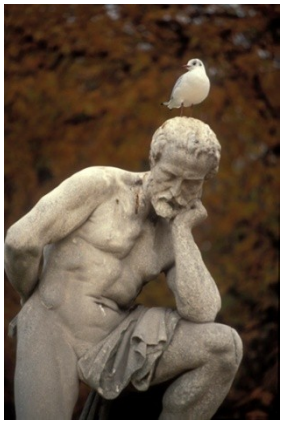
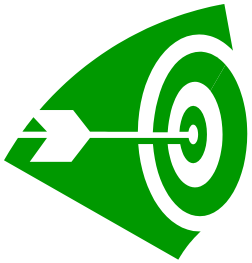
Here we go again!
More on Cognitive Complexity



Nancy Hudson

HEAP Meeting
November 2008
Tampa, FL

Purpose of this presentation



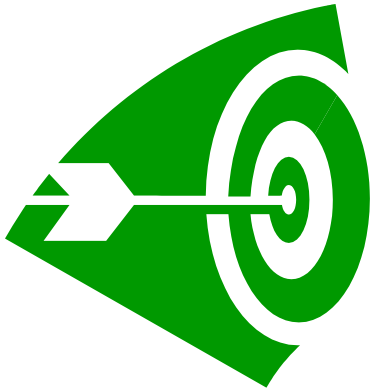
- **Review what we have done so far re: cognitive complexity**
- **Introduce new information (awareness) to further expand our minds on this issue**
- **Initially compare educational taxonomies**
- **Words of Caution**
  - **This is a process in moving us along a continuum of learning**
  - **This is not easy**
  - **Many of us will feel uncomfortable in this phase**
  - **Trust the experience!**

We've Talked a lot about Cognitive Complexity at HEAP Meetings?

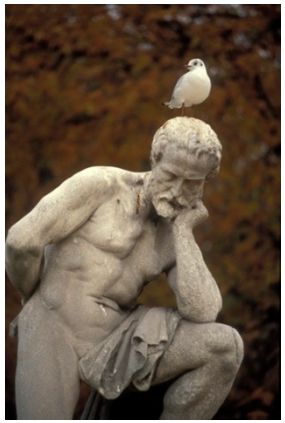
- 1/03 – Intro to Cognitive Complexity Models including Webb – Todd Nielsen
- 4/04 – Thinking Ahead to Create More Challenging Performance-based Items: Blooms & Webb Models to Inform Item Construction – Todd Nielsen
- 9/04 – Analyzing and Developing Prompts for Cognitive Complexity – Matt Schaffer
- 1/05 – Writing Cognitively Complex Prompts
- 3/08 – Purposes of Assessment and Cognitive Complexity - Benham-Deal

Why are we talking so much about this?

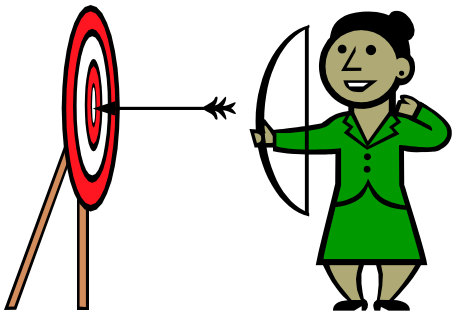
What is the end in mind?



It is about transforming instruction that creates students who are able to think more critically.



Cognitive Complexity



Where is HEAP in supporting states to develop trained teachers who adopt instructional practices leading to students who can think critically?

