



LEARNING SCIENCES
INTERNATIONAL

Study Guide

Engaging in Cognitively Complex Tasks

**Classroom Techniques to Help Students Generate & Test Hypotheses Across
Disciplines**

Engaging in Cognitively Complex Tasks

After reading pages 5–16, which preview the rest of the guide, process your understanding. Further discuss any areas of confusion or interest with your book study group.

The Effective Implementation of Engaging in Cognitively Complex Tasks

Identify and describe the two aspects of effective implementation of engaging students in cognitively complex tasks.

Look at the list of teacher actions on pages 10–11. Which action(s) you would be most likely to utilize, and why?

Monitoring for the Desired Result

The text lists six examples of ways to determine if students are able to engage in cognitively complex tasks. List each of the examples of evidence in the appropriate box below.

Examples I Have Used	Examples That Are New To Me

Engaging in Cognitively Complex Tasks

After reading pages 5–16, which preview the rest of the guide, process your understanding. Further discuss any areas of confusion or interest with your book study group.

Scaffolding and Extending Instruction to Meet Students' Needs

There are four categories of support you can provide students who need scaffolding. Choose one of the four and explain why you believe it could serve as a useful scaffold.

What category of support did you choose?

Why do you believe it could serve as a useful scaffold?

Instructional Techniques to Engage Students in Cognitively Complex Tasks

This guide presents six techniques to engage students in cognitively complex tasks. Each of the techniques is similarly organized. Choose one technique in which you are most interested, and share what you hope to learn or improve from it.

Which technique did you choose?

What do you hope to learn or improve?

Investigating

How to Effectively Implement Investigating

There are four steps to effectively implementing investigation with your students. In your own words, record your understanding of each of the steps.

<p>Use the Planning Template</p>	
<p>Teach and Model the Steps for Generating and Supporting Claims</p>	
<p>Begin Your Investigation Lesson With a Motivating Prompt</p>	
<p>Provide Resources and Guidance During Investigational Tasks</p>	

Determining if Students Can Generate and Test Hypotheses Using Investigating

Review the four suggestions for monitoring. Of the four, which one are you likely to implement in your classroom, and why?

Investigating

After reading pages 17–31, choose one standard from your subject area and/or grade with which to work. Record that standard on the lines below.

Using the standard you have chosen, plan a lesson utilizing the planning template on page 19.

Planning Questions for Teachers Action Steps

1. Identify the Learning Target:
2. Determine the Topic:
3. Decide on the Type of Investigation:
4. Identify Questions or Prompts

Planning Questions for Students' Action Steps
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1. State a Claim:
2. Identify What is Already Known:
3. Identify Confusion or Contradictions:
4. Develop a Plausible Resolution:
5. Reflect on the Initial Claim:

Planning Questions for Teacher's Action Steps During the Implementation
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1. Plan to Monitor:
2. Plan to Adapt:

Scaffold	Extend

Problem Solving

How to Effectively Implement Problem Solving

List and explain the five steps involved in teaching and modeling problem solving.

Look at the list of common mistakes on page 38. Identify one that you have been guilty of in the past, give an example, and describe how you could handle that situation in the future.

Mistake:
Personal Example:
What you could do differently:

Determining if Students Can Generate and Test Hypotheses from Problem Solving

Which of the monitoring techniques will you most likely put into place having read the suggestions?

Problem Solving

After reading pages 33–46, choose one standard from your subject area and/or grade with which to work. Record that standard on the lines below. You may choose to work with the same standard as in the last section or select a new standard.

Using the standard you have chosen and utilizing the problem solving planning template on page 34, determine a learning goal, identify an obstacle, and create a prompt for the problem needing to be solved.

Learning Goal:

Obstacle:

Prompt:

Give two examples (each) of ways in which you might scaffold and extend for those students who might need it.

Scaffold	Extend
1.	1.
2.	2.

Decision Making

How to Effectively Implement Decision Making

Fill in the blanks.

Decision-making tasks require students to _____ the best alternative and then _____ their thinking to _____ that alternative based on pre-established criteria to confirm or disconfirm their original _____ of which alternative would meet the criteria.

The text lists four steps involved in the decision making process, in the boxes below determine which steps should involve teacher guidance and which steps should require students to do their own thinking.

Teacher Action	Student Led

Determining if Students Can Generate and Test Hypotheses Using Decision Making

The text provides numerous examples of monitoring whether students are able to confirm or disconfirm their hypotheses. List one of those monitoring strategies, and provide one of your own.

