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To **Create** a *World* in which
Children *Love* to *Learn!*

Strategies
FOR DEVELOPING
HIGHER-ORDER
Thinking
SKILLS

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SHELL EDUCATION

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Questioning Strategies Overview

Perhaps the most straightforward way to encourage higher-order thinking is by engaging students through questions. However, just asking questions is not a sure way of getting students to think on higher levels. Teachers ask more questions than students ask, and the fact is that teachers ask approximately 80 questions per hour in any given class.

The problem with these questions is that they are mostly lower-level, basic recall types of questions. Teachers must keep asking questions, but they need to modify those questions to motivate students to think at a deeper level. The following strategies serve as a framework to help teachers transform the way they question.

Revised Bloom's Taxonomy has been making headway for more than 10 years. Lorin Anderson, a former student of Benjamin Bloom, worked with researchers to revise the taxonomy to make it relevant to the 21st century (Anderson, David, and Krathwohl 2001). All students, regardless of ability levels, should be thinking critically and creatively. Revised Bloom's Taxonomy is a teacher-friendly model for how to question students.

Williams Model was developed in the early 1970s by Frank Williams. The student behaviors of this model focus on eight levels of questions all based on the synthesis/creating level of Bloom's taxonomy. Fluency, flexibility, originality, and elaboration are cognitive or intellectual processes. Curiosity, risk taking, complexity, and imagination are affective or feeling processes. The eight levels of thinking challenge students to be more-creative thinkers, a necessary skill in order to keep up with technological changes in society (Fryer 1996).

The Socratic Method is used primarily as a process of inductive questioning through small steps with knowledge as the goal. These questions do not necessarily follow a hierarchal order but definitely lead one to another (Paul and Elder 2002). In a classroom, a teacher can use a set of questions to provoke students to think about something. The questions push students to examine what they know with the result of them analyzing a topic in depth.

Depth of Knowledge is a scale of cognitive demand that uses questions, tasks, and products ranked at four levels, adapted from the work of Norman Webb at the University of Wisconsin. The levels of thinking are differentiated by the complexity of mental processing required. Depth of Knowledge focuses on the complexity of the mental process that it takes for students to answer questions, perform tasks, or create products. The key to the different levels of thinking is not necessarily in the verbs that are used but rather in the depth of thinking that is demanded.

Revised Bloom's Taxonomy Overview

Original Bloom's vs. Revised Bloom's Taxonomy

Original Version	Revised Version
Eval.	Creating
Synthesis	Evaluating
Analysis	Analyzing
Application	Applying
Comprehension	Understanding
Knowledge	Remembering
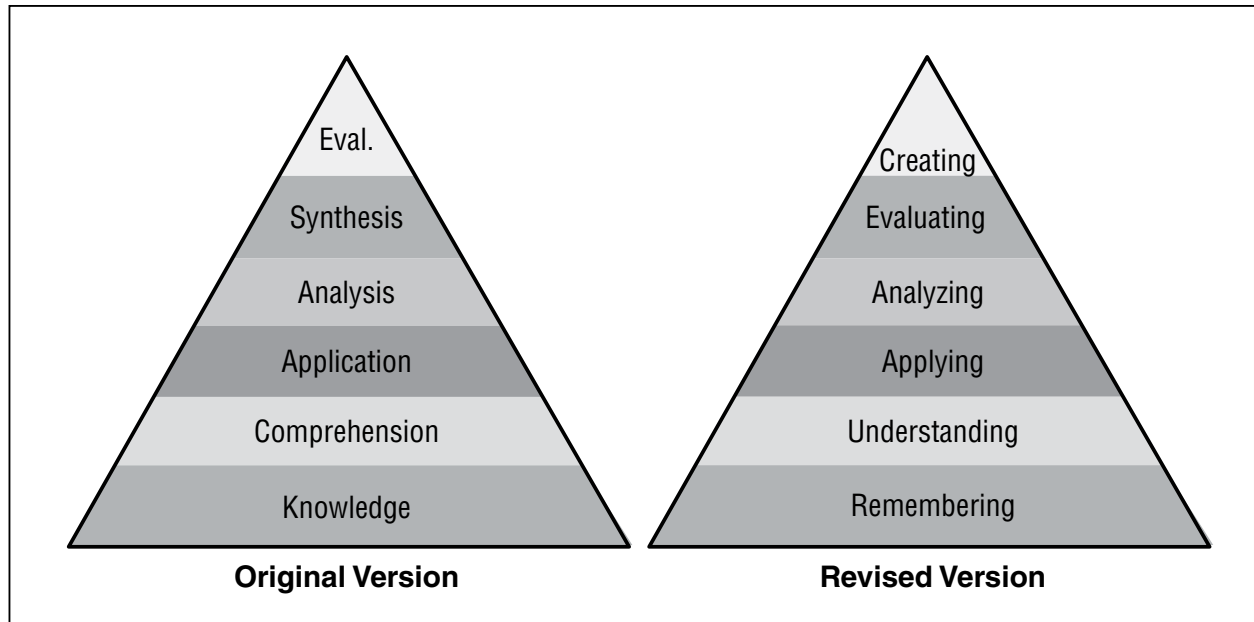
In 1956, educator Benjamin Bloom worked with a group of educational psychologists to classify levels of cognitive thinking. Bloom's Taxonomy has been used in classrooms for more than 50 years as a hierarchy of questions that progress from less to more complex. The progression allows teachers to identify the levels at which students are thinking. It can also provide a framework for introducing a variety of questions to all students. In 2001, cognitive psychologist Lorin Anderson, a former student of Benjamin Bloom, led a group of researchers to revise and update the taxonomy to make it relevant to the 21st century.

