some implications for the transition to Common Core State Standards?

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Presentations made in 2009-2011
Before we begin…

- Take a couple of minutes to write your personal definition of “cognitive rigor” as it relates to instruction/learning/assessment.
Now, let’s apply your rigor definition

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

- What is a basic comprehension question you might ask?
- What is a more rigorous question you might ask?
Introducing the Hess Cognitive Rigor Matrix

Handout: CRM for English Language Arts

Source (article): What exactly do “fewer, clearer, and higher standards” really look like in the classroom? Using a cognitive rigor matrix to analyze curriculum, plan lessons, and implement assessments (Hess, Carlock, Jones, & Walkup, 2009)
Developing the Cognitive Rigor Matrix

Different states/schools/teachers use different models to describe cognitive rigor. Each may address 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 or abstract is the content?

| Knowledge -- Define, duplicate, label, list, name, order, recognize, relate, recall | Remember  Retrieve knowledge from long-term memory, recognize, recall, locate, identify |
| Comprehension -- Classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, review, select, translate | Understand -- Construct meaning, clarify, paraphrase, represent, translate, illustrate, give examples, classify, categorize, summarize, generalize, predict... |
| Application -- Apply, choose, demonstrate, dramatize, employ, illustrate, interpret, practice, write | Apply -- Carry out or use a procedure in a given situation; carry out or use /apply to an unfamiliar task |
| Analysis -- Analyze, appraise, explain calculate, categorize, compare, criticize, discriminate, examine | Analyze -- Break into constituent parts, determine how parts relate |
| Synthesis -- Rearrange, assemble, collect, compose, create, design, develop, formulate, manage, write | Evaluate -- Make judgments based on criteria, check, detect inconsistencies/fallacies, critique |
| Evaluation -- Appraise, argue, assess, choose, compare, defend, estimate, explain, judge, predict, rate, core, select, support, value | Create -- Put elements together to form a coherent whole, reorganize elements into new patterns/structures |
Webb’s Depth-of-Knowledge Levels

- **DOK-1 – Recall & Reproduction** - Recall of a fact, term, principle, concept; perform a routine procedure; locate details

- **DOK-2 - Basic Application of Skills/Concepts** - Use of information; conceptual knowledge; select appropriate procedures for a given task; two or more steps with decision points along the way; routine problems; organize/display data; interpret/use simple graphs; summarize; identify main idea; explain relationships; make predictions

- **DOK-3 - Strategic Thinking** - Requires reasoning, or developing a plan or sequence of steps to approach problem; requires decision making or justification; abstract, complex, or non-routine; often more than one possible answer; support solutions or judgments with text evidence

- **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; synthesize information across disciplines/content areas/multiple sources
DOK is about depth & complexity—not difficulty!

- The intended student learning outcome determines the DOK level. What mental processing must occur?
- While verbs may appear to point to a DOK level, it is what comes after the verb that is the best indicator of the rigor/DOK level.
  - Describe the process of photosynthesis.
  - Describe how the two political parties are alike and different.
  - Describe the most significant effect of WWII on the nations of Europe.
Hess’ Cognitive Rigor Matrix: Applies Webb’s DOK to Bloom’s Cognitive Process Dimensions

<table>
<thead>
<tr>
<th>Depth of thinking</th>
<th>Level 1: Recall &amp; Reproduction</th>
<th>Level 2: Basic Skills &amp; Concepts</th>
<th>Level 3: Strategic Thinking &amp; Reasoning</th>
<th>Level 4: Extended Thinking</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Remember</strong></td>
<td>- Recall, locate basic facts, details, events</td>
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<tr>
<td><strong>Understand</strong></td>
<td>- Select appropriate words to use when intended meaning is clearly evident</td>
<td>- Specify, explain relationships - summarize - identify main ideas</td>
<td>- Explain, generalize, or connect ideas using supporting evidence (quote, example...)</td>
<td>- Explain how concepts or ideas specifically relate to other content domains or concepts</td>
</tr>
<tr>
<td><strong>Apply</strong></td>
<td>- Use language structure (pre/suffix) or word relationships (synonym/antonym) to determine meaning</td>
<td>- Use context to identify meaning of word - Obtain and interpret information using text features</td>
<td>- Use concepts to solve non-routine problems</td>
<td>- Devise an approach among many alternatives to research a novel problem</td>
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<tr>
<td><strong>Analyze</strong></td>
<td>- Identify whether information is contained in a graph, table, etc.</td>
<td>- Compare literary elements, terms, facts, events - analyze format, organization, &amp; text structures</td>
<td>- Analyze or interpret author’s craft (literary devices, viewpoint, or potential bias) to critique a text</td>
<td>- Analyze multiple sources or texts - Analyze complex/abstract themes</td>
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<tr>
<td><strong>Evaluate</strong></td>
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<td>- Cite evidence and develop a logical argument for conjectures</td>
<td>- Evaluate relevancy, accuracy, &amp; completeness of information</td>
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<tr>
<td><strong>Create</strong></td>
<td>- Brainstorm ideas about a topic</td>
<td>- Generate conjectures based on observations or prior knowledge</td>
<td>- Synthesize information within one source or text</td>
<td>- Synthesize information across multiple sources or texts</td>
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Let’s practice using the CRM

**Handout:** *Little Red Riding Hood*
CRM template

**Where would you place your sample questions in the CRM—basic and more rigorous questions?**
The CR Matrix: A Reading Example
Back to *Little Red Riding Hood*, …

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What are some implications for current-to-future…

- Curriculum & Instruction?
- School/Classroom Assessment?
- Formative Assessments & Progress Monitoring?
Figure out where you are now & where your transition plan begins

1. Revisit your definition of rigor – has it changed? In what ways?
2. Establish a shared understanding of what cognitive rigor looks like across content areas for your district/school/classrooms.
3. What existing curriculum or assessment materials could you re-examine to increase the range of cognitive rigor?
4. What gaps will need to be filled?
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
Examples of formative assessment tools that uncover thinking & require “cognitive rigor”

Handouts:
TBEAR, Bookmark, Reading Strategy Use, Literary Essay graphic organizer
Some Related Resources

Papers available at www.nciea.org

Hess, Carlock, Jones, & Walkup (2009). What exactly do “fewer, clearer, and higher standards” really look like in the classroom? Using a cognitive rigor matrix to analyze curriculum, plan lessons, and implement assessments

http://www.nciea.org/publications/DOKreading_KH08.pdf
http://www.nciea.org/publications/DOKsocialstudies_KH08.pdf
http://www.nciea.org/publications/DOKwriting_KH08.pdf
http://www.nciea.org/publications/DOKscience_KH08.pdf
http://www.nciea.org/publications/DOKmath_KH08.pdf

Also contact Karin Hess [khess@nciea.org] about formative tools, CRM templates, and use of an accompanying 20-minute video produced by NYC public schools.