Exercise 1: Engaging in Higher-Order Thinking

Critical thinking is a key 21st century skill for students. As a 21st century teacher, you must be knowledgeable about processes that help students grow into good thinkers. Educational researchers have long recognized that there are types of thinking with different levels of complexity. Being familiar with these differences can help you become a more effective teacher. Using this knowledge, you can tap into many levels of thinking and help all students learn how to think deeply about what they are learning.

Lower-Order Thinking Skills

Traditionally, textbooks and other teaching materials consist of activities that require recall and memorization. Much of the thinking that students are asked to do in schools involves these lower-level skills. Knowledge and comprehension are considered simple thinking tasks and do not necessarily engage students in deep understanding and long-term retention. For example, the majority of traditional tests require students to simply recall information. Often the information is forgotten soon after the test.

Higher-Order Thinking Skills

21st century teaching and learning encourages students to move beyond lower-order thinking to inventive, productive, and ethical thinking. This kind of thinking requires higher-order thinking skills, such as analysis, synthesis, metacognition, problem solving, and evaluation. Most educators agree that their students are not as proficient at these kinds of thinking as they would like them to be. Often, the kinds of questions presented to students can make a big difference in their levels of thinking.

Top Discoveries and Inventions[2]

This exercise explores the relationship between the type of questions teachers can ask and the level of thinking required by students. In this exercise, you will use your newly acquired Internet skills to help you answer questions about the top discoveries and inventions within the last 100 years.

Step 1

Working individually, spend the next 10 minutes brainstorming answers to the questions, *What 5 to 10 scientific discoveries or technological inventions of the last 100 years do you think have had the most impact (positive and negative) on people and history? When did each occur?* Use the Internet to identify and provide accurate dates. Write your answers and share as directed.

Be certain to share answers to each question before the next question is introduced.

Step 2

Choose one discovery or invention from your list. Spend the next 10 minutes to develop an answer to the following question: *What are three positive and three negative impacts of that discovery or invention?* Use the Internet to find one piece of evidence to support either the positive or negative impact of the discovery or invention you chose. Write your answers and share as directed.

The facilitator will lead a discussion sharing answers.

Step 3

Use the same discovery or invention and spend the next three minutes thinking about the following question: *How might our lives might be different if this invention never existed?* Write your answers and share as directed.

Step 4

After hearing all the answers to Steps 1 through 3, work in a small group to discuss the question: *Is there any scientific discovery or technological invention that you think should not be pursued? Why or why not?* Write your answers and share as directed.

Step 5

What did you notice about your thinking processes as you progressed through the questions? How did the first set of questions help you to discuss the last couple of questions? Write your answers and share as directed.

[2]Note: The Top Discoveries and Inventions exercise is modified from pages 240–241 of Simon, Katherine. (2003). Moral Questions in the Classroom. New Haven, CT: Yale University Press.

Many models exist to help teachers identify and categorize thinking skills. For more information on these frameworks, see Appendix A.

Questioning can be an effective way to extend thinking. Learn more about questioning strategies in Module 10: Developing 21st Century Approaches.