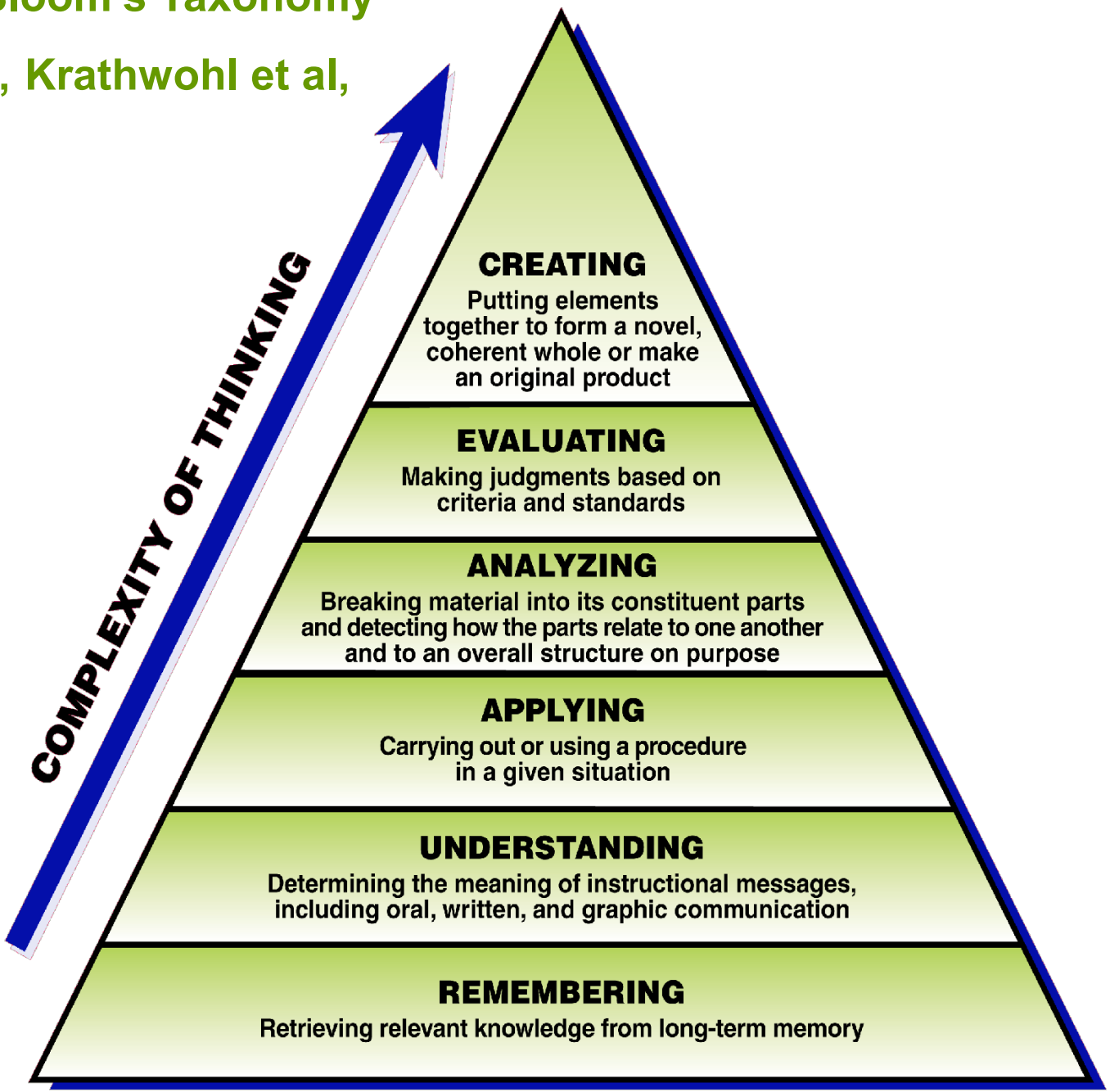
HEAP Activities & Resources

- **Professional Development Presentations at HEAP meetings on cognitive complexity**
- **HEAP's push for a skills-based approach to teaching, learning and assessing**
- **Web-based development of Cognitive Complexity Sets of assessment items for all the National Health Education Skill Standards for use in professional development programs. Using Bloom's revised model to accomplish this**
- **End in mind for HEAP – trained teachers and HEAP members who will be able to submit more cognitively complex assessment items to the HEAP bank using the HEAP's web-based item development tool**

On-the-Fly Formative Assessment
Are you with me so far?