Decision Making

After reading pages 47–62, choose one standard from your subject area and/or grade with which to work. Record that standard on the lines below. You may choose to work with the same standard as in the last section or select a new standard.

Using the standard you have chosen to create a motivating prompt and determine the resources and guidance you would need to provide. Refer to pages 52–53 of the text for guidance.

Prompt:
Resources:

Describe one way in which you could adjust your instruction when individual or small groups of students do not seem to grasp or remember the critical content.	Describe one way in which you could adjust your instruction in order to extend this particular instructional technique.

Experimental Inquiry

How to Effectively Implement Experimental Inquiry

Explain how experimental inquiry differs from the investigating technique of the previous chapter.

The text lists three teacher action steps for implementing experimental inquiry. Record your understanding by describing each step in your own words.

Identify the Learning Target	
Set up a Demonstration	
Use your Demonstration to Create a Prompt	

Look at the list of common mistakes on page 69. Identify two that you have been guilty of in the past.

Determining if Students Can Generate and Test Hypotheses from Experimental Inquiry

Explain in your own words when using feedback strips would be a useful monitoring technique.

Experimental Inquiry

After reading pages 63–79, choose one standard from your subject area and/or grade with which to work. Record that standard on the lines below. You may choose to work with the same standard as in the last section or select a new standard.

Using the standard you have chosen, plan a lesson utilizing the template on pages 64–65 of the text.

Planning Questions for Teacher's Action Steps
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- 1.
- 2.
- 3.

Planning Questions for Students' Action Steps
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- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Using the examples from the text and the standard you have chosen, describe how you will check that students are analyzing their own thinking?

What will students do?	What will teacher do?

Using the examples from the text and the standard you have chosen, describe one way in which you might scaffold and one way in which you might extend the lesson.

Scaffold	Extend

Inventing

How to Effectively Implement Inventing

List and explain the seven steps that students will follow as they design and build their prototypes.

Explain the benefits of peer response groups and self-reflection in maintaining student focus.

Peer Response Groups	Self-reflection

Determining if Students Can Generate and Test Hypotheses from Inventing

Of the three monitoring strategies listed on page 93, which would you be most likely to use, and why?

Inventing

After reading pages 81–95, choose one standard from your subject area and/or grade with which to work. Record that standard on the lines below. You may choose to work with the same standard as in the last section or select a new standard.

Using the standard above and utilizing the template on pages 82–83, design an inventing process that you could use with your students.

Prompt:
Brainstorm:
Design:
Build:
Evaluate:
Revise:
Explain:
Reflect:

Describe one way you might scaffold and one way you might extend for students that need it.

Scaffold	Extend

Student-Designed Tasks

How to Effectively Implement Student Designed Tasks

Although students are designing their own tasks, providing guidance and resources can be imperative to their success. List the four examples of guidance given in the text, and explain in your own words why each would be beneficial.

Guidance	Benefit
1.	
2.	
3.	
4.	

Which of the four types of guidance would you be most likely to utilize, and why?

Determining if Students Can Design Their Own Tasks

Describe how a proficiency scale would be useful in monitoring which students can successfully analyze their thinking and which students need more support or extending?

Student-Designed Tasks

After reading pages 97–106, choose one standard from your subject area and/or grade with which to work. Record that standard on the lines below. You may choose to work with the same standard as in the last section or select a new standard.

Using the standard above, explain how you would avoid the four common mistakes listed on page 101

Mistake	Improvement
The teacher tells the student the topic	
The teacher does not ask students to generate and test a hypothesis	
The teacher does not align the task with the level of cognitive complexity for the learning target	
The teacher does not give the students the opportunity and support to deviate from specific steps	

Describe one specific monitoring technique you would use, as well as one scaffolding technique and one extending technique.

Monitoring Technique

Scaffold	Extend
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Engaging in Cognitively Complex Tasks

Key Terms and Ideas for Implementation of Instructional Techniques

Use the space below to record key terms and ideas that are essential for the implementation of each instructional technique.

Instructional Technique 1: Investigating
Instructional Technique 2: Problem Solving
Instructional Technique 3: Decision Making
Instructional Technique 4: Experimental Inquiry
Instructional Technique 5: Inventing
Instructional Technique 6: Student-Designed Tasks

For additional reflection questions, refer to page 108 in the text.