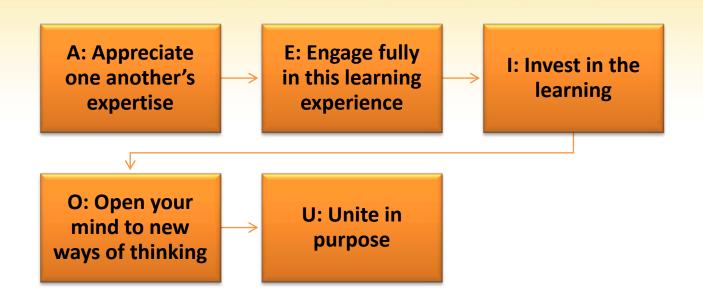
Investigating Depth of Knowledge: A Resource Module for SLO Assessment Development

2014-2015

AEIOU Norms



The Purpose of this Module is to...

- Provide leaders and teachers an opportunity to strengthen their understanding of Webb's Depth of Knowledge (DOK).
- Identify the distinguishing characteristics and sample standards and assessment items based on each of the four DOK levels.
- Explore DOK in order to support leaders and teachers in the development and implementation of SLO assessments district wide.

Essential Questions

- How is DOK connected to the SLO assessment development process?
- What are the benefits of utilizing DOK when developing SLO assessment items?
- Why is understanding cognitive demand and utilizing DOK important for the successful implementation of all SLOs?
- Why is it important for leaders and teachers to experience shared professional learning, such as this module, in order to be more knowledgeable about DOK?

Self-Reflection Questions

Think about your current practices of determining cognitive demand and rigor when developing assessments.

- How do you align and evaluate content standards and assessment items?
- How do you identify the type of thinking required for an assessment in order for the students to be successful?
- How is Webb's Depth of Knowledge used to develop assessments and/or support instruction district wide?
- What procedures are used by teachers district wide to ensure rigor and consistency within the course or subject area when creating and building assessments?

Please record your responses on Page 1 of the Participant's Guide.



Reflection on Academic Rigor

Reflect on the quote about rigor



Record your thoughts on a sticky note



Be prepared to share your thoughts

Education, from kindergarten through college, should push students to move beyond who and where they were when they entered the classroom. Students need to know that explicitly.

Lori Ungemah (2012)

Assistant Professor of English at The New Community College at CUNY

http://www.huffingtonpost.com/lori-ungemah/what-is-academic-rigor_b_1686412.html

What Is Your Definition of Academic Rigor?

- Academic rigor is learning in which students demonstrate a thorough, in-depth mastery of challenging tasks to develop cognitive skills through reflective thought, analysis, problem solving, evaluation or creativity.
- It is the quality of thinking, **not the quantity**, that defines academic rigor.

http://www.iasb.com/journal/j050607_02.cfm

Why Rigor Matters?

Rigor matters because it imposes cognitive load on students, forcing them to confront misconceptions, reconsider positions, separate the implicit from the explicit, and other critical thinking practices that distinguish shaky familiarity from true understanding.

Terry Heick

http://www.teachthought.com/learning/how-to-add-rigor-to-anything/



Defining DOK



What is DOK?

- Depth of Knowledge, or DOK, is based on the 1990s research of Dr. Norman L. Webb from the University of Wisconsin Center for Education Research and the National Institute for Science Education.
- A scale of cognitive demand designed to evaluate and align content standards and their corresponding assessment items.
- The kind and level of thinking (complexity) required of students in order to successfully complete an assessment item or task.

DOK Alignment: Standard and Item

- DOK addresses the content being assessed and the depth to which we expect students to demonstrate understanding of that content.
- Expectations and assessments are aligned if what is elicited from students on an assessment is as demanding cognitively as what students are expected to know and able to do as described in an expectation.

Depth of Knowledge

Focused on ways in which students interact with content standards and assessment items and tasks.

Determined by looking at the standard or the assessment item, **not** student work.

Reflected in the standard and/or assessment item or task.

Guides item development and increases rigor on assessments.



