Strategies to Increase Student Thinking and Learning

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Alignment to Learning Forward Standards
Strategies for Teaching and Learning

The new education law, *Every Student Succeeds Act (ESSA)*, redefines professional development with a purposeful influence from *Learning Forward*.

*Learning Forward*, a national association recognized as leaders in professional learning, has established standards for professional learning that set a high bar for quality learning experiences.

This session aligns to the following standard(s):

- **Learning Communities** *Professional learning that increases educator effectiveness and results for all students* occurs within learning communities committed to continuous improvement, collective responsibility, and goal alignment.

- **Learning Designs** *Professional learning that increases educator effectiveness and results for all students* integrates theories, research, and models of human learning to achieve its intended outcomes.

- **Outcomes** *Professional learning that increases educator effectiveness and results for all students* aligns its outcomes with educator performance and student curriculum standards.
ESSENTIAL QUESTION: How does increasing the rigor in your classroom instruction and formative assessment enhance the learning of your students?

LEARNING GOAL: Learn Ways to Apply Higher Order Thinking, Depth of Knowledge, and Questioning Strategies to strengthen student learning.
Before we begin…
Critical Thinking is Important…

Activity: Take a minute and write why critical thinking questions are important.
Why are thinking questions important? Poll Everywhere – top four reasons...

1. Increases student retention of knowledge, skills, and understandings.
2. Fosters an active learning environment to maintain student engagement.
3. Stimulates students’ interest and curiosity in content.
4. Helps students monitor their own understandings.
5. Supports students in making conjectures and arguing validity.
6. Allows students to hear different explanations by their peers.
Cognitive Rigor

- The kind and level of thinking required of students to successfully engage with and solve a task

- Ways in which students interact with content
Developing the Cognitive Rigor Matrix

Educators use different models to describe cognitive rigor. Each addresses something different.

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

**Webb** – How deeply do you have to understand the content to successfully interact?

**Hess** – Cognitive Rigor Matrix
Transitioning to More Rigorous Standards

• Implemented more rigorous science standards in 2014
• Implemented more rigorous math and ELA standards in 2016
• More rigorous assessments aligned to the new standards 2017

= Demands more cognitive complexity in daily instruction
Anticipation Guide - DOK

Poll Everywhere (Agree or Disagree)

Note: Not all sentences are true!

1. Depth of Knowledge (DOK) is about difficulty.
2. DOK is about complexity.
3. DOK is about what students are expected to know and be able to do related to complexity.
4. DOK is about what follows the verb.
5. DOK is a system for categorizing cognitive demand.
6. DOK has four levels (recall, basic reasoning, strategic thinking, extended thinking).
What is DOK?

- DOK measures the degree to which knowledge is elicited from students.
- DOK is a common language educators use to describe the complexity of learning tasks and test items.
Beginning at the Beginning

What DOK is can best be explained by saying first what DOK is NOT!

- DOK is not a verb.
- DOK is not about the “difficulty” of the task.
- DOK is not a grade-level indicator.
DOK Is About Intended Outcome, NOT Difficulty!

DOK is a reference to the complexity of mental processing that must occur to answer a question, perform a task, or generate a product.
DOK Is Not About Difficulty

**Difficulty** is a reference to how many students answer a question correctly.

“How many of you know the definition of ‘exaggerate’?” DOK 1—recall
If all of you know the definition, this is an **easy** question.

“How many of you know the definition of ‘vociferous’?” DOK 1 – recall
If most of you **do not know** the definition, this is a **difficult** question.
Same Verb – Three DOK Levels

• **DOK 1**: Describe three characteristics of metamorphic rocks
  Requires simple recall

• **DOK 2**: Describe the difference between metamorphic and igneous rocks.
  Requires **cognitive processing** to determine the differences in the two rock types

• **DOK 3**: Describe a model that you might use to represent the relationships that exist within the rock cycle.
  Requires **deep understanding** of rock cycle and a determination of how best to represent it.
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**.
DOK is About Complexity

