

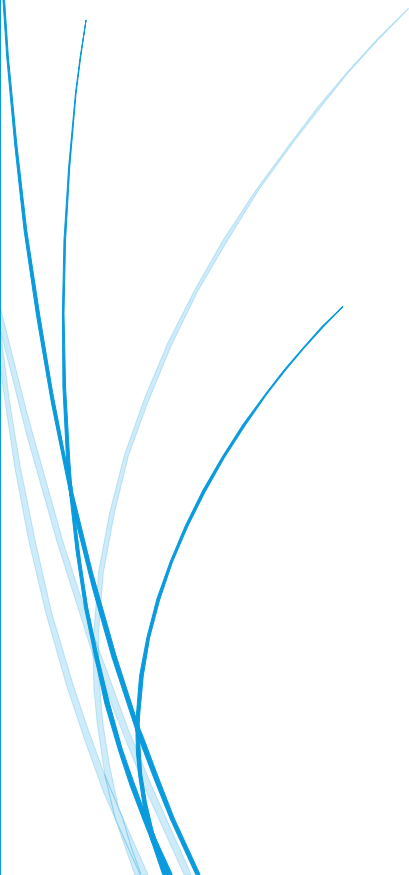


BAKER COUNTY SCHOOL DISTRICT

Building Champions In and Out of the Classroom

# Mentoring Manual

Accomplished Practice 4-Critical Thinking



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# CRITICAL THINKING

## ACCOMPLISHED PRACTICE #4

Uses appropriate techniques and strategies, which promote and enhance critical, creative, and evaluative thinking capabilities of students.

### SAMPLE KEY INDICATORS

- Analyzes student performance standards to identify associated higher-order thinking skills, and designs learning and performance strategies to evoke these higher-order skills.
- Chooses varied teaching strategies, materials, and technologies to expand students' thinking abilities.
- Assists students in selecting projects and assignments that involve the need to gather information and solve problems.
- Poses problems, dilemmas, and questions in lessons that involve value knowledge and that require evaluative thinking.
- Assists students in applying the rules of evidence that govern the acceptability of judgments and conclusions.
- Guides students in evaluating the plausibility of claims or interpretations in the field of study.
- Varies her/his role in the instructional process (instructor, coach, mentor, facilitator, audience critic, etc.) in relation to the purposes of instruction and the students' needs, including linguistic needs.
- Monitors students' work and adjusts strategies in response to learners' needs and successes in creative thinking activities.
- Uses technology and other appropriate tools to extend the learning environment for students.
- Develops short and long term personal and professional goals relating to critical thinking.

### BLOOM'S TAXONOMY-COMPONENT 1

#### DEFINITION:

Bloom's Taxonomy divides the way people learn into three domains. One of these is the cognitive domain which emphasizes intellectual outcomes. The domain further divides into categories which are arranged progressively from the lowest level of thinking, simple recall, to the highest, evaluating information.

#### TARGET AUDIENCE:

## HOW?

Part of the teacher's role in fostering critical and creative thinking abilities is that of building students' understanding of the concepts, skills and processes of the various disciplines and fields, and of their methods for constructing and evaluating knowledge. Teachers need curricula and instructional methods which support inquiry into methods for knowledge construction, such as how scientists "do" Science or how historians establish historical facts. The role of the teacher in helping to improve students' critical and creative thinking abilities includes examining the personal qualities required of teachers by such a goal and the classroom climate and teaching practices which best support it.

**Teachers as models** - Discussion of the teacher's role in fostering critical and creative thinking must begin from a recognition of the teacher as a person whose unique character, interests and desires cannot be separated out from the idea of the teacher's role. Good teachers are doing more when they teach than acting according to prescribed roles. Their desire to nurture a love for learning, to help students recognize and act upon their capabilities, and to establish a classroom climate which is based upon mutual regard and respect gives their teaching purpose and meaning beyond any technical description of the teacher's role. What is required is that teachers be authentic individuals who are striving to improve their practice through the use of critical and creative thought. Acting upon their belief in the importance of critical and creative reflection, teachers would attempt to:

- analyze their own thinking processes and classroom practices and provide reasons for what they do;
- be open-minded, encouraging students to follow their own thinking and not simply repeat what the teacher has said;
- change their own positions when the evidence warrants, being willing to admit a mistake;
- consistently provide opportunities for students to select activities and assignments from a range of appropriate choices;
- exhibit genuine interest, curiosity and commitment to learning;
- undertake the organization and preparation required to achieve learning goals;
- seek imaginative, appropriate and ethical solutions to problems;
- be sensitive to others' feelings, level of knowledge and degree of sophistication;
- show sensitivity to the physical elements which contribute to a stimulating learning environment through the physical arrangements and displays they provide or facilitate;
- allow for student participation in rule setting and decision making related to all aspects of learning, including assessment and evaluation.