Bloom's Taxonomy vs. Webb's DOK

Bloom's Revised Bloom Webb **Evaluation** Creating **Extended Thinking Synthesis Evaluating** Strategic **Analysis Analyzing Thinking Application Skills & Concepts Applying** Comprehension **Understanding** Recall & **Knowledge** Remembering Reproduction



Depth of Knowledge Levels

Level 3: Strategic Thinking Level 4: Extended Thinking

Level 2: Skills and Concepts

Level 1:
Recall/
Reproduction

Depth of Knowledge Characteristics

DOK Level 1

- Verbatim recall of who, what, when, and where
- Simple understanding of a word or phrase
- Minimal understanding of text
- Apply basic mathematical formulas

DOK Level 2

- Apply skills and concepts
- Comprehend and process portions of a text; Main idea
- Explanation of how and why
- May apply DOK Level 1 skills, but not in a complex way.

DOK Level 3

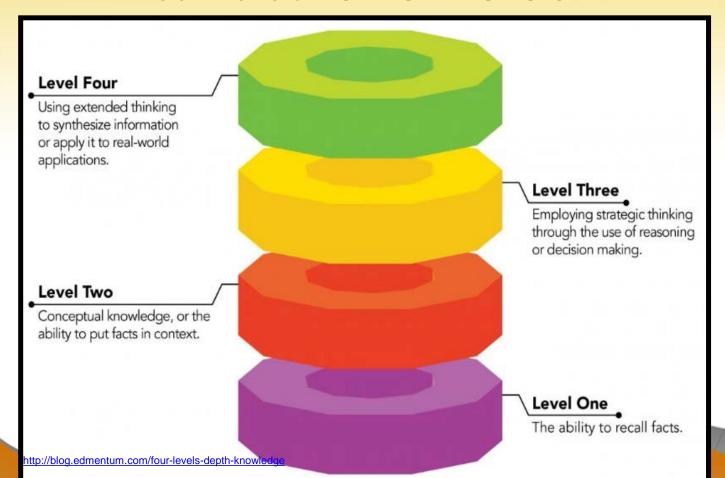
- Cognitive reasoning is a must due to complexity of items/tasks
- Justify how and why from DOK Level 2
- Going beyond text to explain/ connect ideas
- Propose and evaluate solutions

DOK Level 4

- High cognitive demand
- Extended time for investigations
- Take material from one content and apply it to another content
- New situations with deep awareness and great creativity



Cumulative DOK Levels



Defining DOK Reflection

Please answer the questions below.

Briefly Compare describe the Bloom's Define DOK. distinctions of Taxonomy and each DOK Webb's DOK. level.

Please record your responses to the questions on Page 2 of the Participant's Guide.



DOK and Extended Length and Time

Task	DOK Level
Collecting data samples over several months	1: Recall and Reproduction
Organizing the data in a chart	2: Skills and Concepts
Using this chart to make and justify predictions	3: Strategic Thinking
Developing a generalized model from this data and applying it to a new situation	

DOK Is Not Difficulty

- Difficulty is a reference to how complicated an item seems to be and how many students can answer a question correctly.
- DOK is about intended outcome, **not** difficulty. The intended student learning outcome is the focus of the depth of understanding or DOK.
- DOK is a reference to the complexity of mental processing (cognitive demand) that must occur to answer a question, perform a task, or generate a product.
- Assessments should include new examples and situations whenever possible. If the examples and situations in an assessment item were taught in class, the DOK level on the assessment item could become Level 1.



DOK Is Complex Thinking

- DOK provides a measurement of both the rigor and cognitive complexity, or thinking, required by a task, assessment, or standard.
- A "Difficult" question would be as follows: Name all the presidents of the United States beginning with George Washington. (DOK Level 1)
- A "Complex" question would be as follows: After a study on the American Revolution, research & explain reasons why George Washington did not want to be king of the United States. (DOK Level 3)

DOK and Complexity Activity

- Do you know the definition of vacation?
 - This process is DOK Level 1 Recall/Reproduction.
 - If all of the students know the definition, this question is considered an easy question.
- Do you know the definition of pneumonoultramicroscopicsilicovolcanoconiosis?
 - If most students do **not** know the definition, this question is considered a **difficult** question.
 - This process is DOK Level 1 Recall/Reproduction.



DOK and Complexity of Mental Processing Example

Adding is a mental process.

