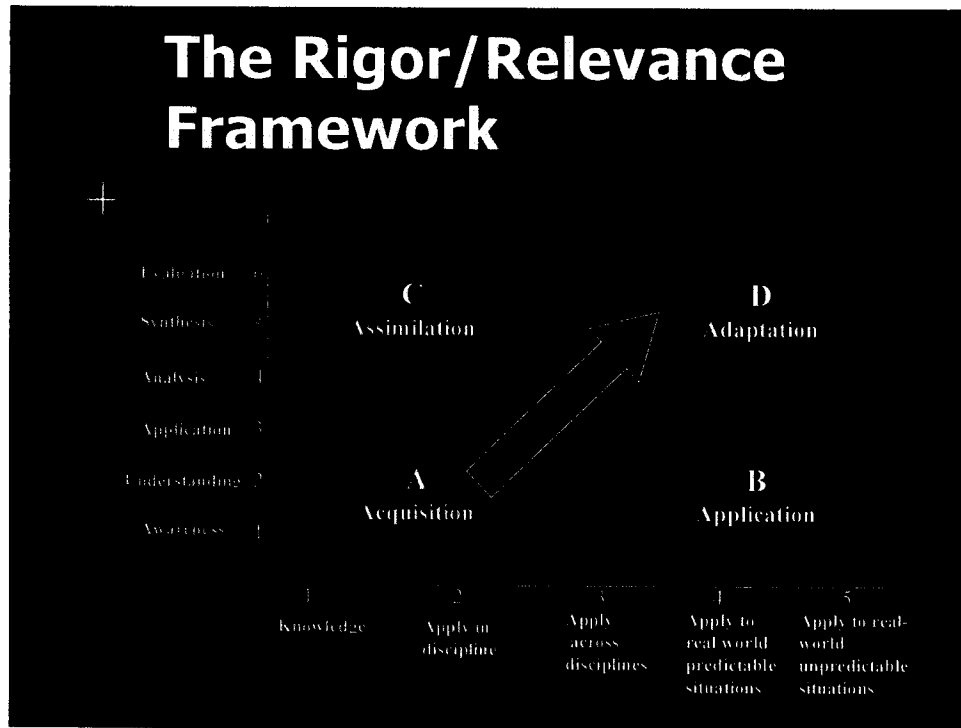


West Virginia  
Department  
of  
Education  
Office of Instruction

**Rigorous Content Standards**

**West Virginia Department of Education  
Office of Instruction  
Rigorous Content Standards**



**The International Center for Leadership in Education, *Rigor and Relevance Framework***

Quality 21<sup>st</sup> Century instruction and assessment, designed around the content, learning skill and technology tool standards and characterized by both rigor and relevance, will provide students with the rich learning and assessment experiences found in Quadrant D of the *Rigor and Relevance Framework*. When students engage in rich learning experiences requiring the skills of analysis, synthesis and evaluation, while applying their knowledge across disciplines to both real world predictable and unpredictable situations, it is only appropriate that the assessments of that learning are also designed in Quadrant D. Thus, we have a need for quality classroom-based performance assessments.

To support Quadrant D learning and classroom assessment, the Office of Instruction is currently working with teachers to create instructional guides in reading, English, language arts, mathematics, science and social studies. The primary focus of the online instructional guides project is to provide classroom teachers with quality classroom performance-based assessments accompanied by carefully designed rubrics that reflect the identified learning goals.

## Depth of Knowledge Study – Dr. Norman Webb, University of Wisconsin

### Reading

**Reading Level 1** requires students to receive or recite facts or to use simple skills or abilities. Oral reading that does not include analysis of the text as well as basic comprehension of a text is included. Items require only a shallow understanding of the text presented and often consist of verbatim recall from text, slight paraphrasing of specific details from the text, or simple understanding of a single word or phrase. Some examples that represent, but do not constitute all of, Level 1 performances are:

- Support ideas by reference to verbatim, or only slightly paraphrased, details from the text
- Use a dictionary to find the meanings of words
- Recognize figurative language in a reading passage

**Reading Level 2** includes the engagement of some mental processing beyond recalling or reproducing a response; it requires both comprehension and subsequent processing of text or portions of text. Inter-sentence analysis of inference is required. Some important concepts are covered, but not in a complex way. Standards and items at this level may include words such as *summarize, interpret, infer, classify, organize, collect, display, compare, and determine whether fact or opinion*. Literal main ideas are stressed. A Level 2 assessment item may require students to apply skills and concepts that are covered in Level 1. However, items require closer understanding of text, possibly through the item's paraphrasing of both the question and the answer. Some examples that represent, but do not constitute all of, Level 2 performance are:

- Use context cues to identify the meaning of unfamiliar words, phrases and expressions that could otherwise have multiple meanings
- Predict a logical outcome based on information in a reading selection
- Identify and summarize the major events in a narrative.