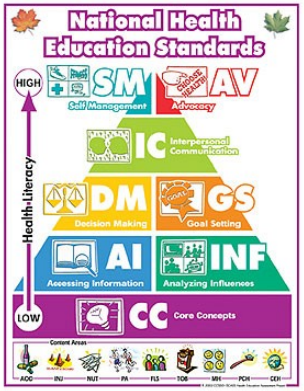
Revised Bloom's Taxonomy

Anderson, Krathwohl et al, 2000

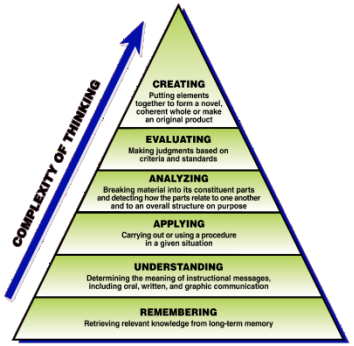


Health Skills and Bloom's Revised Taxonomy

- How do the health skills relate to the different kinds of thinking?



- Can Bloom's help us to better understand the essence of the health skills?



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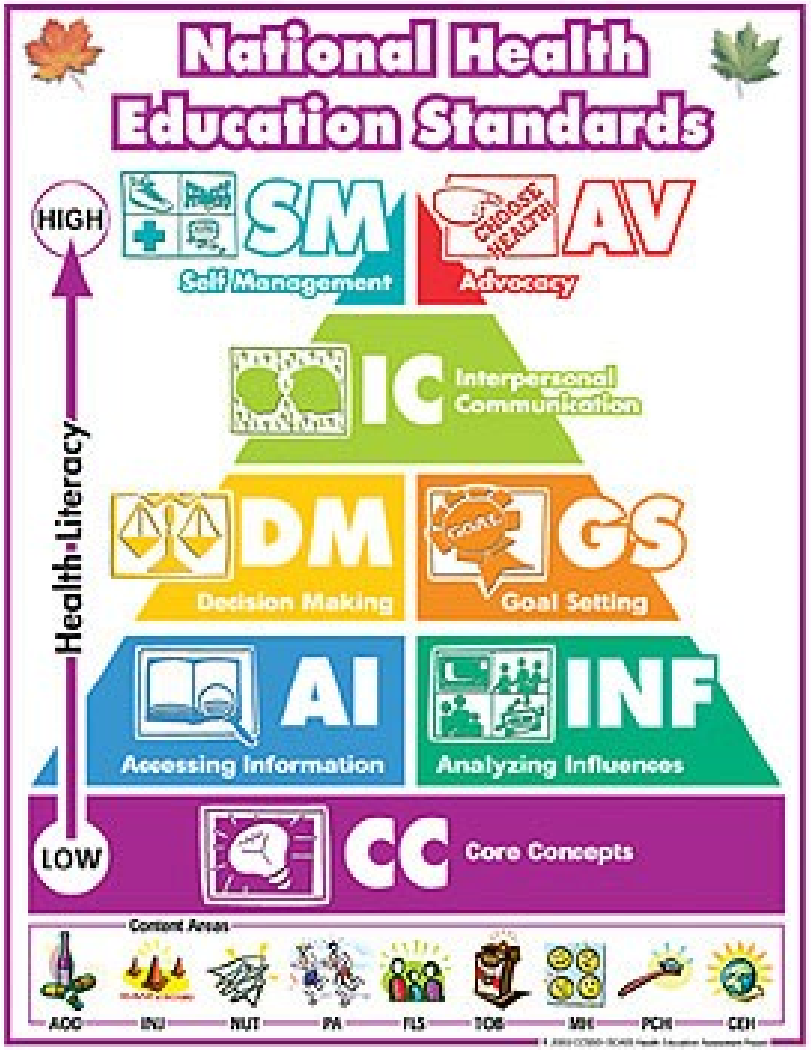
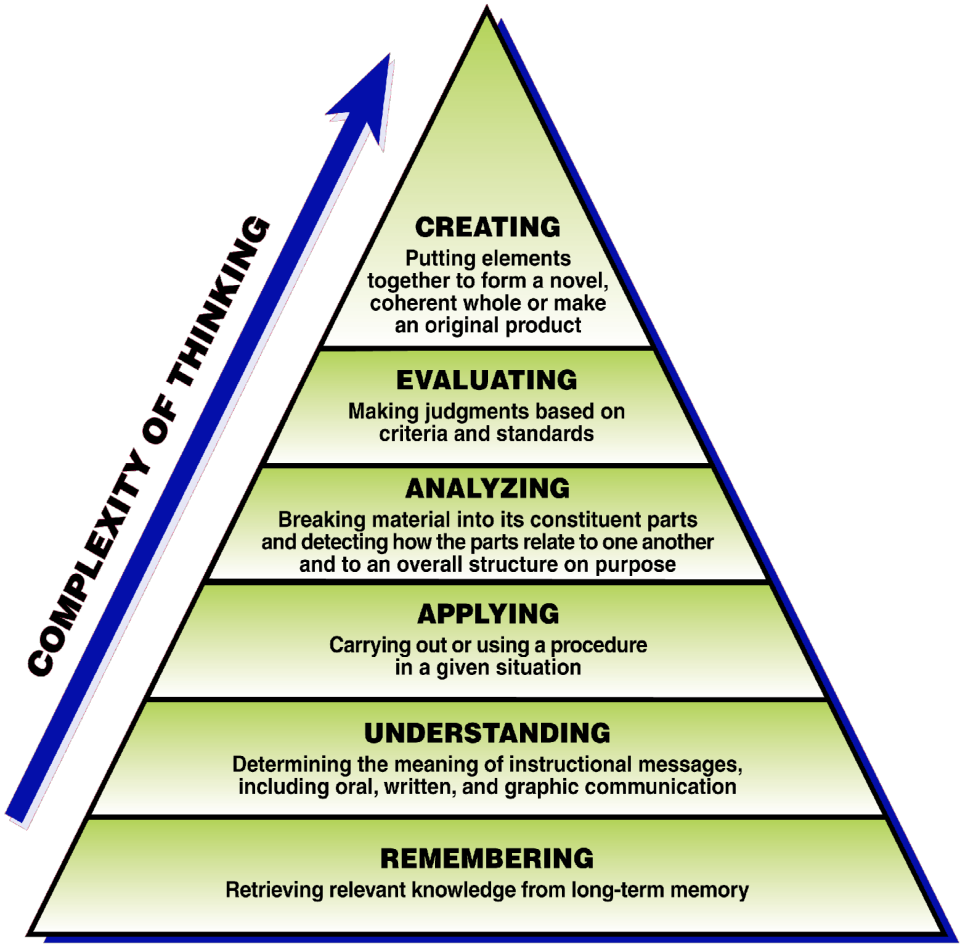
Our Work at the June 08 HEAP Meeting – Examined the HEAP Skill Cues