Some teachers view Bloom's Taxonomy as a ladder. They think all students have to begin at the bottom with remembering questions and work their way progressively up to the creating questions. Other teachers believe that the gifted students should answer the higher-order questions, on-grade-level students should answer the mid-level questions, and struggling students should answer the lower-order questions. While there is nothing inherently wrong with these two practices, each one should be used sparingly when the situation requires it. Maureen Donohue-Smith (2006) views Bloom's Taxonomy as a feedback loop. She says, "The answers to higher-order questions either support or challenge the questioner's data and thus cycle back to a potential reconfiguration of prior knowledge. Students may question facts, rethink interpretations, or challenge generalizations at any point" (43).

Revised Bloom's Taxonomy Overview *(cont.)*

Some people view Bloom's lower-order questions as inferior to the higher-order questions. This leads to the misconception that students do not need facts when in actuality they do need them. The problem has been that some teachers rely solely on the teaching of facts because it is more natural to ask lower-level questions and assign lower-level activities, for example, *Who is this? What is that?* All of this is done out of a desire for students to gain the necessary information. However, instead of the goal being the memorization and regurgitation of facts, it is more important for 21st century thinkers to know how to access those facts to support their thinking. Very few people can remember the millions of facts presented throughout the years in school. That does not mean that facts should not be taught. The point is not to prevent students from knowing facts; however, the move needs to be shifted from remembering the facts to knowing how to access and use the facts when necessary. Every 21st century thinker needs to be able to access the facts. Students should be able to sort through the most important pieces of information because all facts do not carry the same weight.

Bloom's Taxonomy can serve as a gauge for teachers to use when assigning activities or asking questions to help purposefully plan for higher-order thinking. There is no formula or right way to use the Revised Bloom's Taxonomy in each lesson. What matters is knowing the needs of students. At times, students need to begin with lower-order questions so they can build a foundation to support higher-order thinking. This can even be true for very bright students. Other times, students can jump directly to higher-order thinking and then investigate the facts. However, the evaluating question might need to be scaffolded for language for struggling students and for English language learners. These practices support the idea of Bloom's Taxonomy being a feedback loop. All of these questions work together to provide a solid foundation of thinking.

Steps for Using Revised Bloom's Taxonomy

1. Select the grade level objective you will be covering.

2. Decide on the specific skills, concepts, or generalizations that need to be learned.

3. Decide how you want to use questioning in the lesson. Will you use it:

   • As a pre-assessment tool before the lesson?

   • As an activity within the lesson?

   • As an assessment after the lesson?

4. Design your lesson with the specific questioning, focusing more on analyzing, evaluating, and creating.

Animal Habitats

Higher-Order Thinking Skill

- Revised Bloom's Taxonomy

Standards

- Students will know that plants and animals have features that help them live in different environments (McREL 5.2)

- Students will use English to obtain, process, construct, and provide subject matter information in spoken and written form (TESOL 2.2)

Materials

- *Animal Sorting Cards* (pages 37–40)

- Large sheet of construction paper (one per student)

- Glue

- Books, magazines, and other reference materials related to animals and their habitats

- *Bear at Sea* (page 41)

- *Habitat Story Planner* (page 42)

- Writing paper

Procedures

Preparation Note: Prior to the lesson, fold a sheet of construction paper into fourths and label each section with one of the following animal habitats: *ocean*, *forest*, *desert*, and *arctic* for each student in the class.