Deep knowledge becomes a greater focus at **Reading Level 3**. Students are encouraged to go beyond the text; however, they are still required to show understanding of the ideas in the text. Students may be encouraged to explain, generalize or connect ideas. Standards and items at Level 3 involve reasoning and planning. Students must be able to support their thinking. Items may involve abstract theme identification, inference across an entire passage, or application of prior knowledge. Items may also involve more superficial connections between texts. Some examples that represent, but do not constitute all of, Level 3 performance are:

- Explain or recognize how author's purpose affects the interpretation of a reading selection
- Summarize information from multiple sources to address a specific topic.
- Analyze and describe the characteristics of various types of literature

Higher order thinking is central and knowledge is deep at **Reading Level 4**. The standards or assessment item at this level will probably be an extended activity, with extended time provided for completing it. The extended time period is not a distinguishing factor if the required work is only repetitive and does not require the application of significant conceptual understanding and higher order thinking. Students take information from at least one passage of text and are asked

to apply this information to a new task. They may also be asked to develop hypotheses and perform complex analyses of the connections among texts. Some examples that represent, but do not constitute all of, Level 4 performances are:

- Analyze and synthesize information from multiple sources.
- Examine and explain alternative perspectives across a variety of sources.
- Describe and illustrate how common themes are found across texts from different cultures.

## Writing

**Writing Level 1** requires the student to write or recite simple facts. The focus of this writing or recitation is not on complex synthesis or analysis but on basic ideas. The students are asked to list ideas or words, as in a brainstorming activity, prior to written composition; are engaged in a simple spelling or vocabulary assignment; or are asked to write simple sentences. Students are expected to write, speak, and edit using the conventions of Standard English. This includes using appropriate grammar, punctuation, capitalization, and spelling. Students demonstrate a basic understanding and appropriate use of such reference materials as a dictionary, thesaurus, or Web site. Some examples that represent, but do not constitute all of, level 1 performance are:

- Use punctuation marks correctly
- Identify Standard English grammatical structures, including the correct use of verb tenses.

**Writing Level 2** requires some mental processing. At this level, students are engaged in first-draft writing or brief extemporaneous speaking for a limited number of purposes and audiences. Students are expected to begin connecting ideas, using a simple organizational structure. For example, students may be engaged in note-taking, outlining, or simple summaries. Text may be limited to one paragraph. Some examples that represent, but do not constitute all of, Level 2 performance are:

- Construct or edit compound or complex sentences, with attention to correct use of phrases and clauses.
- Use simple organizational strategies to structure written work.
- Write summaries that contain the main idea of the reading selection and pertinent details.

**Writing Level 3** requires some higher-level mental processing. Students are engaged in developing compositions that include multiple paragraphs. These compositions may include complex sentence structure and may demonstrate some synthesis and analysis. Students show awareness of their audience and purpose through focus, organization, and the use of appropriate compositional elements. The use of appropriate compositional elements includes such things as addressing chronological order in a narrative, or including supporting facts and details in an informational report. At this stage, students are engaged in editing and revising to improve the quality of the composition. Some examples that represent, but do not constitute all of, Level 3 performance are:

- Support ideas with details and examples
- Use voice appropriate to the purpose and audience
- Edit writing to produce a logical progression of ideas.

Higher-level thinking is central to **Writing Level 4**. The standard at this level is multi-paragraph composition that demonstrates the ability to synthesize and analyze complex ideas or themes. There is evidence of a deep awareness of purpose and audience. For example, informational papers include hypotheses and supporting evidence. Students are expected to create compositions that demonstrate a distinct voice and that stimulate the reader or listener to consider new perspectives on the addressed ideas and themes. An example that represents, but does not constitute all of, level 4 performance is:

- Write on analysis of two selections, identifying the common theme and generating a purpose that is appropriate for both.

Table 1

Number and Percent of Objectives by Depth-of-Knowledge Level by Grade for West Virginia 2006 Language Arts Content Standards and Objectives – Dr. Norman Webb Data

Results Following Original DOK and Alignment Study				Results Following Revised DOK and Alignment Study		
Grade	Number of Objectives	DOK Level	# of Objectives by Level	Number of Objectives	DOK Level	# of Objectives By Level
K	23	1 2 3	9 13 1			
1	31	1 2 3	11 16 4			
2	29	1 2 3 4	12 12 3 2			
3	29	1 2 3 4	10 11 6 2			
4	35	1 2 3 4	9 14 11 1			
5	38	1 2 3 4	16 16 6			
6	43	1 2 3 4	13 18 12			
7	43	1 2 3 4	14 18 11			
8	39	1 2 3 4	8 15 16			
9	36	1 2 3 4	5 17 11 3			
10	37	1 2 3 4	4 17 14 2			
11	34	1 2 3 4	2 12 15 5			
12	37	1 2 3 4	2 8 20 7			

Mathematics (based on Webb, Technical Issues in Large-Scale Assessment, report published by CCSSO, December 2002)

Webb recommends that large-scale, on-demand assessments only assess Depth of Knowledge Levels 1, 2 and 3, due primarily to testing time constraints. Depth of knowledge at Level 4 in mathematics is best reserved for local assessment.

