



**Competency-Based Education
Folio Series**

**Element IVf
STIMULATING ELABORATIVE
INFERENCES**

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Element IVf

STIMULATING ELABORATIVE INFERENCES IN A COMPETENCY-BASED CLASSROOM

One type of general instructional activity that is specifically designed to deepen students' understanding of content is elaborative inferences. As the name implies, these types of inferences elaborate on content that has been previously learned. It's important to remember, however, that simply asking students inferential questions doesn't automatically translate into students deepening their knowledge. Teachers must plan questions and elaboration activities with an eye toward stimulating students to make specific types of inferences.

What Does It Look Like When You Are Stimulating Elaborative Inferences?

When stimulating students' thinking to make elaborative inferences, teachers should engage in activities like the following:

- Asking students questions that require specific types of inferences
- Asking students to analyze their own thinking

Teachers also should be able to describe the primary strategies they use when stimulating students' thinking regarding elaborative inferences.

In addition to teachers engaging in specific behaviors, encouraging elaborative inferences is also signaled by students engaging in behaviors like the following:

- Volunteering to answer inferential questions
- Providing explanations for their answers
- Asking their own questions that are inferential in nature

When asked, students can also:

- Explain what inferential questions require them to do
- Explain how inferential questions have deepened their understanding of specific topics

What You Should Understand and Be Able To Do

Engaging students in activities that encourage them to make elaborative inferences involves the following strategies:

- Stimulate default inferences
- Stimulate reasoned inferences
- Use elaborative interrogation
- Use questioning sequences

STRATEGIES

The strategies covered in this section reflect some of the key concepts and skills teachers should understand and be able to apply to effectively stimulate students' thinking regarding elaborative inferences.

Stimulate Default Inferences

Default inferences are the type of inferences people make when they think of something they are somewhat familiar with. For example, if a person knows a little bit about firemen and then meets a real fireman, that person will automatically assume that the real fireman has all of the general characteristics of a fireman (e.g., brave, in good physical condition). This process is referred to as making default inferences. A teacher can stimulate default inferences by using the types of questions shown in Exhibit 1. These types of questions were introduced in Folio IVa, Reviewing Content.

Exhibit 1. Suggested Default Inference Questions (continued, next page)

Topic	Default Questions
Specific person or type of person (Abraham Lincoln, U.S. president)	What <i>time period</i> is associated with this person? What <i>places</i> are associated with this person? What <i>events</i> are associated with this person? What <i>accomplishments</i> are associated with this person?
Specific organization or type of organization (New York Yankees, professional baseball team)	What <i>beliefs</i> are associated with this organization or group? What <i>locations</i> are associated with this organization or group? What <i>time period</i> is associated with this organization or group? What <i>events</i> are associated with this organization or group?
Specific intellectual or artistic product or type of intellectual or artistic product (<i>Mona Lisa</i> , famous painting)	What <i>person</i> is associated with this product? What <i>time period</i> is associated with this product? What <i>event</i> is associated with this product? What <i>causes or consequences</i> are associated with this product? What <i>places</i> are associated with this product? What <i>values</i> are associated with this product?
Specific naturally occurring object or type of naturally occurring object (Linden tree, tree)	What <i>events</i> are associated with this object? What <i>people</i> are associated with this object? What <i>time period</i> is associated with this object? What <i>location</i> is associated with this object?
Specific naturally occurring place or type of naturally occurring place (Arctic Ocean, ocean)	What <i>events</i> are associated with this place? What <i>people</i> are associated with this place? What <i>time period</i> is associated with this place? What <i>location</i> is associated with this place?
Specific animal or type of animal (Secretariat, famous racehorse)	What <i>events</i> are associated with this animal or type of animal? What <i>people</i> are associated with this animal? What <i>time period</i> is associated with this animal? What <i>locations</i> are associated with this animal? What <i>system</i> is this animal a part of? What <i>color, number/quantity, or dimension</i> is associated with this animal?