- DOK focuses on **complexity of content standards** in order to successfully complete a task or assessment. The outcome (product) is the focus of the depth of understanding.
- The **intended student learning goal** determines the DOK level.
- Instruction and classroom assessments **must reflect the DOK level** of the objective or intended learning outcome.
DOK Review

➤ Choose 3 questions from the DOK cards.
➤ Identify the DOK level.
➤ Turn to your partner to discuss.
➤ Share with group.
How can strategies be used to develop critical thinking for teaching and learning?
STRATEGY CARDS SPAN LEVELS OF DEPTH OF KNOWLEDGE
VOTE WITH YOUR FEET

Students choose a response (strongly agree or agree or disagree or strongly disagree)

Students write the reason for their choice before moving to the corner of the room for their choice.

Interaction between students occurs as they defend their position on an issue.

Use as a pre-unit, mid-unit, or end-of-unit learning activity.

WHAT DOK LEVEL(S) ARE POSSIBLE IN THIS STRATEGY?
THINK/WRITE/PAIR/SHARE

Question: ____________________________________________

Think about your answer. Write it down, if needed.

Select a Partner

Listen to or explain answers

Switch Roles

State your answer in class discussion, a written assignment, or a speech.
Student Response Formats
Response Cards, Clickers, Whiteboards

- Clickers Provide Game-Like Atmosphere
- Quick Poll
- Immediate Feedback
- Opportunity to Discuss Misconceptions or Accelerate Pace of Instruction
- Anonymity to Classmates – Identified to the Teacher

If response cards were used instead of hand raising for just 30 minutes per day, each student would make more than 3,700 additional academic responses during the school year.

WHAT DOK LEVEL(S) ARE POSSIBLE WITH THIS STRATEGY?
Engaging work,...work that stimulated their curiosity, permitted them to express their creativity, and fostered positive relationships with others. It was also work at which they were good.

How, then, would we define engagement? Perhaps the best definition comes from the work of Phil Schlecty (1994), who says students who are engaged exhibit three characteristics: (1) they are attracted to their work, (2) they persist in their work despite challenges and obstacles, and (3) they take visible delight in accomplishing their work.

September 1995 | Volume 53 | Number 1
Strengthening Student Engagement: What Do Students Want (and what really motivates them)?
Richard Strong, Harvey F. Silver and Amy Robinson
In the last two decades, fungal diseases have rapidly attacked populations of frogs, bats, and salamanders. The latest victims under siege are snakes, and if snake fungal disease isn’t stopped, researchers say it could yield disastrous results.

Snake fungal disease—caused by the pathogen *Ophidiomyces ophiiodiicola*—is marked by skin lesions and thick blisters that can disfigure a snake’s face and even prevent it from being able to eat, often leading to starvation.

The outcome of the disease varies between species, but the mortality rate is especially high in rattlesnakes, including the eastern massasauga rattlesnake. About 30 snake species have been found to be infected in at least fifteen states in the United States, and many of the world’s 3,000 snake species are just as vulnerable, said Jonathan Kolby, an American biologist and conservationist.

By Hannah Lang
NATIONAL GEOGRAPHIC, June 12, 2017
WHAT DOK LEVEL(S) ARE POSSIBLE WITH THIS STRATEGY?

**Foldables**

**Vocabulary Book**
Fold a sheet of notebook paper in half like a hot dog. On one side, cut every third line to create tabs. You can adjust the number of lines depending on the paper and the desired size of the tabs. Label the title with vocabulary.

**Layered-Look Book**
Stack two or more sheets of paper so that the top edges are an equal distance apart. Bring the bottom edges up and align the sheets so that all of the layers (or tabs) are the same distance apart. Fold and crease well to form the Layered-Look Book. Use glue or staples to hold the sheets together. Students can label the tabs and record information inside the Layered-Look Book.