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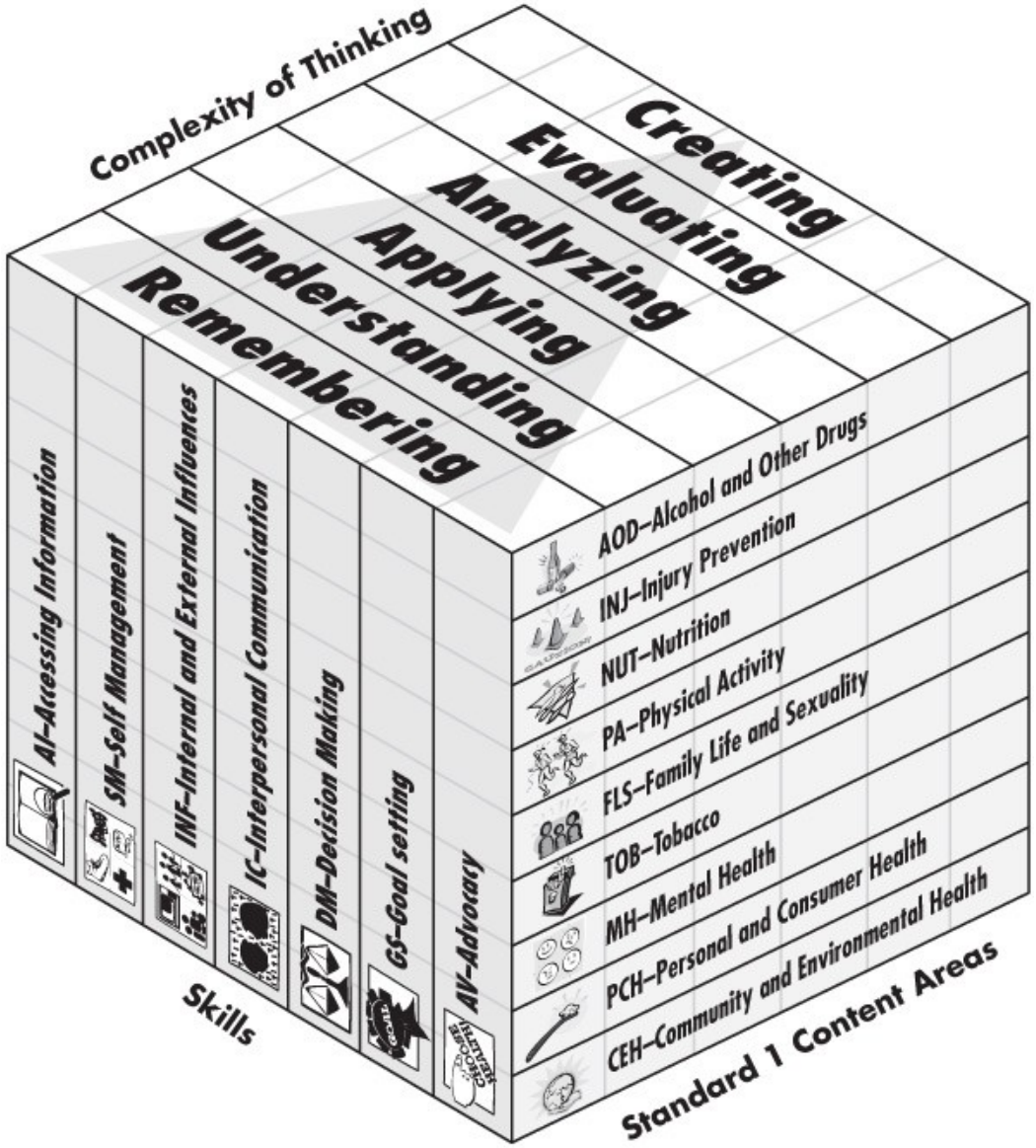
Conceptual Model for Assessment Development in Phase IV?