Topic	Default Questions
Specific manmade object or type of manmade object (Rolls Royce, expensive passenger automobile)	What <i>locations</i> are associated with this object? How is this object <i>used</i> ? What <i>larger entity</i> is this object part of? What is the <i>process</i> for making this object? What does this object <i>look like</i> ? What <i>value</i> is associated with this object? What <i>dangers</i> are associated with this object?
Specific manmade place or type of manmade place (Coliseum, sports arena)	What <i>events</i> are associated with this place? What <i>people</i> are associated with this place? What <i>location</i> is associated with this place? What <i>actions</i> are performed at this place? What <i>larger entity</i> is this place part of? How is this place <i>acquired or sold</i> ? What <i>value</i> is associated with this place? What <i>dangers</i> are associated with this place?
Naturally occurring phenomenon or event or type of naturally occurring phenomenon or event (Mount St. Helen eruption, volcanic eruption)	What <i>places</i> are associated with this phenomenon? What <i>time period</i> is associated with this phenomenon? What <i>causes or consequences</i> are associated with this phenomenon? What <i>happened/happens</i> during this phenomenon?
Specific manmade phenomenon or event type of manmade phenomenon or event (Macy's Thanksgiving Day Parade, holiday event)	What <i>people</i> are associated with this event? What <i>time period</i> is associated with this event? What <i>places</i> are associated with this event? What <i>causes or consequences</i> are associated with this event? What <i>happened</i> during this event? What <i>equipment</i> was used during this event? What <i>problems</i> were caused or solved by this event?
Specific manmade abstraction or type of manmade abstraction (Linear function: function. Love: emotion)	What are the <i>features</i> of this abstraction that distinguish it from other abstractions? What are the <i>necessary conditions</i> for this abstraction? What does this abstraction <i>help explain or organize</i> ? What are some <i>types</i> of this abstraction? In what <i>situations</i> is this abstraction useful or important? Into what <i>category</i> does this abstraction fall?

Note: Adapted from Marzano, 2019, pp. 30–31.

To stimulate elaborative inferences about content, a teacher first begins by asking students questions like those shown in Exhibit 1 about content they have already been introduced to. Students then describe the characteristics they assume are associated with that content (i.e., they describe their default inferences). The teacher should record these inferences, perhaps by writing them on a whiteboard. Next, the teacher asks students to explain how learned these characteristics. For example, did they assume these characteristics are associated with the topic, or did they read or hear about specific characteristics? The example in Exhibit 2 (see next page) describes how this might manifest in the classroom.

Exhibit 2. Using Default Questions: Example

A teacher is leading a unit on plants associated with different climate regions on Earth. As part of the unit, the class has learned about the important role that trees play in providing oxygen, improving air quality, and conserving water. The teacher explains that in upcoming lessons the class will be learning about very old trees in the United States, such as trees located in the Ancient Bristlecone Pine Forest in the mountains of California. They also will discuss why very old trees are important to study.

The teacher asks students a series of questions to stimulate their thinking about what they may learn in the upcoming lessons, including:

- What location or locations in the United States are associated with very old trees?
- What time period is associated with these old trees?

The teacher gives students time to think and record their answers to the questions and then asks several students to share their answers with the class.

One student share that at first he thought that a tree would grow to be old by living in a gentle environment, but she learned from articles she read with her family that the harsh environment at high elevations can create the conditions that cause some trees to live a very long time, in particular bristle cone pine trees. The student also says she learned that cold temperatures, high winds, and a short growing season are among the reasons these trees grow so slowly.

Stimulate Reasoned Inferences

Reasoned inferences require students to generate information they have not learned before. This distinguishes these inferences from default inferences, which involve information students already assume is associated with a particular topic. When stimulating reasoned inferences, the teacher provides students with statements that are true about specific content and then asks them to generate inferences that are based on these true statements. Such statements are referred to as premises.

There are two types of premises: generalizations and *if-then* statements. Generalizations usually involve the adjectives *all*, *some*, *most*, or *none*. For example, the following are generalizations:

- All mammals have hair or fur.
- Some fast food is very unhealthy.
- None of the people in the park today were dressed right for cold weather.

If-then statements describe conditional relationships. If one thing occurs, another will occur. The following are examples of if-then premises:

- If an individual is extremely poor, then that person is more likely to go hungry compared to someone who has a lot of money.
- If I keep that pot of chili on the hot stove without stirring it, then it may burn and taste terrible.
- If I add fertilizer to the soil around a pepper plant, then the plant is more likely to develop bright leaves and flowers.

Once one or more premises about a specific topic have been presented to students, the teacher asks students to generate inferences about the topic and explain their thinking. The example in Exhibit 3 describes how this might manifest during learning.

Exhibit 3. Stimulating Reasoned Inferences: Example

A teacher is leading a unit about the effects of advertising on individuals' perceptions of a product. She introduces the next lesson by presenting students with the following premises:

- Most television advertising is much more expensive than radio or print advertising.
- If people read, listen to, or see the same ad many times, then they are more likely to buy the product the ad is promoting.
- If the amount of advertising increases by 1%, then the market share for the product will increase by about .1%.