**Folded Table or Chart**
Fold a sheet of paper in half (for two columns), then in half again (for four columns). Do the same in the other direction for the desired number of rows, or simply make one fold along the top for column headings.
Some General Tips

• If there is only one correct answer, it is probably level DOK 1 or DOK 2
  • DOK 1: you either know it (can recall it, locate it, do it) or you don’t.
  • DOK 2: (conceptual) apply one concept, then make a decision before applying a second concept.

• If more than one solution/approach, requiring evidence, it is DOK 3 or DOK 4
  • DOK 3: Must provide supporting evidence and reasoning (not just HOW solved, but WHY – explain reasoning).
  • DOK 4: all of “3” + use multiple sources or texts.
How Do We Develop Deeper Thinking?

• Making thinking apparent in everything you teach.
• Use **Think Aloud strategy** to model your thinking and meta-cognition.
• Include opportunities for students to “think aloud” with partners, small groups, and with the entire class.
• **Encourage multiple responses** or answers to the same question.
• **Use questions in class and on assessments** that require deep thinking and application.
Cognitive Rigor & Implications for Classroom Assessment

• Assessing only at the highest DOK level will miss opportunities to know what students do and don’t know – use 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 should focus on differing DOK levels.

STRATEGY CARDS SPAN LEVELS OF DEPTH OF KNOWLEDGE
Reflecting on Your Learning
What is one way you might apply these ideas in your work?

THINK ABOUT…

- What existing curriculum/formative assessment materials could you/your school use for a range of cognitive rigor?

- What classroom/instructional practices support the different levels of DOK?
3-2-1 Exit Ticket

**Three** Things I Learned Today...

**Two** Questions...

**One** Comment on Presentation Today...
Depth of Knowledge in English Language Arts

**DEPTH OF KNOWLEDGE IN ENGLISH/LANGUAGE ARTS**

**DOK 1**
**USING SIMPLE SKILLS**
- Reciting facts. Using simple skills.
- Reading doesn’t require analysis. Focus is on basic comprehension.
- Understanding words and phrases.

**DOK 2**
**MENTAL PROCESSING**
- Engaging beyond recall.
- Requiring both comprehension and processing.
- Requiring students to:
  - Summarize
  - Interpret
  - Infer
  - Classify

**DOK 3**
**BEYOND THE TEXT**
- Requiring students to go beyond the text.
- Explain, generalize, and connect ideas.
- Students must be able to support their thinking.
- Identify abstract themes. Infer across an entire passage. Apply prior knowledge.

**DOK 4**
**HIGHER ORDER THINKING**
- Higher order thinking is essential. Knowledge is deep.
- Extended activity. Extended periods of time.
- Taking information from one source and applying it in a different task.
- Developing hypotheses.

*Key Concepts:*
- DOK 1: Recall from text, reference details, find word meanings
- DOK 2: Predict outcomes, use context clues
- DOK 3: Summarize from multiple sources, analyze/describe characteristics
- DOK 4: Analyze information, examine perspectives, illustrate common themes

*Based on Webb’s Depth of Knowledge*
Depth of Knowledge in Mathematics

DEPTH OF KNOWLEDGE IN MATHEMATICS

DOK 1
RECALLING INFORMATION
Following a set of procedures. (like a recipe)
Applying a formula.
Performing a clearly defined series of steps.

Key Words:
- Identify
- Recognize
- Use
- Measure
- Recall

DOK 2
SKILLS AND CONCEPTS
Requiring students to make some decisions about how to approach a problem or activity.
Working with problems that have more than one step.
Collecting Classifying Organizing and Comparing data.
Organizing and displaying data in charts, graphs, and tables.

Key Words:
- Classify
- Organize
- Make
- Collect
- Compare
- Draw
- Record

DOK 3
STRATEGIC THINKING
Requiring reasoning, planning, and a higher level of thinking.
Students have to explain their thinking and justify their responses.
Complexity comes from a higher demand for reasoning, not harder problems.

Key Words:
- Reason
- Support
- Develop
- Evidence
- Make
- Conclude

DOK 4
EXTENDED THINKING
Requiring reasoning, planning, and thinking over an extended period of time.
Students have to deal with multiple elements and make connections between them.
Cognitive demand is high. Work is complex.