- Knowing the rule for addition is the intended outcome that influences the DOK level.
- Once someone learns the rules of addition, 4 + 4 is not difficult to solve. (DOK Level 1-Recall)
- Adding 9,678,895 + 3,578,885 is still DOK Level 1-Recall, but the problem may be more difficult to solve.

DOK and Verbs

- DOK is **not** determined by the verb, but by the context in which the verb is used and the depth of thinking required.
- With DOK, what comes after the verb is more important than the verb itself.
- While verbs may appear to point to a DOK level, it is what comes after the verb that is the best indicator of the DOK level.

DOK and Verb Context

- Verbs should be used appropriately and considered in context of other words.
 - For example, "Explain to me where you live" does not raise the DOK of a simple rote response.
 - ➤ "Analyze this sentence to decide if the commas have been used correctly" does not meet the criteria for high cognitive processing.

DOK and Context of Verb

Same verb in four different content <u>standards</u> used at four different DOK levels

- DOK Level 1 <u>Identify</u> essential information needed to accomplish a task. (Requires simple recall)
- **DOK Level 2** <u>Identify</u> information in a passage that is supported by facts. (Requires cognitive processing)
- **DOK Level 3** <u>Identify</u> the appropriateness of an argument using supporting evidence. (Requires deep understanding)
- **DOK Level 4** <u>Identify</u> interrelationships in more than one literary work. (Requires application of multiple texts)

DOK and Context of Verb

Same verb in three different <u>items or tasks</u> used at three different DOK levels

- DOK Level 1 <u>Describe</u> three characteristics of metamorphic rocks. (Requires simple recall)
- DOK Level 2 <u>Describe</u> the difference between metamorphic and igneous rocks. (Requires cognitive processing to determine the differences in the two rock types)
- **DOK Level 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 and Context of Verb Activity

- Review each of the following statements individually.
- Assign each statement a DOK Level of 1, 2, or 3.
- Record answers on Page 3 of the Participant's Guide.

Describe what kind of house and furniture you would build to protect your property from Goldilocks. Justify your answer.	DOK 1 , 2, or 3
Describe two physical characteristics of Goldilocks.	DOK 1 , 2, or 3
Describe the differences between the three bears.	DOK 1 , 2, or 3

Activity Source: http://www.rgccisd.org



DOK and Context of Verb Activity Key

Describe what kind of house and furniture you would build to protect your property from Goldilocks. Justify your answer.	DOK 3
Describe two physical characteristics of Goldilocks.	DOK 1
Describe the differences between the three bears.	DOK 2

Activity Source: http://www.rgccisd.org

Cognitive Complexity Reflection

Please answer the questions below.

Does extended time guarantee a DOK Level 4 item? Why?

Explain why DOK is not about the difficulty of an item.

How are verbs used to determine DOK?

Please record your responses to the questions on Page 4 of the Participant's Guide.

Dr. John D. Barge, State School Superintendent

DOK Ceiling

Defines the highest DOK level for each standard

Sample Standard	Potential DOK Levels	DOK Ceiling
Solve two step linear equations and inequalities in one variable over the rational numbers, verify the reasonableness of results, and interpret the solution or solutions in the context from which they arose.	DOK Level 1 – Solve two step linear equations DOK Level 2 – Verify reasonableness of results DOK Level 3 – Interpret solutions in context	3



DOK Ceiling Activity

- Identify each DOK level in the language of the standard.
- Define the highest DOK level, the ceiling, for the standard.
- Record answers on Page 3 of the Participant's Guide.

Sample Standard	Potential	DOK Ceiling
	DOK Levels	
Students identify various forms	DOK Level 1	
of government in the world,		
compare and contrast various	DOK Level 2	
forms of government in the		
world, and evaluate how	DOK Level 3	
effective they have been in	56 10 5	
establishing order, providing		
security, and accomplishing		
common goals.		