Is Bloom the only guy in town? Bloom is dead. Does his work live on?

- Bloom's Taxonomy
- Bloom's Taxonomy Revised by Anderson, Krathwohl et al
- Webb's Depth of Knowledge Model
- Marzano & Kendall's Taxonomy

Before we begin to compare taxonomies, let's review domains of human learning

- Cognitive domain
  - Knowing, head

- Affective
  - Feeling, heart

- Psychomotor
  - Doing, hand/body

Blooms' Taxonomy - 1956

- Benjamin Bloom headed a group of educational psychologists who developed a classification of levels of intellectual behavior important in learning.
- Tool for designing test items, especially multiple choice
- Criticized for oversimplifying the nature of thought and its relationship to learning
- Established 5 classifications – 1) Knowledge 2) Comprehension 3) Application 4) Analysis and 5) Synthesis

Bloom's Taxonomy Revised - 2000

- **Lorin Anderson, Bloom's former student partnered with David Krathwohl to redefine Bloom's original concepts**
- **Brought together experts in cognitive psychology, curriculum & instruction, educational measurements, and assessment**
- **Changed the nouns to verbs**
- **Defined how the taxonomy intersects and acts upon different types and levels of knowledge – factual, conceptual, procedural, and metacognition**

Webb's Depth of Knowledge Model

- **Developed by Norman Webb, University of Wisconsin and CCSSO's SEC (Survey of Enacted Curriculum) SCASS**

- **Used by many states as an alignment tool between content standards and assessments**
- **It is descriptive, not a taxonomy**
- **It is a scale of cognitive demand**

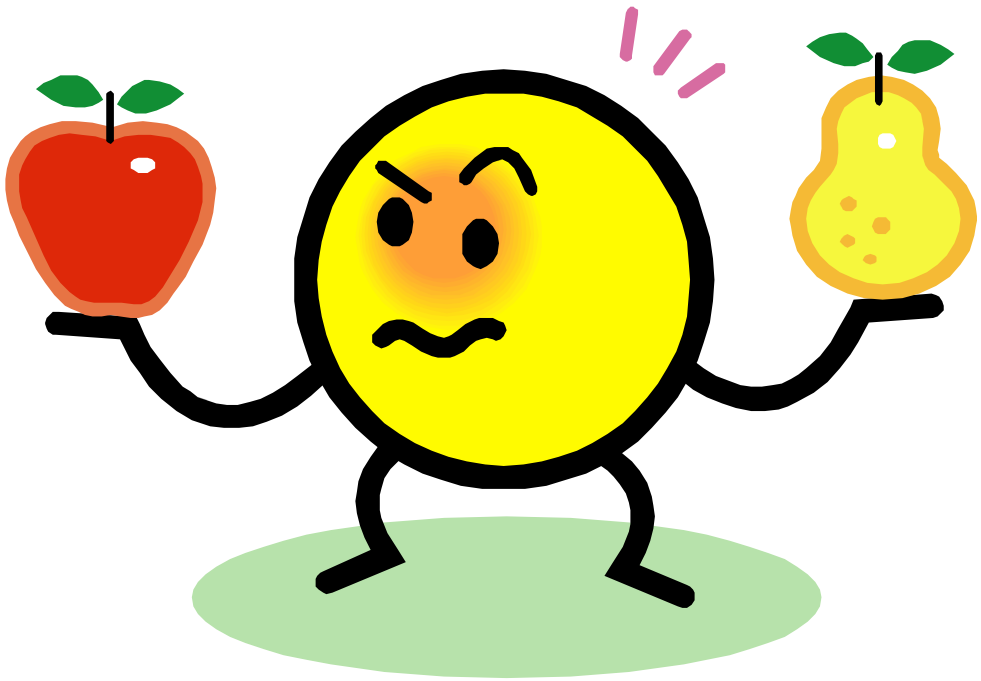
Marzano & Kendall's New Taxonomy of Educational Objectives

- Based on three domains of knowledge
  - Information
  - mental procedures
  - psychomotor procedures
- Cognitive System on processing
  - Retrieval
  - Comprehension
  - Analysis
  - knowledge utilization
- Metacognition System
- Self-System

On-the-Fly Formative Assessment

Are you with me so far?