**Recall and Reproduction – Depth of Knowledge Level 1** includes the recall of information such as fact, definition, term, or a simple procedure, as well as performing a simple algorithm or applying a formula. That is, in mathematics a one-step, well-defined, and straight algorithmic procedure should be included at this lowest level. Other key words that signify a Level 1 include *identify, recall, recognize, use* and *measure*. Verbs such as *describe* and *explain* could be classified at different levels depending on what is to be described and explained. Some examples that represent but do not constitute all of Level 1 performance are:

- Identify a diagonal in a geometric figure
- Multiply two numbers
- Find the area of a rectangle
- Convert scientific notation to decimal form
- Measure an angle

**Skills and Concepts/Basic Reasoning – Depth of Knowledge Level 2** includes the engagement of some mental processing beyond a habitual response. A level 2 assessment item requires students to make some decisions as to how to approach the problem or activity, whereas Level 1 requires students to demonstrate a rote response, perform a well-known algorithm, follow a set procedure (like a recipe) or perform a clearly defined series of steps. Keywords that generally distinguish a Level 2 item include *classify, organize, estimate, make observations, collect and display data, and compare data*. These actions imply more than one step. For example, to compare data requires first identifying characteristics of the objects or phenomenon and then grouping or ordering the objects.

Some action verbs, such as explain, describe, or interpret could be classified at different levels depending on the object of the action. For example, if an item required students to explain how light affects mass by indicating there is a relationship between light and heat, this is considered a Level 2. Interpreting information from a simple graph, requiring reading information from the graph, also is a Level 2. Interpreting information from a complex graph that requires some decisions on what features of the graph need to be considered and how information from the graph can be aggregated is a Level 3. Caution is warranted in interpreting Level 2 as only skills because some reviewers will interpret skills very narrowly, as primarily numerical skills, and such interpretation excludes from this level other skills such as visualization skills and probability skills, which may be more complex simply because they are less common. Other Level 2 activities include explaining the purpose and use of experimental procedures; carrying out experimental procedures; making observations and collecting data; classifying, organizing, and comparing data; and organizing and displaying data in tables, graphs, and charts. Some examples that represent but do not constitute all of Level 2 performance are:

- Classify quadrilaterals
- Compare two sets of data using the mean, median, and mode of each set
- Determine a strategy to estimate the number of jellybeans in a jar

- Extend a geometric pattern
- Organize a set of data and construct an appropriate display.

**Strategic Thinking/Complex Reasoning – Depth of Knowledge Level 3** requires reasoning, planning, using evidence, and a higher level of thinking than the previous two levels. In most instances, requiring students to explain their thinking is a Level 3. Activities that require students to make conjectures are also at this level. The cognitive demands at Level 3 are complex and abstract. The complexity does not result from the fact that there are multiple answers, a possibility for both Levels 1 and 2, but because the task requires more demanding reasoning. An activity, however, that has more than one possible answer and requires students to justify the response they give would most likely be a Level 3. Other Level 3 activities include drawing conclusions from observations; citing evidence and developing a logical argument for concepts; explaining phenomena in terms of concepts; and using concepts to solve problems. Some examples that represent but do not constitute all of Level 3 performance are:

- Write a mathematical rule for a non-routine pattern
- Explain how changes in the dimensions affect the area and perimeter/circumference of geometric figures
- Determine the equations and solve and interpret a system of equations for a given problem
- Provide a mathematical justification when a situation has more than one possible outcome.
- Interpret information from a series of data displays

**Extended Thinking/Reasoning – Depth of Knowledge Level 4** requires complex reasoning, planning, developing and thinking most likely over an extended period of time. The extended time period is not a distinguishing factor if the required work is only repetitive and does not require applying significant conceptual understanding and higher-order thinking. For example, if a student has to take the water temperature from a river each day for a month and then construct a graph, this would be classified as a Level 2. However, if the student is to conduct a river study that requires taking into consideration a number of variables, this would be a Level 4. At Level 4, the cognitive demands of the task should be high and the work should be very complex. Students should be required to make several connections – relate ideas within the content area or among content areas – and have to select one approach among many alternatives on how the situation should be solved, in order to be at this highest level. Level 4 activities include designing and conducting experiments; making connections between a finding and related concepts and phenomena; combining and synthesizing ideas into new concepts; and critiquing experimental designs. Some examples that represent but do not constitute all of Level 4 performances are:

- Collect data over time taking into consideration a number of variables and analyze the results
- Model a social studies situation with many alternatives and select one approach to solve with a mathematical model.
- Develop a rule for a complex pattern and find a phenomenon that exhibits that behavior
- Complete a unit of formal geometric constructions, such as nine-point circles of the Euler line
- Construct a non-Euclidean geometry.

