Module 3

Fostering Critical Thinking and Collaboration

Description: Engaging students in higher-order thinking and promoting collaboration are two key behaviors found in student-centered, 21st century classrooms. The objective of this module is to have you understand how to cultivate higher-order thinking in students, develop skills for promoting and facilitating collaboration, and become familiar with the structure of each activity—a four-step iterative cycle of plan, do, review, and share.

Pair and Share: Reflecting on Module 2

Share your answers to the Take-Home Exercise: Reflecting on Module 2 with a colleague and the whole group as directed. Record any new and good ideas on the lines that follow.

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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.

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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.

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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.

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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.

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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.

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[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.

Exercise 2: Promoting Collaboration

Achieving Learning Goals

Efforts to achieve learning goals can be organized in three ways:

- **Competitively:** Students work against each other to see who is best or fastest at achieving a goal that only one or a few can attain.

- **Individualistically:** Students work alone to accomplish goals unrelated to others.

- **Cooperatively:** Students work together to achieve shared goals.

Competitive, individualistic, and cooperative efforts all have a role in achieving learning goals. Ideally, all students should learn how to compete, work alone, and work with others.

1. What might be the advantages and disadvantages of each way of achieving learning goals?

2. Do you think you might prefer one way to accomplish your learning goals? Why or why not?

Share ideas with the whole group.

Forming Collaborative Groups or Pairs

Students in 21st century classrooms are often encouraged to achieve learning goals by working cooperatively in a collaborative manner. Collaboration involves teamwork—working with one or more people to set goals and complete tasks. Research indicates that collaboration provides opportunities for students to improve academic success in that they must ask questions, discuss ideas, explore solutions, clarify their own thinking, and develop a deeper understanding of the content. Also, social skills such as taking turns, sharing, giving help to others, and accepting help from others can be acquired through collaboration.

Collaborative groups or pairs can be formed in many ways:

- By students themselves based on friendships or interests

- By random assignment

- By the teacher

1. What might be the advantages and disadvantages of each way?

2. Do you generally prefer one particular way to form groups or pairs? Why?

Share ideas with the whole group.

Teachers are strongly encouraged to assign pairs that stay together for the duration of all activities in a unit, with the goal of two students learning together. Efforts to break up pairs that are not getting along are often counterproductive. Breaking up pairs is discouraged because it denies students the opportunity to learn the skills needed to resolve problems in collaborating with one another.

Facilitating Collaboration

Collaboration may not come naturally to students and may require motivation, role modeling, direct instruction, and practice time. For example, ways to work together should be discussed, including taking turns, listening when others are speaking, and being responsible for one's own learning.

When students are collaborating and working together, teachers should ensure that all group members

- participate and feel included

- agree to their goals and their plans for making their product

- work on their assigned parts to complete their product

- review their work together to see how to make it better

- talk about their work and help each other as they go along

When students work with peers, conflicts may arise. Read the following list of conflicts and identify possible solutions as directed.

Conflict 1: A student refuses to work with a partner or in a group.

Each group will be assigned a conflict. Groups will report out.

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Conflict 2: No one wants to work with a specific student.

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Conflict 3: One student is shy and does not want to speak.

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Conflict 4: One student does not let a partner or other group members share the computer.

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Conflict 5: One student does not respect or listen to the ideas of a partner or other group members.

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Exercise 3: Planning, Doing, Reviewing, and Sharing

The ability of students to think critically and collaborate meaningfully with others often occurs best within a cycle of their generating and improving their work. So that you can gain direct experience with this type of 21st century learning environment, the design of every technology productivity activity and action plan included in the Intel® Teach Getting Started Course requires you to plan, do, review, and share. To learn more about this four-step iterative cycle, read and discuss the following information.

Plan It

Step 1 is Plan It. The icon or picture symbol for Plan It shows a pencil. A pencil is shown because planning typically is done with a pencil and paper. A pencil is better than a pen because pencils often have erasers, so you can change your plans if needed.

You begin Plan It by learning what you are being asked to do or solve. Then, you discuss and answer questions that help you decide what you are interested in doing and how you are going to do it. Often, writing your answers and drawing a quick picture detailing your plan is a helpful step. Plan It ends when you have shared your plan with a colleague and have received constructive feedback.

Share answers with the whole group.

1. Have you ever made a plan before? What did you plan?

2. Did your plan change? How did having a plan help?

Do It

Step 2 is Do It. The icon for Do It shows a computer mouse. A computer mouse is shown because doing typically is done with a mouse, along with a keyboard and a computer.

During Do It, you follow your plan and complete what you have been asked to do or solve. Your ideas should be different from the ideas shown in the examples in this book. As part of doing, you carefully read and follow the numbered directions. In the directions, you will find helpful suggestions and new challenges. You may find that you want to change your original plans as you do your work. Do It ends when you have completed all of the numbered directions. You might also have tried one or more of the challenges. Should you have needed help, you may have asked a colleague.

1. What have you done or made that has required you to read and follow directions?

2. Why is reading and following directions important?

3. Have you ever started a process or project and then needed to go back and change your original plan? If so, why?

Review It

Step 3 is Review It. The icon for Review It shows a magnifying glass. A magnifying glass is shown because a magnifying glass often is used when we want to see something more clearly and in greater detail.

During Review It, you go back and closely look over the product that you created. You check to see whether you have followed your plan and the directions. You also make sure that your product has all the required elements. Often, you might ask a colleague to help check your work. If elements are missing, or if you would like to change specific aspects of your work, you can add to or change your product. Review It ends when you have saved your work, checked it, and decided that no additional changes are needed.

1. Have you ever thought that you had finished a process or project only to find out that something was missing or needed to be changed? What happened?

2. How can going back and reviewing your work help to improve it?

Share It

Step 4 is Share It. The icon for Share It shows an open hand. An open hand is shown because we often use our hands when we share our work with others.

During Share It, you begin by showing colleagues the work you have done on the computer. As part of sharing, you might tell others about your work and answer any questions they might have. You should also read the questions in the book and discuss your answers. Share It ends after you have shared your answers with the class.

1. When have you had an opportunity to share your work with others? What did you share?

2. What can be learned by sharing your work with others?

During the next module, Module 4: Discovering Word Processing, you have your first opportunity to plan, do, review, and share with colleagues.

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Take-Home Exercise: Reflecting on Module 3

Reflect on the exercises, activities, skills, and approaches addressed in this module. Record your answers to the following questions and be prepared to share your answers at the beginning of the next module.

1. What can you do in your classroom to promote higher-order analysis, synthesis, and evaluation?

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2. What opportunities exist in your classroom for students to collaborate with one another?

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Module 3 Summary

Step 1

What did you accomplish in this module? List your ideas and those of others as directed on the lines that follow.

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Step 2

What key points are addressed in this module? List your ideas and those of others as directed on the lines that follow.

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Step 3

Ask any questions and share any comments. Learn about and prepare for Module 4: Discovering Word Processing.

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