The teacher gives students time to record in their academic notebooks their inferences about the topic of advertising and what they may be learning in the upcoming lessons. She then provides an opportunity for students to share their inferences and explain their thinking.

Use Elaborative Interrogation

As its name implies, when using elaborative interrogation, the teacher asks students a series of questions about what they believe to be true regarding specific content.

The process of elaborative interrogation begins with the teacher asking students to list those things they believe to be true about a specific topic. As students articulate these statements, the teacher lists those statements on the whiteboard. The teacher then asks the following question about each statement: How do you know this is true?

As students respond to the question, the teacher continues to play the role of interrogator. He or she asks questions like the following:

- Where did you learn that piece of information?
- How sure are you about this?
- Can you provide an example of this?

After this questioning is complete, the teacher asks students to reconsider their original statements and revise them if they have changed their opinion as a result of the teacher's interrogation. The example in Exhibit 4 describes how this might take place during learning.

Exhibit 4. Using Elaborative Interrogation: An Example

A teacher has been leading a unit about conventional and alternative methods that promote and maintain personal health, such as diet, exercise, prayer, meditation, supplements, safety practices, spending time in the outdoors, and so on.

The teacher asks students to think about those things they believe to be true about good health practices and make a list in their academic notebooks. After students have had time to do this, the teacher asks students to share one or more of the statements or items they wrote in their notebooks. Next, the teacher asks students to consider, for each statement they wrote in their notebooks, "How do you know this is true?" After students have had time to think about their answers and write in their notebooks, the teacher asks a series of questions:

- Where did you learn that piece of information? Who told you that, or where did you read or learn that?
- How certain are you that what you wrote is true?
- What examples can you provide for each of your statements?
- Is there anything you want to correct or clarify in any of your statements?
- For each statement, is it true all of the time or only in certain situations?

After each question, the teacher pauses and gives students time to write in their notebooks.

At the end of the exercise, the teacher asks students to share any insights they have had about what they believe to be true about the practices that contribute to good health, as well as questions they now have.

Use Questioning Sequences

Questioning sequences are a series of questions that follow a specific set of steps. This strategy was developed by Marzano and Simms in 2014 and articulated in the book *Questioning Sequences in the Classroom*. It involves the following five steps.

Step 1: Select a topic

The first step is to select a topic to focus on. Topics that are selected for questioning sequences should be very robust with many interrelated ideas. They also should be topics the teacher has spent a considerable amount of time on so that students already know a great deal about them.

Step 2. Ask detailed questions

During this step, the teacher asks students questions about details that are important to the topic. These detail questions address the defining characteristics of the topic. To craft these questions, teachers might use the questions found in Exhibit 1 of this folio in the section entitled “Stimulate Default Inferences,” but teachers should feel free to develop their own questions as well.

Step 3. Ask category questions

Once the defining characteristics of the selected topic have been elucidated through detail questions, the teacher asks questions that deal with categories related to the topic. Such questions include the following:

- Questions about the category or categories the topic may belong to.
- Questions about the categories within the topic.
- Questions that compare the topic with topics that belong to the same category.

Step 4. Ask elaboration questions

During this phase, the teacher asks students to elaborate by:

- Describing how defining characteristics of a topic relate to one another
- Creating new generalizations and principles about the topic

Step 5. Ask evidence questions

Finally, the teacher asks students to provide support for their conclusions by:

- Identifying the sources for their conclusions
- Explaining the overall logic or reasoning behind their conclusions
- Qualifying or narrowing their conclusions

The example in Exhibit 5 (see next page) describes how this process might manifest during learning.

Exhibit 5. Using Questioning Sequences: Example

A teacher is leading a unit about the Declaration of Independence, including the key people involved in the process of writing this important document in the history of the United States. This group, known as the Committee of Five, was made up of Thomas Jefferson, John Adams, Benjamin Franklin, Roger Sherman, and Robert Livingston.

DETAIL QUESTIONS

The teacher begins the questioning sequence by posing questions about important details related to the key individuals involved. For example:

- What time period is associated with Thomas Jefferson?
- What places are associated with Thomas Jefferson?
- What events are associated with Thomas Jefferson?
- What accomplishments are associated with Thomas Jefferson?

As students answer these questions, they begin to activate their knowledge, which leads to the identification of important facts related to the establishment of the United States.