1. Distribute to each student one set of *Animal Sorting Cards* (pages 37–40).

2. Discuss with students what the term *habitat* means. Explain that many animals live in different habitats and that today they are going to learn about some animals and the habitats they might live in. Take a few minutes to review the four habitats being addressed. Some characteristics include the following:

   ocean—made of saltwater, deep, waves vary in size, there are four oceans (Pacific, Atlantic, Artic, and Indian)
   forest—it is dense, wet, it rains often, has lot of plants and trees
   desert—it is dry, hot, there is sand, cactus is a common plant
   arctic—it is cold, empty, there is ice

3. Instruct students to cut apart the animal cards. Work together to sort the animals into the appropriate habitat, and glue them to the construction paper. *(Note:* Some animals can live in more than one habitat.*)*

4. Ask students questions that help them recall and describe the characteristics of each habitat. For example: *What is the weather like? What special features can be found in each habitat?*

Animal Habitats *(cont.)*

Procedure *(cont.)*

4. Divide the class into learning groups and assign each group one of the four habitats. Have students work together to discuss the special features that each animal uses to survive in its habitat. Encourage students to use books, nature magazines, and other reference materials to support their information. Circulate among the groups, asking analytical questions such as, *How does a polar bear's fur help it to live in the arctic? How does a squirrel's bushy tail help it to live in a forest?*

English Language Support

Using pictures can help English language learners build their vocabularies and deepen their knowledge of a subject matter. Display a collection of photographs and illustrations that show the habitats and related animals.

5. After the group discussions are finished, challenge students to think creatively. Ask students, *What would happen if one of these animals moved from its natural habitat to a different one? What problems would the animal face? How would it try to solve the problems?*

6. Distribute copies to students of the *Bear at Sea* activity sheet (page 41). Read the story aloud. Ask students to identify what went wrong with Bear's trip.

7. Tell students that as a class, they will write a story about an animal that visits a habitat that is different from its natural one. Give each student a copy of the *Habitat Story Planner* activity sheet (page 42). As a class, complete the *Habitat Story Planner*, using *Bear at Sea* as an example.

8. Take a class vote to select an animal to be able to complete the *Habitat Story Planner* accordingly. Then, work as a class to create a story about what might happen to an animal that visits a habitat that is different from its own.

Differentiation Tip

Depending on your students abilities and if you would like to extend this lesson, allow students to choose from a variety of formats when writing their stories. For example, more advanced students can write traditional stories, grade-level students can write comic-strip stories, and struggling students can write their stories with pictures and captions.
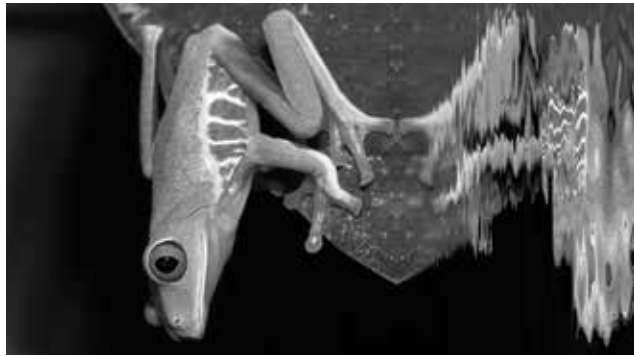
Assessment

Listen to how students describe different animals' attributes and how they connect to the habitats. Determine if they understand the concept of a habitat based on their rationale and contribution to the habitat story.

Animal Sorting Cards

Directions: Cut apart the pictures. Sort the animals into habitat groups.
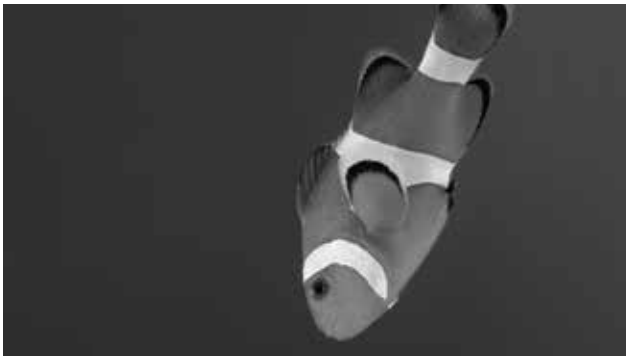
Animal Sorting Cards *(cont.)*

Animal Sorting Cards *(cont.)*

Animal Sorting Cards *(cont.)*

Name: _____ Date: _____

Bear at Sea

Directions: Read the story.

Bear lived in the forest. He wanted to go on an adventure.

"I'm a good swimmer," said Bear. "I will take a trip to the sea."

When he got there, he jumped in the water. He swam out. Soon Bear was hungry. He tried to catch a fish, but he fell in the waves. "It is easier to catch fish at home," said Bear. "In my lake, I don't have waves."

Bear dove to the bottom of the sea. He saw a crab dig under the sand. "I'm a great digger!" said Bear. "I can catch that crab for my lunch." Bear started to dig. His strong claws created a sand cloud. Bear couldn't see, and the crab got away.

When the sand settled, Bear saw a shark! Bear looked for a tree so that he could hide. There were no trees in the sea. "The sea is no place for me!" he cried.

Bear swam to shore and back to the forest as fast as he could.

Name: _____ Date: _____

Habitat Story Planner

Directions: Choose an animal from your animal sorting cards. Work with your class to plan a story about the animal visiting a different habitat.

Our animal is a _____.

It lives in the _____.

In our story, it will visit _____.

Our animal might try to...	It does not work because...