Let's do a little comparing

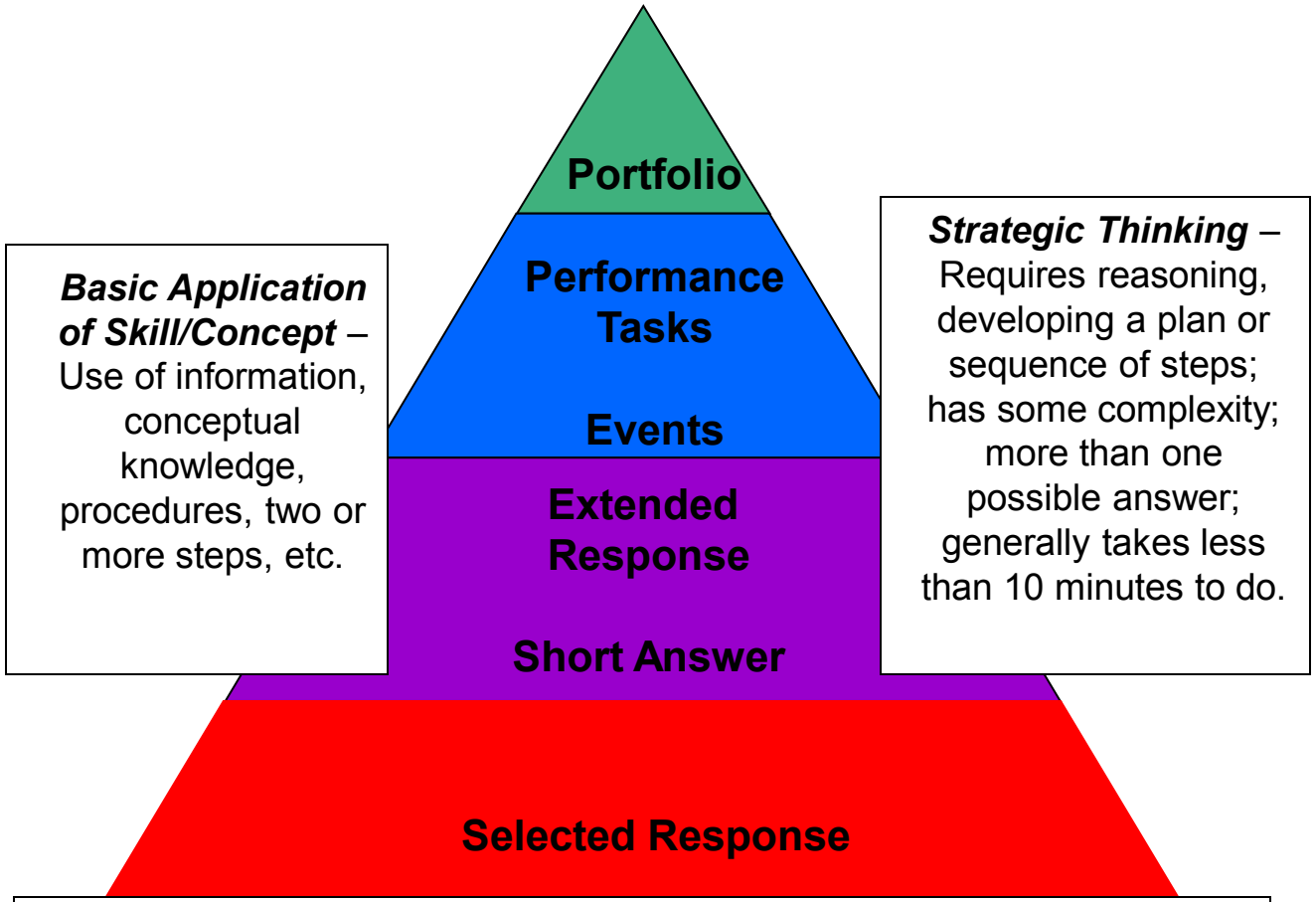


Cognitive Complexity

BLOOM'S *REVISED* TAXONOMY	WEBB'S DEPTH OF KNOWLEDGE
REMEMBER Retrieving relevant knowledge from long-term memory (e.g., recognizing, recalling)	***Recall*** – Recall of a fact, information, or procedure (e.g., What are the Red Cross Emergency Action steps [check, call, care]?)
UNDERSTAND Determining the meaning of instructional messages, including oral, written, and graphic communication (e.g., interpreting, exemplifying, classifying, summarizing, inferring, comparing, explaining)	
APPLYING Carrying out or using a procedure in a given situation (e.g., executing, implementing)	***Basic Application of Skill/Concept*** – Use of information, conceptual knowledge, procedures, two or more steps, etc. (e.g., Given a emergency scenario, students determine the care needed for a victim, and explain the reason for their actions).
ANALYZING Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure on purpose (e.g., differentiating, organizing, attributing)	***Strategic Thinking*** – Requires reasoning, developing a plan or sequence of steps; has some complexity; more than one possible answer; generally takes less than 10 minutes to do (e.g., Module 363 –ER – Stressed due to parents' divorce; Crunched for time; Signs of stress – ways to relieve stress – why managing stress is important to health.)
EVALUATE Making judgments based on criteria and standards (e.g., checking, critiquing)	
CREATING …ments together to form a novel, …hole or make an original product …rating, planning, producing)	***Extended Thinking*** – Requires an investigation; time to think and process multiple conditions of the problem or task; and more than 10 minutes to do non-routine manipulations (e.g., Task 608 – Welcome to Health High – Create fact sheet/brochure from research activity)