Table 2

*Average Depth-of-Knowledge Levels for Mathematics by Grade for West Virginia and Three Other States – Data from Dr. Norman Webb*

Grade	Total		Number of objs.	Total		Number of objs.	Total		Number of objs.	Total	
	Number of objs.	Avg DOK		Avg DOK	Number of objs.		Avg DOK	Number of objs.		Avg DOK	
	West Virginia September		West Virginia November		State A		State B		State C		
K	27	1.37	25	1.6							
1	44	1.32	34	1.53	46	1.46					
2	40	1.5	34	1.59	45	1.51	44	1.54			
3	44	1.59	34	1.74	49	1.55	48	1.47	17	2	
4	46	1.35	28	1.68	37	1.55	42	1.55	17	2.35	
5	34	1.53	31	1.80	37	1.61	50	1.44	15	2.33	
6	33	1.58	31	1.93	63	2.29	38	1.37	23	1.83	
7	32	1.63	29	2.1	41	1.56	38	1.87	17	1.88	
8	30	2	27	2.22	43	1.51			17	1.86	
Algebra I	23	1.61	20	1.95	37	1.57			21	1.81	
Geometry	22	2.23	21	2.29	48	1.75					
Algebra 2			16	1.93							
Concept. Math			17	2.24							
Trig			11	2.64							
Prob.			14	2.43							
Pre-Calc			14	2.36							

It should be noted that the DOK levels present in the recently revised objectives have considerably increased when compared to the WV standards from September and that of states that have comparable constructs to that of WV. It can also be concluded from this data that the mathematics objectives have been refined and streamlined such that fewer objectives are presented, but with greater depth of knowledge. Even when compared with State C, whose objectives are broad and lack specificity, WV showed a greater DOK in 4 of 7 grade levels and a more even progression across grade levels. As a result of recent revisions the WV mathematics standards show an improvement of concision, depth of knowledge and progression from grades K to Pre-Calculus.

**Mathematics**

Table 3 – Data from Dr. Norman Webb

Grade	Number of Objectives	Depth of Knowledge	
K	25	1	12
		2	11
		3	2
1	34	1	19
		2	12
		3	3
2	34	1	18
		2	12
		3	4
3	34	1	13
		2	17
		3	4
4	28	1	12
		2	13
		3	3
5	31	1	8
		2	21
		3	2
6	31	1	6
		2	21
		3	4
7	29	1	6
		2	15
		3	7
		4	1
8	27	1	4
		2	13
		3	10
Algebra	21	1	4
		2	13
		3	3
Geometry	21	1	1
		2	13
		3	7
Algebra II	16	1	2
		2	13
		3	1
Conceptual Mathematics	17	1	0
		2	13
		3	4
Trigonometry	11	1	0
		2	5
		3	5
		4	1
Probability & Statistics	14	1	0
		2	8
		3	6
Pre Calculus	14	1	0
		2	9
		3	5

## Sample Level 3 Depth of Knowledge in Mathematics

M.O.K.1.10 create grade-appropriate picture and story problems, solve using a variety of strategies, present solutions and justify results.

M.O.K.5.1 collect, organize, display and interpret data using a pictograph and bar graph (with and without technology)

M.O.1.1.14 create grade-appropriate picture and story problems using a variety of strategies (with and without technology), present solutions and justify results

M.O.1.5.1 collect, sort, organize and draw conclusions about data using a bar graph and a pictograph

To change M.O.1.5.1 to a DOK Level 4:

*Identify a real life situation to gather data over time; make a hypothesis as to the outcome; design and implement a method to collect, organize, and analyze data; analyze the results to make a conclusion; evaluate the validity of the hypothesis based upon collected data; design a mode of presentation using a pictograph and a bar graph (with and without technology)*

M.O.6.4.2 develop and test hypotheses to determine formulas for

- perimeter of polygons, including composite findings
- area of parallelograms
- area of triangles
- area of composite figures made of parallelograms and triangles
- circumference of a circle
- area of a circle
- volume of a rectangular prism

M.O.7.2.4 analyze proportional relationships in real-world situations, select an appropriate method to determine the solution and justify reasoning for choice of method

M.O.7.2.5 solve one-step linear equations and inequalities using a variety of strategies containing rational numbers with integer solutions; graph solutions, and justify the selection of the strategy and the reasonableness of the solution.

