

Other examples of synthesis tasks are:

1. Develop an educated guess why the culture that created the city of Great Zimbabwe declined.
2. Develop original stories of life in Great Zimbabwe in the 14th century.
3. Create an original story, poem, or song about the decline and fall of the culture that created Great Zimbabwe.

Evaluation

The highest level of Bloom's taxonomy of the cognitive domain is evaluation. When engaged in an evaluation task, individuals make a judgment about the worth or merit of two or more plausible alternatives, select the preferred alternative, and defend that choice using specified criteria. For example, assume you attend an auction of Renaissance style paintings created by contemporary artists. If you elect to purchase one, the decision combines an affective preference ("This painting appeals to me more.") with a cognitive justification at the evaluation level ("It uses the materials from the artistic period, accurately uses perspective, and is faithful to the dress and man-made structures of the period.").

In an evaluation task, students must defend their decision using a combination of logical argument, evidence, and predetermined criteria. For example, an essay can be judged on one or all of the following standards: organization, coherence, use of language appropriate to the audience, succinctness, and evocative impact.

Other examples of evaluation tasks are:

1. Critique African tribal masks created by classmates according to agreed-upon criteria.
2. Defend or reject the role of the Christian missionary as a positive force in the development of Africa.
3. Evaluate the behavior of King Monomatapa in terms of the standard of conduct of European monarchs who ruled during the same period, such as King Henry VIII of England.
4. In a debate, defend or reject the behavior of European colonization of Africa during the 19th century, with special attention to Cecil Rhodes.

Table 4.2 displays the levels of the cognitive domain, a description of each level, and appropriate learning process action verbs often associated with each level.

Using Bloom's Taxonomy to Break Down Complex Tasks

Although national, state, and district standards are often broken down into grade-level benchmarks, many benchmarks are still too broad to use as objectives. These broader goals then must be broken down into a list of objectives in a logical teaching order. Typically, the objectives are clustered by topic and then placed in order from lower to higher level. This order can be used to guide your lessons. Look back at the Section 2 Objectives. Note how the first objective in the list is lower level and the others build

TABLE 4.2 Bloom's Taxonomy of the Cognitive Domain.

Level	Description	Suggested Action Words
6. EVALUATION	Students can use previously learned standard/criteria to determine the worth or merit of a complex product.	defend or reject, develop and critique, judge, state or support a position, justify, argue, decide, appraise,
5. SYNTHESIS	Students can create an original and complex product from a set of simpler components.	create, build, develop an original, compose, write, solve, perform, establish, predict, produce, modify, plan, formulate
4. ANALYSIS	Students can take a complex set of material and break it down into its component parts and/or explain why a complex set of relationships is organized as it is or what caused it to be.	compare and contrast, analyze, break down, explain why, show how, draw a diagram, deduce
3. APPLICATION	Students can apply previously learned material such as concepts, rules, or generalizations to newly taught material.	classify, apply, find, choose, compute, sort, generalize, organize
2. COMPREHENSION	Students can express previously learned material in their own way.	define, put in your own words, describe, summarize, translate, illustrate, restate, demonstrate,
1. KNOWLEDGE	Students can recall, reproduce, or recognize previously learned information as it was taught to them.	reproduce, recognize, recall, list, identify, name, label, underline, place in order

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Standard: Establish learning goals that are appropriate for (K–12) students and emphasize critical thinking, creativity, and problem solving (from Eastern Michigan University Teacher Preparation Program Outcomes).

Long-Range Goal:

Future teachers will prepare learning objectives for a two- or three-week unit.

Breakdown of Objectives Leading to Goal:

Clearly Stated Objectives

Students will be able to: explain what A, B, C, and D signify in a clear objective; label the four parts in objectives; and write an objective that contains all parts.

Three Learning Domains

Students will be able to: list the three learning domains (affective, cognitive, and psychomotor); distinguish among affective, cognitive, and psychomotor objectives; and give examples of the three types of objectives.

The Cognitive Domain

Students will be able to: list and explain each of the six levels of cognitive objectives; classify unfamiliar objectives by labeling them; write two objectives of each type; and given a list of objectives related to a certain topic, place them in a logical teaching order.

Uses of Objectives

Students will be able to: explain the uses for objectives in instruction and assessment; and debate the pros and cons of using objectives in the classroom.

Figure 4.1 Illustration of Objectives in a Logical Teaching Order

until the highest level task is last. Bloom's taxonomy is especially helpful for doing this kind of content analysis. Figure 4.1 illustrates how the objectives for teaching future teachers to write objectives would be placed in a chronological teaching order.

Common Questions about Bloom's Taxonomy

Future teachers often ask similar questions. Two of the most common follow with responses.

Question 1

"Just as soon as I think I can classify tasks and objectives at some level of Bloom's taxonomy, I come across one that I can't classify, or a group of us get together and we have three different answers. Even the instructor is unable to persuasively justify why an objective is at the application level or the analysis level. Why does this happen?"

Classifying tasks and objectives is one of the most complex intellectual endeavors in teaching. In order to create a higher level objective for your unit you must access and organize all relevant concepts, generalizations, and facts into a meaningful network. As a new teacher you may not have enough knowledge about the topic to do this structure quickly. Because you are likely to be teaching abstract concepts, it is understandable that you find it difficult to determine whether some element of the content is a generalization or a fact or whether a given instructional objective is at the synthesis or evaluation level. Eventually, however, after teaching a topic and thinking about the ideas within the topic, the conceptual structure begins to emerge and higher level tasks become easier to design and distinguish.