## WHO CAN HELP?

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## PEOPLE

- i. New Teacher Induction Program
- ii. Mentor Teacher

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## WEBSITES

- iii. [Bloom's Taxonomy](#)
- iv. [Bloom's Taxonomy of Educational Objectives](#)

# Blooms Taxonomy

In 1956, Benjamin Bloom, a professor at the University of Chicago, shared his famous "Taxonomy of Educational Objectives". Bloom identified six levels of cognitive complexity that have been used over the past four decades to make sure that instruction stimulates and develops students' higher-order thinking skills. The Levels are:

**Knowledge:** Rote memory skills (facts, terms, procedures, classification systems)

**Power words:** choose, describe, find, locate, list, say, underline, spell, state, when, write.

- **Questioning Prompts:** How do you identify \_\_\_\_? Which one \_\_\_\_? What did you find out about \_\_\_\_? How would you outline \_\_\_\_? Where did (does) \_\_\_\_?

**Comprehension:** The ability to translate, paraphrase, interpret or extrapolate material.

**Power words:** approximate, compare, demonstrate, infer, rephrase, review, translate.

- **Questioning Prompts:** How would you explain \_\_\_\_? What can you conclude \_\_\_\_? What is the difference between \_\_\_\_? What would happen if \_\_\_\_?

**Application:** The capacity to transfer knowledge from one setting to another.

**Power words:** acquire, calculate, choose, draw, operate, present, select, solve, use.

- **Questioning Prompts:** How does \_\_\_\_ apply to \_\_\_\_? Illustrate a way to \_\_\_\_\_. Identify the results if \_\_\_\_\_. Under what conditions would \_\_\_\_?

**Analysis:** The ability to discover and differentiate the component parts of a larger whole.

**Power words:** categorize, chart, document, order, point out, review, sequence.

- **Questioning Prompts:** Discuss the pros and cons of \_\_\_\_\_. Why do you think \_\_\_\_? What relationship exists between \_\_\_\_? What is your analysis of \_\_\_\_?

**Synthesis:** The ability to weave component parts into a coherent whole.

**Power words:** assemble, collect, develop format, imagine, plan, revise, synthesize.

- **Questioning Prompts:** Devise a way to \_\_\_\_\_. Elaborate on \_\_\_\_\_. How would you test \_\_\_\_\_? Predict the outcome of \_\_\_\_\_. What would happen if \_\_\_\_\_?

**Evaluation:** The ability to judge the value or use of information using a set of standards.

**Power words:** appraise, compare, decide, dispute, grade, interpret, prioritize, test.

- **Questioning Prompts:** How else would you \_\_\_\_\_? Rate the \_\_\_\_\_. What data was used to evaluate \_\_\_\_\_? What is your opinion of \_\_\_\_\_? Which \_\_\_\_\_ is valid?

## DEPTH OF KNOWLEDGE: COGNITIVE COMPLEXITY CLASSIFICATION - COMPONENT 2

### DEFINITION:

Critical thinking on *Florida Standards Assessments* require a new cognitive classification system, replacing Bloom's Taxonomy, and is based largely upon Dr. Norman L. Webb's work with "Depth of Knowledge" levels. The rationale for classifying items by their level of complexity is to focus on the expectations of the item, not the ability of the student.

### TARGET AUDIENCE:

All Teachers, preparing for the Florida Standards Assessment

### HOW?

## Understanding the Difference between Bloom's Taxonomy and Cognitive Classification System

1. The benchmarks in the **Florida Standards** identify knowledge and skills students are expected to acquire at each grade level, with the underlying expectation that students also demonstrate critical thinking. Goal 3, Standard 4, of Florida's System of School Improvement and Accountability makes this expectation clear:  
"Florida students use creative thinking skills to generate new ideas, make the best decisions, recognize and solve problems through reasoning, interpret symbolic data, and develop efficient techniques for lifelong learning."
2. It is important to develop items that elicit the complexity of knowledge and skills required to meet these objectives. Teachers provide experiences through curriculum that illicit the levels of complexity of knowledge.

3. The categories-low complexity, moderate complexity, and high complexity-form an ordered description of the demands an item may make on a student. For example, low complexity items may require a student to solve a one-step problem. Moderate complexity items may require multiple steps. High complexity items may require a student to analyze and synthesize information.
  
4. Whereas teaching directly to the items on a test is not desirable, teaching to the set of beliefs about learning that underlie an assessment-which should be the same set of beliefs that underlies the curriculum-can provide positive direction for instruction.

## WHO CAN HELP?

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### PEOPLE

Mentor Teacher

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### WEBSITES

- i. [Depth of Knowledge Overview Chart](#)
  - ii. [Webb's Depth of Knowledge Guide](#)
  - iii. [Webb's Depth of Knowledge Circle Chart](#)
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### BOOK

[Alignment Between Standards and Assessment](#), University of Wisconsin Center for Educational Research, Webb, N.L.

# Descriptors of DOK Levels for Science

(Based on Webb, March 2002)

## Recall and Reproduction – Depth of Knowledge (DOK) Level 1

Recall and Reproduction requires 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.

## Skills and Concepts/Basic Reasoning – Depth of Knowledge (DOK) Level 2

Skills and Concepts/Basic Reasoning 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 a 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.

### **Strategic Thinking/Complex Reasoning – Depth of Knowledge (DOK) Level 3**

Strategic Thinking/Complex Reasoning requires deep knowledge using 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 a 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.

### **Extended Thinking/Reasoning – Depth of Knowledge (DOK) Level 4**

Extended Thinking/Reasoning requires **high cognitive demand** and is **very complex**. 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 a 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 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 activity. However, if the student conducts a river study that requires taking into consideration a number of variables, this would be a Level 4.