DOK Ceiling Activity Key

Sample Standard	Potential	DOK Ceiling
	DOK Levels	
Students identify various forms of government in the	DOK Level 1: Identify various forms of government	3
world, compare and contrast various forms of government in the world, and evaluate how effective they have been in	DOK Level 2: Compare and contrast various forms of government	
establishing order, providing security, and accomplishing common goals.	DOK Level 3: Evaluate forms of government based on criteria	



Assigning DOK Level to Standards

Consider the following when determining DOK levels for standards:

- The level of work students are most commonly required to perform for the course in order to successfully demonstrate their attainment of the standard.
- DOK level describes the depth of thinking involved in a task, not the likelihood the task will be completed correctly.
- If there is a question regarding which of two DOK levels a standard addresses, it is usually appropriate to select the higher of the two levels.

Assigning DOK Level to Items/Tasks

Consider the following when determining DOK levels for items/tasks:

- Two items can have the same stem but different DOK levels if one is a multiple-choice item and the other is a constructed response item.
- DOK level is assigned based on the intent of an item.
- Many questions seem higher-order when in fact the question was discussed in detail in class (thus, making it a DOK Level 1 question).
- If an item/task falls between two DOK levels, select the higher of the two levels.

DOK Summary

Measures rigor and cognitive complexity

A student cannot reach a higher DOK level unless he has first mastered a lower DOK level

Ensures standard's level of complexity matches the assessment item(s)

If students cannot perform at the standard's DOK level, they have not mastered the standard



Benefits of Using DOK with SLOs

Ensures intent of standard matches SLO assessment items

Determines the complexity of SLO assessment items

Confirms teachers are teaching to a level that will promote student academic growth

Promotes shared learning and a common language for rigor and cognitive demand

DOK and SLO Reflection

Please answer the questions below.

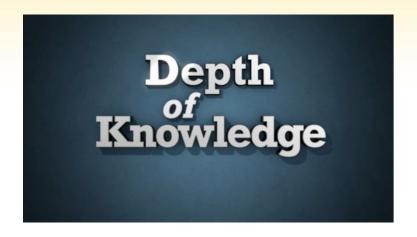
Define DOK ceiling and its importance.

What does DOK align and evaluate?

Why is DOK an essential part of the SLO assessment development process?

Please record your responses to the questions on Page 4 of the Participant's Guide.

DOK Four Minute Video



http://vimeo.com/42788913

Describing DOK Levels



Recall/Reproduction

DOK Level 1

Basic problem or task Facts, terms, or properties of objects Simple routine procedures or well known formulas

Either you know it or you don't One right answer and one step



DOK 1: Recall/Reproduction

Sample Activities

- Recall elements and details of story structure, such as sequence of events, character, plot, and setting.
- Conduct basic mathematical calculations.
- Label locations on a map.
- Represent in words or diagrams a scientific concept or relationship.
- Perform routine procedures like measuring length or using punctuation.
- Describe the features of a place or people.



Skills and Concepts

DOK Level 2

Main Idea and Inference;
Deeper than definitions

routine problem and decide how to solve it

Interpret and organize data with simple graphs One right answer and usually involves two or more steps

DOK 2: Skills and Concepts

Sample Activities

- Identify and summarize the major events in a narrative.
- Use context cues to identify the meaning of unfamiliar words.
- Solve routine multiple-step problems.
- Describe the cause/effect of a particular event.
- Identify patterns in events or behavior.
- Formulate a routine problem given data and conditions.

Webb, Norman L. and others. "Web Alianment Tool" 24 July 2005. Wisconsin Center of Educational Research, University of Wisconsin-Madison. 2 Feb. 2006. http://www.wcer.wisc.edu/WAI/index.aspre-



DOK General Rule of Thumb

If there is only one correct answer for the item, it is probably DOK level _____ or DOK level____?

Answer: DOK Level 1 or DOK Level 2

- DOK 1: You either know it (can recall it, locate it, do it) or you don't
- DOK 2: Apply one concept, then make a decision before going on applying a second concept (conceptual)

Karin Hess, Senior Associate, National Center for the Improvement of Educational Assessment

Please record your response to the question on Page 3 of the Participant's Guide.

Strategic Thinking

DOK Level 3

Complex or abstract thinking with analysis and evaluation

Apply knowledge or skills in a new and unique situation

Often requires students to justify answers

Usually more than one correct response or approach

DOK 3: Strategic Thinking

Sample Activities

- Support ideas with details and examples.
- Use voice appropriate to the purpose and audience.
- Identify research questions and design investigations for a scientific problem.
- Develop a scientific model for a complex situation.
- Determine the author's purpose and describe how it affects the interpretation of a reading selection.
- Apply a concept in other contexts.