M.O.8.5.4 analyze problem situations, games of chance, and consumer applications using random and non-random samplings to determine probability, make predictions, and identify sources if bias.

## Science

Four levels of depth of knowledge were used for this analysis. Because the fourth level is rare or even absent in most standardized assessments, reviewers usually make distinctions among DOK levels 1, 2 and 3. Please note that, in science, “knowledge” can refer both to content knowledge and knowledge of scientific processes. This meaning of knowledge is consistent with the *National Science Education Standards* (NSES), which terms “Science as Inquiry” as its first Content Standard.

**Level 1 (Recall and Reproduction)** is the recall of information such as a fact, definition, term, or a simple procedure, as well as performing a simple science process or procedure. Level 1 only requires students to demonstrate a rote response, use a well-known formula, follow a set procedure (like a recipe), or perform a clearly defined series of steps. A “simple” procedure is well-defined and typically involves only one-step. Verbs such as *identify*, *recall*, *recognize*, *use*, *calculate*, and *measure* generally represent cognitive work at the recall and reproduction level. Simple word problems that can be directly translated into and solved by a formula are considered Level 1. Verbs such as *describe* and *explain* could be classified at different DOK levels, depending on the complexity of what is to be described and explained.

A student answering a Level 1 item either knows the answer or does not: that is, the answer does not need to be “figured out” or “solved.” In other words, if the knowledge necessary to answer an item automatically provides the answer to the item, then the item is at Level 1. If the knowledge necessary to answer the item does not automatically provide the answer, the item is at least at Level 2. Some examples that represent, but do not constitute all of, Level 1 performance are:

- Recall or recognize a fact, term, or property.
- Represent in words or diagrams a scientific concept or relationship.
- Provide or recognize a standard scientific representation for simple phenomenon.
- Perform a routine procedure such as measuring length.

**Level 2 (Skills and Concepts)** includes the engagement of some mental processing beyond recalling or reproducing a response. The content knowledge or process involved is *more complex* than in Level 1. Items require students to make some decisions as to how to approach the question or problem. Keywords that generally distinguish a Level 2 item include *classify*, *organize*, *estimate*, *make observations*, *collect and display data*, and *compare data*. These actions imply *more than one step*. For example, to compare data requires first identifying characteristics of the objects or phenomenon and then grouping or ordering the objects. Level 2 activities include making observations and collecting data; classifying, organizing, and comparing data; and organizing and displaying data in tables, graphs, and charts.

Some action verbs, such as *explain*, *describe*, or *interpret*, could be classified at different DOK levels, depending on the complexity of the action. For example, interpreting information from a simple graph, requiring reading information from the graph, is at Level 2. An item that requires interpretation from a complex graph, such as making decisions regarding features of the

graph that need to be considered and how information from the graph can be aggregated, is at Level 3. Some examples that represent, but do not constitute all of Level 2 performance, are:

- Specify and explain the relationship between facts, terms, properties, or variables.
- Describe and explain examples and non-examples of science concepts.
- Select a procedure according to specified criteria and perform it.
- Formulate a routine problem given data and conditions.
- Organize, represent and interpret data.

**Level 3 (Strategic Thinking)** requires reasoning, planning, using evidence, and a higher level of thinking than the previous two levels. The cognitive demands at Level 3 are complex and abstract. The complexity does not result only from the fact that there could be multiple answers, a possibility for both Levels 1 and 2, but because the multi-step task requires more demanding reasoning. In most instances, requiring students to explain their thinking is at Level 3; requiring a very simple explanation or a word or two should be at Level 2. An activity that has more than one possible answer and requires students to justify the response they give would most likely be at Level 3. Experimental designs in Level 3 typically involve more than one dependent variable. Other Level 3 activities include drawing conclusions from observations; citing evidence and developing a logical argument for concepts; explaining phenomena in terms of concepts; and using concepts to solve non-routine problems. Some examples that represent, but do not constitute all of, Level 3 performance, are:

- Identify research questions and design investigations for a scientific problem.
- Solve non-routine problems.
- Develop a scientific model for a complex situation.
- Form conclusions from experimental data.

**Level 4 (Extended Thinking)** makes high cognitive demands and requires complex thinking. Students are required to make several connections—relate ideas within the content area or among content areas—and have to select or devise one approach among many alternatives on how the situation can be solved. Many on-demand assessment instruments will not include any assessment activities that could be classified as Level 4. However, standards, goals, and objectives can be stated in such a way as to expect students to perform extended thinking. “Develop generalizations of the results obtained and the strategies used and apply them to new problem situations,” is an example of a Grade 8 objective that is at Level 4. Many, but not all, performance assessments and open-ended assessment activities requiring significant thought will be Level 4.