A HEAP of Cognitive Complexity

Extended Thinking – Requires an investigation; time to think and process multiple conditions of the problem or task; and more than 10 minutes to do non-routine manipulations.



Basic Application of Skill/Concept – Use of information, conceptual knowledge, procedures, two or more steps, etc.

Strategic Thinking – Requires reasoning, developing a plan or sequence of steps; has some complexity; more than one possible answer; generally takes less than 10 minutes to do.

Recall – Recall of a fact, information, or procedure.

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Bloom's Revised Taxonomy

	Cognitive Processes					
Knowledge Processes	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
Factual						
Conceptual						
Procedural						
Metacognitive						

Factual –Knowledge basic to specific disciplines
Conceptual – knowledge of classifications, principles, theories, models pertinent to the specific discipline
Procedural – methods of inquiry, techniques, particular methodologies
Metacognitive – awareness of one's own cognitive processes; how you go about solving problems

Marzano & Kendals New Taxonomy of Educational Objectives

- Model of thinking skills that incorporates a wider range of factors that affect how students think
- Based on research
- Knowledge Domain – information, mental procedures, physical procedures
- Made up of three systems: Self-System, Metacognitive System, Cognitive System

Marzano's New Taxonomy Thinking Skills Framework

Self System		
Beliefs about the importance of knowledge	Beliefs about efficacy	Emotions associated with knowledge

Metacognitive System			
Specifying Learning Goals	Monitoring the Execution of Knowledge	Monitoring Clarity	Monitoring Accuracy

Cognitive System			
Knowledge Retrieval • Recall • Execution	Comprehension • Synthesis • Representation	Analysis • Matching • Classifying • Error Analysis • Generalizing • Specifying	Knowledge Utilization • Decision Making • Problem Solving • Experimental Inquiry • Investigation

Knowledge Domain		
Information	Mental Procedures	Physical Procedures

When faced with a new task

- **Self System decides to continue the current behavior or engage in the new activity**
- **Metacognitive System sets goals and keeps track of progress**
- **Cognitive System processes all the necessary information**
- **Knowledge Domain provides the content**

Random Thoughts and Consideration for HEAP's Future Action

- CCSSO is restructuring SCASS which can led to greater coordination to transform instruction through assessment
- Many states are using different models to support them in improving students' critical thinking
- Right now Bloom's revised taxonomy is working as a PD tool for our members but we all recognize its limitations
- HEAP's WBS can grow with us when CCSSO coordinates its approach to improving students critical thinking

On-the-Fly Formative Assessment
Are you still with me?

References

- Anderson, L.W. and David R. Krathwohl, D.R. et al (2000) *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Allyn & Bacon
- http://www.uwsp.edu/education/1wilson/curric/newtaxonomy.htm
- http://facstaff.wcer.wisc.edu/normw/MIAMI%20FLORIDA%20FINAL%20slides%2011-15-05.pdf (Webb's model)
- Robert J. Marzano, John S. Kendall, (2007) *The New Taxonomy of Educational Objectives*, Second Edition

  Corwin Press, 2007
- http://educate.intel.com/en/ProjectDesign/ThinkingSkills/ThinkingFrameworks/Marzano_New_Taxonomy3.htm
- http://www.aagc.org/Preparing_the_Next_Generation.ppt

Small Working Group Assignment

- **Examine the cognitive complexity set for the NHES skill you have been given**
- **Edit the completed set as needed**
- **Develop more sets with the prompts provided**
- **Keep notes of insights, concerns, observations, and recommendations for next steps**
- **We will process with the larger group**