Key Words:
- Relate
- Ideas
- Select
- Approaches

Based on Webb’s Depth of Knowledge

engageok ON THE ROAD

TJUNKINS
# Depth of Knowledge in Science

## Depth of Knowledge in Science

<table>
<thead>
<tr>
<th>DOK 1</th>
<th>DOK 2</th>
<th>DOK 3</th>
<th>DOK 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RECALLING INFORMATION</strong></td>
<td><strong>SKILLS AND CONCEPTS</strong></td>
<td><strong>STRATEGIC THINKING</strong></td>
<td><strong>EXTENDED THINKING</strong></td>
</tr>
<tr>
<td>Recalling facts, terms, and properties.</td>
<td>Engaging beyond recall.</td>
<td>Requiring evidence, reasoning, and higher order thinking.</td>
<td>Open-ended tasks requiring significant, complex thought.</td>
</tr>
<tr>
<td>Following procedures and/or a series of steps.</td>
<td>Students are making decisions about how to approach and solve problems.</td>
<td>Multi-step tasks that require students to justify their responses and explain their thinking.</td>
<td>Extended periods of time for scientific investigation.</td>
</tr>
<tr>
<td>Student either knows the answer or not; there's nothing to be figured out or solved.</td>
<td>Collecting, classifying, and organizing data in: tables, charts, graphs.</td>
<td>Citing evidence. Developing logical arguments. Drawing conclusions from data.</td>
<td>Making connections and relating ideas.</td>
</tr>
</tbody>
</table>

**Key Concepts:**
- Identify
- Recognize
- Calculate
- Measure
- Explain relationships
- Describe examples
- Select procedures
- Developing models
- Forming conclusions
- Designing investigations
- Conducting experiments
- Deducting relationships
- Analyzing data

Based on Webb’s Depth of Knowledge

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*Image: engageok*
# Depth of Knowledge in Social Studies

## Depth of Knowledge (DOK)

<table>
<thead>
<tr>
<th>DOK 1</th>
<th>DOK 2</th>
<th>DOK 3</th>
<th>DOK 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recalling Information</strong></td>
<td><strong>Basic Reasoning</strong></td>
<td><strong>Complex Reasoning</strong></td>
<td><strong>Extended Reasoning</strong></td>
</tr>
<tr>
<td>Recalling facts, terms, and concepts.</td>
<td>Engaging beyond recalling or reproducing.</td>
<td>Requiring evidence, reasoning, and higher order thinking.</td>
<td>Plan, investigate, and develop over an extended period of time.</td>
</tr>
<tr>
<td>Asking students to know who, what, and when.</td>
<td>Asking students to know how and why.</td>
<td>Justify how and why with application and evidence.</td>
<td>Apply conceptual understanding and higher level thinking.</td>
</tr>
<tr>
<td>Recognizing and identifying specific information found in:</td>
<td>Comparing and contrasting people, places, and events.</td>
<td>Propose solutions. Make connections. Recognize misconceptions.</td>
<td>Analyze and synthesize information from multiple sources.</td>
</tr>
<tr>
<td>- maps</td>
<td>- charts</td>
<td>- drawings</td>
<td>- graphs</td>
</tr>
<tr>
<td><strong>Key Concepts:</strong></td>
<td><strong>Key Concepts:</strong></td>
<td><strong>Key Concepts:</strong></td>
<td><strong>Key Concepts:</strong></td>
</tr>
<tr>
<td>Identify</td>
<td>Classify into categories</td>
<td>Draw conclusions</td>
<td>Develop arguments</td>
</tr>
<tr>
<td>List</td>
<td>Understand relationships</td>
<td>Apply concepts</td>
<td>Plan solutions to problems</td>
</tr>
<tr>
<td>Define</td>
<td></td>
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</tbody>
</table>

*Based on Webb's Depth of Knowledge*