Level 4 requires complex reasoning, experimental design and planning, and probably will require an extended period of time either for the science investigation required by an objective, or for carrying out the multiple steps of an assessment item. However, the extended time period is not a distinguishing factor if the required work is only repetitive and does not require application of significant conceptual understanding and higher-order thinking. For example, if a student has to take the water temperature from a river each day for a month and then construct a graph, this would be classified as a Level 2 activity. However, if the student conducts a river

study that requires taking into consideration a number of variables, this would be at Level 4. Some examples that represent, but do not constitute all of, Level 4 performance are:

- Based on provided data from a complex experiment that is novel to the student, deduct the fundamental relationship between several controlled variables.
- Conduct an investigation, from specifying a problem to designing and carrying out an experiment, to analyzing its data and forming conclusions.

**Table 4. Chart IV. WV DOK Levels for Science, Grades K-8**

Data from Dr. Norman Webb

Grade	Number of objectives	Total Avg DOK	Number of objectives	Total Avg DOK	Number of objectives	Total Avg DOK
	<b>West Virginia</b>		<b>State A</b>		<b>State B</b>	
K	23	1.57				
1	30	1.47				
2	32	1.44				
3	45	1.84	49	1.2	-	-
4	59	1.85	44	1.2	-	-
5	44	1.93	51	1.3	24	1.8
6	47	1.91	25	1.4	-	-
7	52	1.85	26	1.3	-	-
8	47	1.89	38	1.4	28	2

**WV DOK Levels for High School Science by Standard**

NOTE: Latest Review by Dr. Webb is not yet available

Grade/Course	Standard 1 Nature of Science					Standard 2 Science Content				Standard 3 Application of Science			
	DOK Level					DOK Level				DOK Level			
	1	2	3	4	<b>Avg</b>	1	2	3	<b>Avg</b>	1	2	3	<b>Avg</b>
9	3	2	2	1	<b>2.13</b>	9	21	4	<b>1.85</b>	1	2	3	<b>2.33</b>
10	3	2	2	1	<b>2.13</b>	12	21	1	<b>1.68</b>	1	2	3	<b>2.33</b>
Adv Bio	3	2	2	1	<b>2.13</b>	7	15	1	<b>1.74</b>	1	2	3	<b>2.33</b>
Bio Tech	3	2	2	1	<b>2.13</b>	11	13	3	<b>1.70</b>	1	2	3	<b>2.33</b>
Anatomy/Phys	3	2	2	1	<b>2.13</b>	22	9		<b>1.29</b>	1	2	3	<b>2.33</b>
Adv Chem	3	2	2	1	<b>2.13</b>	13	20	1	<b>1.65</b>	1	1	4	<b>2.50</b>
Chem Tech	3	2	2	1	<b>2.13</b>	14	12		<b>1.46</b>	1	2	3	<b>2.33</b>
Adv Earth	3	2	2	1	<b>2.13</b>	19	10	4	<b>1.55</b>	1	2	3	<b>2.33</b>
Adv Physics	3	2	2	1	<b>2.13</b>	7	11	3	<b>1.81</b>	1	2	3	<b>2.33</b>
Physics Tech	3	2	2	1	<b>2.13</b>	11	20	2	<b>1.73</b>	1	2	3	<b>2.33</b>

## Social Studies

**Level 1 (Recall and Reproduction)** asks students to recall facts, terms, concepts, trends, generalizations, and theories, or to recognize or identify specific information contained in graphics. This level generally requires students to identify, list, or define. The items at this level usually ask the student to recall who, what, when and where. Items that require students to *describe* and *explain* could be classified at Level 1 or 2, depending on what is to be described and explained. At Level 1, *describe or explain* would recall, recite, or reproduce information. Items that require students to recognize or identify specific information contained in maps, charts, tables, graphs or drawings are generally Level 1 items.

**Level 2 (Basic Reasoning)** includes the engagement of some mental processing beyond recalling or reproducing a response. This level generally requires students to contrast or compare people, places, events and concepts; convert information from one form to another; classify or sort items into meaningful categories; describe or explain issues and problems, patterns, cause and effect, significance or impact, relationships, points of view or processes. At Level 2, *describe or explain* would require students to go beyond a description or explanation of recalled information to describe or explain a result or *how* or *why*.

**Level 3 (Application)** requires reasoning, using evidence, and a higher level of thinking than the previous two levels. Students would go beyond knowing *how and why* to justifying the *how and why* through application and evidence. The cognitive demands at Level 3 are more complex and more abstract than Levels 1 or 2. Items at Level 3 include drawing conclusions; citing evidence; using concepts to explain *how and why*; using concepts to solve problems; analyzing similarities and differences in issues and problems; proposing and evaluating solutions to problems; recognizing and explaining misconceptions or making connections across time and place to explain a concept or big idea.

