

The Webbs We Weave

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Why Use Depth of Knowledge?

Monitors construct validity to standards,
measuring depth as well as breadth

Provides assessment expectations to the
field

Webb's 1-2-3-4 classification has become
fairly common in the assessment
industry



Some Pitfalls of DoK

What's the ceiling (or floor)?

Where are the 1's and 4's?

While the Webb system is well-used, its application varies across states

How do we track this in test development?

1 means 'easy', 3 means 'hard'

Different Approaches to Classifying Assessment Tasks for Students

Webb	Bloom	Porter's Verbs
Recall (Level 1)	Recall	Memorize
	Comprehension	Identify
Simple Procedure (Level 2)	Perform Procedures	Apply
	Demonstrate Understanding	Understand
	Generalize	Analyze
Strategic Thinking (Level 3)	Solve Non-routine Problems	Synthesize
		Evaluate
Extended Thinking (Level 4)		



Kentucky – A Case Study

Adopted a model of DoK with latest revision to the
Core Content for Assessment for all content areas



Why move to DoK?

Mechanism to ensure that the intent of the standard and the level of student demonstration required by that standard matches the assessment items (required under NCLB)

Provides cognitive processing ceilings (highest level students can be assessed) on the KCCT



Kentucky's Depth of Knowledge Levels

Recall and Reproduction: Level 1

Skills & Concepts: Level 2

Strategic Thinking: Level 3

Extended Thinking: Level 4



Recall and Reproduction: Level 1

DoK 1 requires recall of information, such as a fact, definition, term, or performance of a simple process or procedure.

Answering a Level 1 item can involve following a simple, well-known procedure or formula. Simple skills and abilities or recall characterize DoK 1.



Sample DoK 1s for Science

List animals that survive by eating other animals

Recall a basic property of water

Recall why movements occur in the Earth's plates

Identify an ion that acids have in common



Skills/Concepts: Level 2

DoK 2 includes the engagement of some mental processing beyond recalling or reproducing a response. Items require students to make some decisions as to how to approach the question or problem.

These actions imply more than one mental or cognitive process/step.

Sample DoK 2s for Science

Compare desert and tropical environments

Interpret a simple diagram and apply a property of magnets—that opposite poles attract

Produce a simple description of the concept of sound

Graphically represent a scientific phenomenon (formation of mid ocean ridges) and describe a cause/effect relationship resulting from the phenomenon



Strategic Thinking: Level 3

DoK 3 requires deep understanding as exhibited through planning, using evidence, and more demanding cognitive reasoning. The cognitive demands at Level 3 are complex and abstract.

An assessment item that has more than one possible answer and requires students to justify the response they give would most likely be a Level 3.



Sample DoK 3s for Science

Apply the concept of cause and effect to an environmental change that may result in a particular species' extinction by producing and justifying a response

Provide evidence through examples and explanations of the continuous constructive and destructive forces that produce changes to the Earth

Develop a scientific model for a complex idea

Extended Thinking: Level 4

DoK 4 requires high cognitive demand and is very complex. Students are expected to make connections— relate ideas *within* the content or *among* content areas—and have to select or devise one approach among many alternatives on how the situation can be solved.

Due to the complexity of cognitive demand, DoK 4 often requires an extended period of time although time alone does not mean that the activity/task reflects DoK 4.

Challenges in implementing DoK to an existing assessment

Calibrating to a state's implementation of DoK levels

Helping educators understand what is meant by DoK and how that is reflected in the assessment (DoK does not equate with difficulty)

Impact on the item pool (not exceeding the ceiling)

Determining the appropriate balance of DoKs for the test blueprint (particularly when the assessment is designed to assess grade spans)

Number of Standards at Given DoK Ceilings

End of Primary				
Subdomain	DoK 1	DoK 2	DoK 3	
1	-	3	2	
2	-	4	-	
3	-	4	-	
4	-	5	-	
<hr/>				
Totals	-	16	2	

Grade 4				
Subdomain	DoK 1	DoK 2	DoK 3	
1	-	-	4	
2	-	1	3	
3	-	1	3	
4	-	2	5	
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Totals	-	4	15	



Kentucky's Plan and Goals for DoK Blueprints

Analyze current pool of items relative to DoK targets

Provide a plan that roughly aligns total test DoK
with targets from standards

Tally and track DoK coverage across years



Another Option

Assign DoK expectations from standards as a first step

Create functional categories of student cognition by merging the content standards and DoK

Design test blueprints based on these functional categories rather than strictly using Webb 1-2-3-4

From Porter, et al., 2002

Cognitive Demand Categories for Language Arts / Reading

B	C	D	E	F
Memorize / Recall	Perform Procedures / Explain	Generate / Create / Demonstrate	Analyze / Investigate	Evaluate
<u>Reproduce sounds or words</u>	<u>Follow instructions</u>	<u>Create / develop connections among text, self, world</u>	<u>Categorize / schematize information</u>	<u>Determine relevance, coherence, internal consistency, logic</u>
<u>Provide facts, terms, definitions, conventions</u>	<u>Give examples</u>	<u>Recognize relationships</u>	<u>Distinguish fact and opinion</u>	<u>Assess adequacy, appropriateness, credibility</u>
<u>Locate literal answers in text</u>	<u>Check consistency</u>	<u>Dramatize</u>	<u>Compare and contrast</u>	<u>Test conclusions, hypotheses</u>
<u>Identify relevant information</u>	<u>Summarize</u>	<u>Order, group, outline, organize ideas</u>	<u>Identify with another's point of view</u>	<u>Synthesize content and ideas from several sources</u>
<u>Describe</u>	<u>Identify purpose, main ideas, organizational patterns</u>	<u>Express new ideas (or express ideas newly)</u>	<u>Make inferences, draw conclusions</u>	<u>Generalize</u>
	<u>Gather information</u>	<u>Develop reasonable alternatives</u>	<u>Predict probable consequences</u>	<u>Critique</u>
		<u>Integrate with other topics and subjects</u>		

Sample Functional DoK Categories

Foundational	Conceptual	Application	Constructive
<ul style="list-style-type: none"> -Declarative knowledge -Fact recall -Definition / vocabulary 	<ul style="list-style-type: none"> -Recognition of a concept -Description of a principle -Description of a process 	<ul style="list-style-type: none"> -Procedural knowledge -Applying conceptual knowledge to a novel situation -Using predetermined models to devise a solution -Classifying diverse objects into unifying groups -New, different example of a concept 	<ul style="list-style-type: none"> -Synthesis of a novel response (by pulling several different pieces of knowledge together) -Multi-step problem solving -Experimental design and critique -Hypothesis formulation -Predictive reasoning -Experimental data analysis -Engineering design process



A Stepwise Activity to Play with this Idea a Bit...

1. Examine some science standards and pick out student performance words (stated or implied) that match DoK expectation
2. Produce a summative table that lists these words and phrases by DoK
3. Analyze these lists to come up with classifications of ‘Functional DoK’
4. Place expectations from the standards into each classification