CATEGORY QUESTIONS

Next, the teacher asks questions that deal with categories related to the topic. A number of categories could be used for the focus of these questions (e.g., Founding Fathers, Committee of Five, U.S. Presidents). Possible questions include, for example:

- What individuals can you identify who are or were U.S. Presidents (not just individuals who were part of the Committee of Five, but other U.S. Presidents you recall)?
- What key actions do people in the category of U.S. Presidents perform (in the past and currently)?
- What are the requirements to be a U.S. President?
- What did one of the past U.S. Presidents have in common with another past U.S. President? How did these two individuals differ?
- What is another category that the key individuals belong to? *Note:* This question might lead students to identify the Founding Fathers as another category, which might lead the teacher to pose related questions, such as, what other individuals are considered to be Founding Fathers? What were the Founding Fathers known for?

ELABORATION QUESTIONS

During this phase, the teacher poses questions that ask students to elaborate, such as:

- Why do you think these five men were appointed to draft the Declaration of Independence?
- Why do you think the U.S. President is the Commander in Chief of the U.S. military?

EVIDENCE QUESTIONS

Finally, the teacher asks students to provide support for their elaborations, for example:

- What sources can you identify that support your conclusions about U.S. Presidents, the Committee of Five, or other claims or generalizations you have generated?
- How might you explain the logic or reasoning behind your conclusions?
- What errors, if any, do you see in the reasoning behind your elaborations?
- How might you qualify or narrow your elaborations?

DETERMINE YOUR STATUS & GROWTH REGARDING THIS ELEMENT

To develop teachers' individual skills in stimulating students' thinking relative to elaborative inferences, each teacher should begin by identifying his or her current level of expertise relative to this strategy by using the scale shown in Exhibit 6.

Exhibit 6. Teacher Self-Evaluation Scale for Elaborating on Information in a CBE Classroom

	4 Innovating	3 Applying	2 Developing	1 Beginning	0 Not Using
Elaborating on Information	I engage in all behaviors at the <i>Applying</i> level. In addition, I identify those students who are not making substantive additions to their knowledge base. I design alternate activities and strategies to meet their needs, leading to almost all students making substantive additions to their knowledge base.	I engage students in activities that help them elaborate on information, and most students are making substantive additions to their knowledge base.	I engage students in activities to elaborate on information without making significant errors or omissions. Evidence for this level of performance includes: 1. I use question sequences. 2. I ask inferential questions.	I engage students in activities that help them elaborate on information, but I make significant errors or omissions, such as not sequencing questions in such a way as to gradually increase the rigor of students' responses or not pushing students to expand on their answers.	I do not engage students in activities that help them make elaborative inferences.

Source: Adapted from Marzano 2011, 2012; Marzano & Toth, 2013.

The self-evaluation scale shown in Exhibit 6 has a straightforward logic to it. At the *not using* level, the teacher is not doing anything to stimulate students' thinking, leading to elaborative inferences. At the *beginning* level, the teacher is trying to engage students in activities that stimulate elaborative inferences but is doing so with some significant errors or omissions. At the *developing* level, the teacher is engaging students in these activities without making significant errors or omissions. At this level, however, the teacher's actions are not translating into the majority of students benefiting from these activities. This occurs at the *applying* level, where the teacher engages students in activities that stimulate elaborative inferences without making significant errors or omissions and at least a majority of students are experiencing the desired effects. At the *innovating* level, the teacher is going above and beyond the applying level by (1) identifying those students who are not experiencing the desired effects of these activities and (2) making adaptations to meet their specific needs.

Teachers should start by examining the evidence for the *developing* level, which involves doing certain things and being able to describe certain behaviors they engage in. If teachers do not engage in these behaviors and cannot describe the strategies they use, then they should probably rate themselves at the *not using* level or the *beginning* level. If they are making no attempts at strategies for this element, they should rate themselves at the *not using* level. If they are making attempts at strategies for this element, they should probably rate themselves at the *beginning* level. If teachers meet the criteria for the *developing* level, then they should examine the evidence for the *applying* level. Such evidence focuses on things students are doing and things students can describe. If students are meeting these criteria, then teachers should determine whether they are making adaptations for specific students who are not benefitting from activities that stimulate them to make elaborative inferences. If so, then teachers can score themselves at the *innovating* level.

To further help teachers rate themselves, we offer the guidelines shown in Exhibit 7.