**Level 4 (Extended Reasoning)** requires even more complex reasoning and the addition of planning, investigating, or developing that will most likely require an extended period of time. The extended time period is *not* a distinguishing factor if the required work is only repetitive and does *not* require applying significant conceptual understanding and higher-order thinking. At this level, the cognitive demands should be high and the work should be very complex. Students should be required to connect and relate ideas and concepts *within* the content area or *among* content areas in order to be at this highest level. The distinguishing factor for Level 4 would be evidence through a task or product that the cognitive demands have been met. A Level 4 performance will require students to analyze and synthesize information from multiple sources, examine and explain alternative perspectives across a variety of sources, and/or describe and illustrate how common themes and concepts are found across time and place. In some Level 4 performance, students will make predictions with evidence as support, develop a logical argument, or plan and develop solutions to problems.

As the above description implies, the depth-of-knowledge levels indicate the content complexity of objectives. Complexity is not the same as difficulty. A relatively simple task may still be difficult for some students. Since we expect younger students to be ready for less complex tasks than older ones, it is reasonable to have a progression over the grades in the

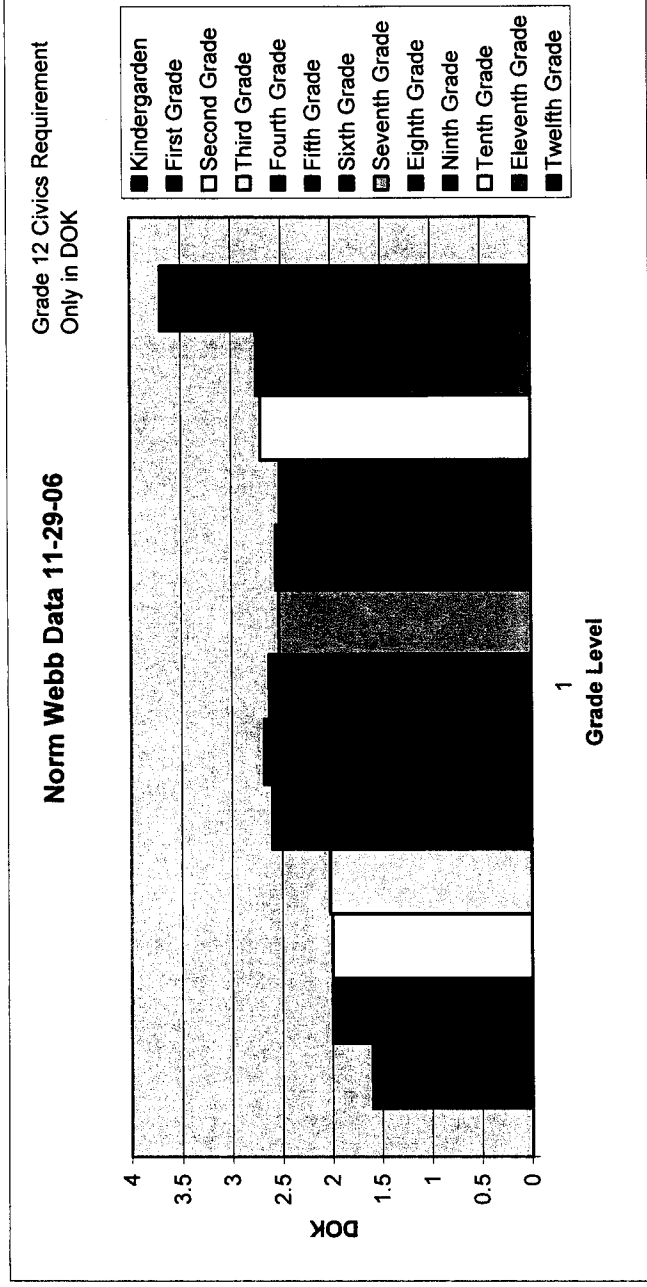
degree of content complexity expected of students. If that occurs, the average depth of knowledge required should increase over time. If it is relatively flat across the grades, we may logically conclude that the CSOs do not have an increase in sophistication over the grades.