Extended Thinking

DOK Level 4

Complex problems with a high cognitive demand

Solve real-world problems; Investigati on over time

Connect multiple content areas and sources

Multiple solutions and steps



DOK 4: Extended Thinking

Sample Activities

- Conduct a project that requires specifying a problem, designing and conducting an experiment, analyzing its data, and reporting results/ solutions.
- Apply mathematical model to illuminate a problem.
- Analyze and synthesize information from multiple sources.
- Describe and illustrate how common themes are found across texts from different cultures.
- Design a mathematical model to inform and solve a practical or abstract situation.



DOK Level 3 vs. DOK Level 4

- An item or task that requires students to apply problemsolving criteria based on one source in order to determine the best solution would be DOK Level 3.
- The addition of an investigation to gather data from multiple sources to use as evidence of the problem, and adding an implementation plan would make this same task a DOK Level 4.
- Remember, a DOK level 4 item requires research, investigation, and application often over an **extended period** of time due to the research of multiple sources and concepts.

DOK General Rule of Thumb

If there is more than one solution/approach, requiring evidence, the item is DOK level _____ or DOK level _____?

Answer: DOK Level 3 or DOK Level 4

- DOK 3: Must provide supporting evidence and reasoning (Not just HOW solved, but WHY – explain reasoning)
- DOK 4: All of DOK 3 + Use of multiple sources or texts

Karin Hess, Senior Associate, National Center for the Improvement of Educational Assessment

Please record your response to the question on Page 3 of the Participant's Guide.

Question Stems for Eliciting Thinking at Different DOK Levels

DOK Level 1:

- How can you find the meaning of _____?
- Who wrote ?
- What is the symbol ?
- Can you recall ??

DOK Level 2:

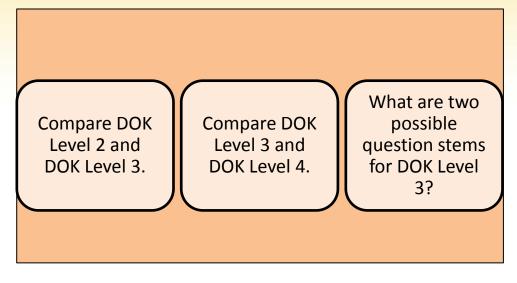
- How would you classify the type of _____?
- What can you say about_____?
- Can you rate ______ to _____?
- How would you summarize ?

Question Stems for Eliciting Thinking at Different DOK Levels

DOK Level 3:
■ What conclusion can be drawn from these three texts?
What is your interpretation of this text? Support your rationale.
■ What makes this performance superior to others you have experienced? Support your answer with specific details.
☐ How would you express the idea of in a two-dimensional artwork?
DOK Level 4:
Create a composition using instruments or voice of your choice.
■ How could the playwright change the character's actions to foreshadow?
What would you use to support (ex: thematic concents)?

Describing DOK Reflection

Please answer the questions below.



Please record your responses to the questions on Page 2 of the Participant's Guide.



Practicing with DOK

Please use your fingers (1-4) to indicate the DOK level.



Standard: Students will analyze how changes in technology, costs, and demand interact in competitive markets to change the price of goods.

DOK Level 3/Strategic Thinking:

The expectation in this standard is that students will know the changes, will see the cause and effect of those changes, and then will analyze why these changes have occurred. There is the process of application of understanding of the concepts of supply and demand to a specific time and place through the specific technology, the costs, and demand in the market place.

Item: During World War II, the United States experienced many shortages of resources.

- A. Identify two shortages the US experienced during World War II.
- B. Explain how the US dealt with each shortage you identified in Part A. Use details to support your answer.

DOK Level 2/Skills and Concepts:

More than one step is required here. The student must first identify the resource shortages (Step 1). Next, the student must describe in detail how the US handled each shortage (Step 2).

Standard: Students will construct twodimensional patterns for three-dimensional models, such as cylinders and cones.

DOK Level 2/Skills and Concepts:

Although recognizing and drawing a two-dimensional pattern, or a regular cylinder, is expected to be routine (Level 1), building a three-dimensional model would not be as routine. It would require at least two steps: first, recognizing the shape and, second, drawing a two-dimensional object to reflect the shape in three dimensions.