Exhibit 7. Element IVf. Teacher Guidelines for Self-Evaluation: Stimulating Elaborative Inferences in a CBE Classroom

Design Area IV: I design and execute instructional activities in real time and virtually that help students refresh, revise, and integrate their knowledge of specific content.	
Element IVf Planning Question: How will I help students elaborate on information?	
Teacher Evidence for Level 2 (Developing)	Student Evidence for Level 3 (Applying) or 4 (Innovating)
<p style="text-align: center;">I am:</p> <ul style="list-style-type: none"> • Asking students inferential questions • Engaging students in elaborative interrogation • Using question sequences (i.e., detail questions, then category questions, then elaboration questions, then evidence questions) • Asking students to expand on their answers <p style="text-align: center;">When asked, I can:</p> <ul style="list-style-type: none"> • Explain how elaboration strategies manifest in real time and virtually • Describe the elaboration strategies I most commonly use 	<p style="text-align: center;">Students are:</p> <ul style="list-style-type: none"> • Volunteering answers to inferential questions • Providing explanations for their answers • Asking questions that are inferential in nature <p style="text-align: center;">When asked, students:</p> <ul style="list-style-type: none"> • Describe my questions as challenging but helpful • Can explain what an inferential question requires them to do

Source: Adapted from Marzano 2011, 2012; Marzano & Toth, 2013.

Tracking Progress Over Time

Occasionally score yourself on the strategy you have selected to work on and track your progress.

Strategy: _____

Initial Score: _____

Goal Score: _____ by _____ (date)

Score on Element	4										
	3										
	2										
	1										
	0										
		a	b	c	d	e	f	g	h	i	j

Date

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

j. _____

Strategy Reflection Log

As you practice your selected strategy, record notes about how you are progressing using the following form.

Date	Notes

Teacher Survey for Elaborative Inferences

Teachers can use this survey to evaluate themselves at different points in time as part of continuous improvement. Each evaluation is an opportunity to assess progress and then set new personal goals for improvement. The individual teacher using this survey should select the number on the scale of 1–5 that most accurately reflects his or her use of the particular strategy, where 1 = “no, not at all” and 5 = “yes, definitely.”

1. I stimulate students’ thinking to make default inferences by asking questions about information related to content they have already been introduced to.

1 2 3 4 5

2. I stimulate students’ thinking to make reasoned inferences by providing them with statements that are true about specific content and then asking them to generate inferences based on these true statements.

1 2 3 4 5

3. I use elaborative interrogation by asking students a series of questions about what they believe to be true regarding specific content.

1 2 3 4 5

4. I use questioning sequences that involve questions that stimulate students’ thinking about important details related to a topic, a category or categories related to the topic, elaborations, and evidence for students’ conclusions.

1 2 3 4 5

What strategies do you commonly use to stimulate students’ thinking about elaborative inferences?

Student Survey for Elaborative Inferences – Elementary School

1. My teacher asks me questions about content I have already been introduced to and asks me to describe characteristics that I think are related to that content.

I very much disagree. I disagree. I don't agree or disagree. I agree. I very much agree.

2. My teacher gives me statements that are true about specific content and then asks me to develop a conclusion based on those statements.

I very much disagree. I disagree. I don't agree or disagree. I agree. I very much agree.

3. My teacher asks me questions about things I believe are true about content I am learning and then asks me other questions that make me think about whether I want to change my opinion.

I very much disagree. I disagree. I don't agree or disagree. I agree. I very much agree.

4. My teacher asks me questions about a topic I am learning, including questions about important details, questions about a category or categories related to the topic, questions that ask me to explain more, and questions about evidence I have for my conclusions.

I very much disagree. I disagree. I don't agree or disagree. I agree. I very much agree.

Student Survey for Elaborative Inferences – High School

1. Our teacher asks us questions about content we have already been introduced to and asks us to describe characteristics that we think are associated with that content.

I strongly disagree. I disagree. I don't agree or disagree. I agree. I strongly agree.

2. Our teacher gives us statements that are true about specific content and then asks us to develop a conclusion based on those statements.

I strongly disagree. I disagree. I don't agree or disagree. I agree. I strongly agree.

3. Our teacher asks us questions about things we believe are true about content we are learning and then asks us additional questions that make us think about whether we want to revise our initial opinions.

I strongly disagree. I disagree. I don't agree or disagree. I agree. I strongly agree.

4. Our teacher asks us a series of questions about a topic we are learning, including questions about details that are important to the topic, questions about a category or categories the topic may belong to, questions that ask us to elaborate, and questions about evidence we may have for our conclusions.

I strongly disagree. I disagree. I don't agree or disagree. I agree. I strongly agree.

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