Important Quote from Dr. Webb Related to Depth of Knowledge in Social Studies, Original Review, September 2006:

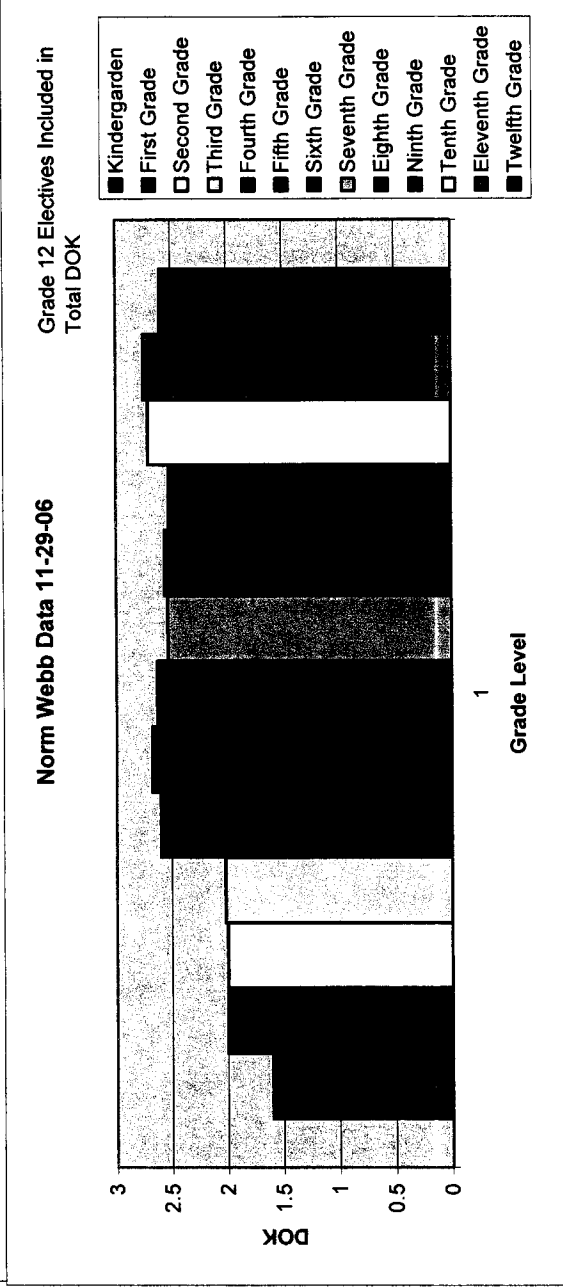
The percentage of objectives judged to be a DOK level 1 is generally between 31 to 42% for grades K-2, whereas in grades 3-12 only between 2 to 23% of the objectives were judged to be a DOK level 1. Throughout all grades, at least 25% of the objectives were at DOK level 2. The proportion of objectives assigned a DOK level 3 (application) generally increased by grade. This is most noticeable in grades 8-12, where 45% or more of the total objectives were assigned a DOK level 3. The concurrent decrease in proportion of objectives with a DOK level 1 and increase in the proportion of objectives with a DOK level 3 signifies a greater emphasis on skills and concepts in the lower grades with an increase in emphasis on reasoning and analysis in the middle and high school grades. **In particular, an unusual number of objectives were assigned DOK Level 4 (extended reasoning), as in Grade 4, where out of the 51 objectives 16% (8) expected students to engage in complex analyzing and synthesizing. The assignment of DOK Level 4 is clearly a reflection of the WV Social Studies Content Standards and Objectives. In part, we also attribute this proportion to the nature of social studies content which, compared to other content areas, often asks students to develop life-long disposition such as, “build empathy and understanding for individuals and groups” (SS.O.1.5.4). Further, the nature of Social studies content also frequently expects students to investigate, explain and apply connections among common themes and concepts such as “evaluate and sequence and analyze the impact of contemporary social, economic and technological developments on people and culture in West Virginia and the United States (SS.O.8.5.7). Overall, considering only the depth-of-knowledge level, the distribution of complexity across the grades appears reasonable.**

Social Studies Norm Webb Data Chart K-12 with and without 12th grade electives of economics and geography

Kindergarden 1.6  
 First Grade 2  
 Second Grade 2  
 Third Grade 2.02  
 Fourth Grade 2.6  
 Fifth Grade 2.68  
 Sixth Grade 2.63  
 Seventh Grade 2.53  
 Eighth Grade 2.56  
 Ninth Grade 2.52  
 Tenth Grade 2.71  
 Eleventh Grade 2.75  
 Twelfth Grade 3.7



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 First Grade 2  
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 Fourth Grade 2.6  
 Fifth Grade 2.68  
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 Eighth Grade 2.56  
 Ninth Grade 2.52  
 Tenth Grade 2.71  
 Eleventh Grade 2.75  
 Twelfth Grade 2.6



## Sample Performance Assessment

You are a member of a team of scientists investigating deforestation of the Amazon rain forest. You are responsible for gathering scientific data (including such visual evidence as photographs) and producing a scientific report in which you summarize current conditions, possible future trends, and their implications for both the Amazon itself and its broader influence on our planet. Your report, which you will present to a United Nations subcommittee, should include detailed and fully-supported recommendations for an action plan which are clear and complete.