Item: From any vertex of a 4-sided polygon, 1 diagonal can be drawn. From any vertex of a 5-sided polygon, 2 diagonals can be drawn. From any vertex of a 6-sided polygon, 3 diagonals can be drawn. From any vertex of a 7-sided polygon, 4 diagonals can be drawn. How many diagonals can be drawn from any vertex with a 20-sided polygon?

DOK Level 1/Recall and Reproduction:

This is not really a geometry pattern. Rather, it simply requires students to notice an easy, routine pattern. This pattern is immediately recognizable and requires no processing. A more complex pattern could make this a DOK level 2 or DOK level 3 item.



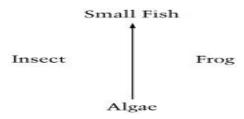
Standard: Students will analyze claims for their scientific merit and explain how scientists decide what constitutes scientific knowledge; show how science is related to other ways of knowing; show how science and technology affect our society; and show how people of diverse cultures have contributed to and influenced developments in science.

DOK Level 3/Strategic Thinking:

The activities described in this standard require synthesis of different kinds of information, analysis of information, and criticism based on scientific methodology, and deep explanation.



Item: You will now finish a diagram of a food web in the pond. The food web shows what eats what in the pond system. Draw arrows in the diagram below from each living thing to the things that eat it. (The first arrow is drawn for you.)



DOK Level 1/Recall/Reproduction:

Even though this item has multiple steps, the steps are not interrelated and do not increase the item's cognitive demands. Each step involves only recall.



Standard: Students will apply knowledge of grammar and usage, including, but not limited to, parts of speech, punctuation marks, sentence structure, verb tense, and clauses and phrases.

DOK Level 2/Skills and Concepts:

While using correct punctuation is generally a DOK Level 1 activity, correct usage of clauses and phrases is a more complex activity. The range of activities for this standard then makes it a DOK Level 2.

Item: What is the main reason the passage is written from the first person point of view?

- a) convince readers that the author is right.
- b) provide readers with the author's perspective. *
- c) enable the author to express unbiased opinions.
- d) show the author's professional qualifications.

DOK Level 3/Strategic Thinking:

The student must first process the text first and then understand first person point of view. Lastly, the student must conclude why the author chose first person point of view (judgment).

http://www.carter.kyschools.us/Prototypes08/Assessment%20Items/Reading/HS/Seventeen%20Again.pdf



Standard: Students will demonstrate understanding of the Earth's physical environment as a set of interconnected systems by analyzing the ways that humans have perceived, reacted to, and changed environments at the local/or global level and develop a plan to implement a change.

DOK Level 4/Extended Thinking:

Students are required to research the necessary data to analyze a specific situation in order to develop a plan to implement change.



Item: Under our system of checks and balances, how can the Supreme Court limit the power of both the Congress and the President?

- a) impeaching public officials.
- b) vetoing a law.
- c) making appointments.
- d) declaring a law unconstitutional.*

DOK Level 1/Recall and Reproduction:

This item requires students to recall basic information about how the system of checks and balances prevents the concentration of political power.



Getting to Know DOK Activity



Getting to Know DOK Activity

- Based on the distinguishing characteristics of each DOK level, write one assessment item or task for each DOK level on an index card.
- A variety of item types is preferred, but the items can be based on the standards and subject areas of your choice.
- Please share your items or tasks with another participant.
- Discuss the DOK level of each item/task in order to see if you both have the same answer.

LEVEL 1 Recall/Reproduction (Acquire)

LEVEL 2 Skill/Concept (Acquire/Use)

LEVEL 3 Strategic Thinking (Use/Extend)

LEVEL 4 Extended Thinking (Extend)

References

http://facstaff.wcer.wisc.edu/normw/

http://www.wcer.wisc.edu/WAT



Additional SLO Support

- TLE Electronic Platform: https://tle.gadoe.org
 (TKES / LKES Implementation Handbooks)
- GaDOE website: <u>www.doe.k12.ga.us</u> (SLO Page)
- SLO Manual: <u>www.rt3georgia.com</u> (SharePoint)

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