Question 2

"Bloom's taxonomy is too complex. There are too many levels, and it's too difficult to keep the levels straight in my mind. Can't you simplify it further?"

Good question! Here is a simplified, three-level version of the taxonomy for you to consider.

- Level A. knowledge/comprehension
- Level B. application/analysis/synthesis (higher level)
- Level C. evaluation

Level A consists of familiar tasks at the knowledge or comprehension level. At level A, students are asked to remember or recall information—such as names, dates, definitions, items, numbers, labels, statements—exactly as it was taught, summarize it, express it in their own words, or do simple computation. For example, the question, "What happened in the 1970s to the price of gasoline when the supply was drastically reduced?" is at level A.

Level B includes application, analysis, or synthesis tasks. Tasks at level B are triggered by an unfamiliar example, a novel situation, or a set of data that the student

must manipulate in some way—classify, reorganize, explain, break down, identify cause and effect, and so on. In contrast to the knowledge level, the assessment situation must contain an unfamiliar element. For instance, "If you were a wheat farmer in the United States and you knew that there would be a severe drought in wheat-growing regions of Canada and Russia in the coming year, would you plan to plant more or less wheat next year? Why or why not?" In synthesis assessment tasks, the students must also create something unique: a story, essay, painting, performance, model, or exhibit.

Level C includes evaluation tasks. For instance, "Write a 500-word essay opposing the rationing of health care in the United States as a way to control health costs" or "Present your arguments to support or oppose the rationing of health care in the form of a five-minute speech to classmates."

For appropriate verbs to use in creating instructional objectives at all levels of the taxonomy, consult Table 4.2.

Practice Activity A

Classifying Tasks into Bloom's Taxonomy

Classify the following objectives using *KC* for knowledge/comprehension, *HL* (higher level) for application/analysis/synthesis, or *E* for evaluation.

- ___ 1. After practicing calculating the area of squares and rectangles, complete unfamiliar problems using similar shapes.
- ___ 2. Recall the definition of *colonialism*.
- ___ 3. Explain why an unfamiliar example of colonialism is similar to European colonialism of the 18th or 19th century. (The example has not been discussed in class.)
- ___ 4. Provide a definition of *culture* as it is used in a newspaper story.
- ___ 5. Describe the characteristics of a traditional lifestyle that were presented in class.
- ___ 6. Defend or reject the thesis "Multicultural education will reduce prejudice and enhance tolerance among adolescents."
- ___ 7. List one of the sources of information about Zimbabwe taught in class.
- ___ 8. When given a brief description of a mythical kingdom, explain why it is closer in character to that of the kingdom of Monomatapa or of Henry VIII.
- ___ 9. Sort a group of unfamiliar statements into a group consisting of historical generalizations.
- ___ 10. Create an original tribal mask and explain how it accurately reflects the African roots of Zimbabwe.

Practice Point

Practice Activity A: Answer Key

1. HL (Math objectives are often difficult to classify unless you are able to examine the actual problem. The complexity of the task is the key to whether to classify it at the application or analysis level.)

2. KC (knowledge)
3. HL (analysis)
4. KC (comprehension)
5. KC (knowledge)
6. E (evaluation)
7. KC (knowledge)
8. HL (analysis)
9. HL (application)
10. HL (synthesis)

Practice Activity B

Bloom's Taxonomy

Practice Point

Revise, if necessary, the three clearly stated instructional objectives you wrote in Practice Activity B at the end of Section 1. Make sure one is at the knowledge or comprehension level; a second at the application, analysis or synthesis level; and a third at the evaluation level.

CHAPTER SUMMARY

The first section of Chapter 4 began with the parable "The Sea Horse Fable." Its theme supports the use of instructional objectives as a valuable decision-making tool for teachers. Two arguments favoring the use of instructional objectives are: (1) they assist teachers in focusing student attention on what is expected in the lesson and unit, and (2) they increase the likelihood that activities and assessments will be related to what was actually taught. Two arguments against the use of instructional objectives are: (1) since lower level (memory-type) instructional objectives are easier to construct, some important higher level thinking and affective outcomes may be lost, and (2) some spontaneity may be lost when the classroom is focused too closely on predetermined outcomes.

The middle of this section discussed teaching for understanding through complex authentic performance. The section concluded with guidelines for writing clearly stated instructional objectives.

In Section 2 the focus changed to using Bloom's taxonomy to analyze cognitive learning tasks and write learning objectives at different levels; e.g. knowledge, comprehension, application, analysis, synthesis, and evaluation.

Unit Preparation

Look at the list of goals you prepared in Chapter 3. If necessary, transform them into clearly stated instructional objectives, with well-written behavior statements appropri-

ate for the audience of students who will be expected to achieve them. Analyze whether the objectives will lead students to demonstrate the understandings provided in your state standards and benchmarks. If so, the unit and lesson objectives should include both higher level behaviors and the lower level behaviors required to reach complex learning. Include an authentic culminating objective that will require students to combine and synthesize unit information into an understanding performance.

Again, consider these objectives as a first draft. As you learn more about different types of lesson planning, you are likely to envision alternative ways students may demonstrate their learning. At this stage make sure that your draft objectives are clearly written, focus on key content, and require students to use information in complex ways.



Portfolio Activity

Choose one or two of your goals (standards or benchmarks) and prepare a chart that shows how they could be broken down into lesson objectives and placed in a chronological order. Label each with the appropriate level of Bloom's Taxonomy. Be prepared to talk about how your objectives will lead students to higher-level thinking and authentic demonstrations of understanding. You may want to practice this conversation in a mock interview.

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