

# **Tools to Support Issue-Oriented Science**

**PDI: “Engage, Motivate, Educate: Issue-  
Oriented Science”  
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**Science Education for Understanding Program  
Lawrence Hall of Science  
University of California, Berkeley**

## Tools to Support Issue-Oriented Science

### Instructional Support

Name	Function
1. SEPUP's Instructional Model	Provides guidance in structuring an issue-oriented learning sequence that engages students in building scientific knowledge that they use to reach a decision or solve a problem.

### Literacy Support

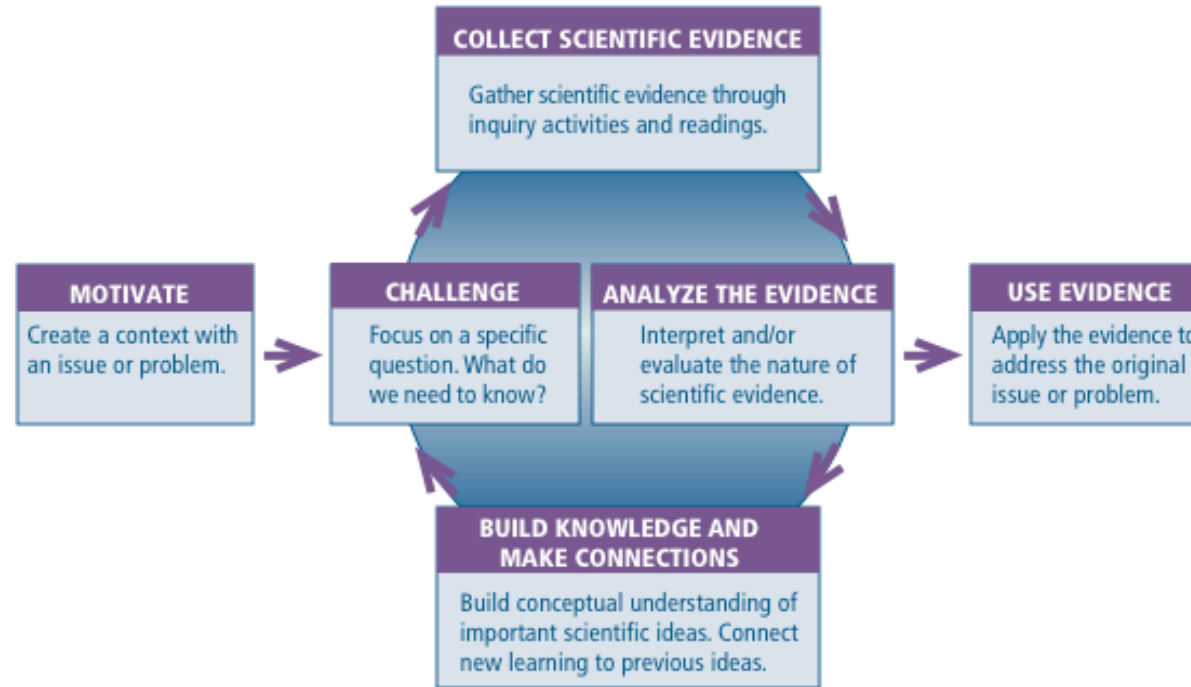
Name	Function
2. Discussion Web	Structures students' ideas in an either/or situation and can be used to prepare for a debate.
3. Intra-act Discussion	Tool that engages students in listening to the ideas of others.
4. Evidence and Trade-offs Writing Frame	Guides students in writing a response that takes a position, supports the position with evidence, and discusses the trade-offs of the decision.
5. Writing Review	Used in the peer review process. Provides a way for students to provide constructive feedback on a piece of writing.
6. Anticipation Guide	Monitors changes in students' ideas before and after an activity.
7. Three-level reading guide	Guides students to process information from a reading on three levels, literal, interpretive, and applied. This helps them identify both the explicit and implicit meaning.

### Group Interaction Support

Name	Function
8. Developing Communication Skills	Sentence starters to model constructive group communication.
9. Group Interaction Scoring Guide	Provides criteria that can be used to evaluate students' ability to participate effectively in group activities.
10. Evaluating Group Interaction	Provides a structured way to provide constructive feedback about group work.



# SEPUP's Instructional Model for Issue-Oriented Science



To **motivate** students, a personal or societal issue provides a framework for each SEPUP unit, and students' questions are addressed in the subsequent series of activities. The issue provides a context for the activities to follow.

Each activity begins with a **challenge**, a specific question or goal. To tackle the challenge, students collect evidence in guided or open-ended investigations. Students read background information, conduct investigations, run experiments, collect data, and **analyze their evidence**, all of which **builds scientific knowledge** to help them address the central issue.

At the end of a unit, students **use their evidence** and new knowledge in a culminating activity or activities that require them to reach a decision or to solve the original problem. Through these activities, they learn how science affects people's lives.

Name \_\_\_\_\_

Date \_\_\_\_\_

# Discussion Web

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## Intra-act Discussion

Names				
Me	Agree/Disagree + or -	Agree/Disagree + or -	Agree/Disagree + or -	Agree/Disagree + or -
	Agree/Disagree + or -	Agree/Disagree + or -	Agree/Disagree + or -	Agree/Disagree + or -
	Agree/Disagree + or -	Agree/Disagree + or -	Agree/Disagree + or -	Agree/Disagree + or -
	Agree/Disagree + or -	Agree/Disagree + or -	Agree/Disagree + or -	Agree/Disagree + or -
	Agree/Disagree + or -	Agree/Disagree + or -	Agree/Disagree + or -	Agree/Disagree + or -

+ : Predictions were correct.  
 - : Predictions were incorrect.

Number of correct predictions: \_\_\_\_\_ / 12

Name \_\_\_\_\_

Date \_\_\_\_\_

## Writing Frame

There is a lot of discussion about the issue of \_\_\_\_\_

\_\_\_\_\_

My decision is that \_\_\_\_\_

\_\_\_\_\_

My decision is based on the following evidence:

First, \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Second, \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Third, \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

People who disagree with my decision might say that \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Writing Review

Use these questions to review someone else's writing. Answer the following questions after you have read or heard this person's answer *twice*.

Name of person whose writing you reviewed \_\_\_\_\_

1. State the topic of the writing.

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2. a. Are the facts clear and accurate? \_\_\_\_\_  
b. If you answered "no," which facts need to be more clear or need correction?  
c. If you answered "yes," which facts are presented clearly and accurately?

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3. a. Do the facts support the writer's position? \_\_\_\_\_  
b. If you answered "no," which facts do not support the writer's position?  
c. If you answered "yes," which facts support the writer's position?

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4. List any statements or ideas that the writer did not support with facts.

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5. Do you agree with the writer's conclusion? Explain why or why not.

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# Anticipation Guide Template

Before starting the activity, mark whether you agree (+) or disagree (–) with each statement below.

After completing the activity, mark whether you agree (+) or disagree (–) with each statement below. Under each statement, explain how the activity gave evidence to support or change your ideas.

Before	After	
_____	_____	<b>1.</b>
_____	_____	<b>2.</b>
_____	_____	<b>3.</b>
_____	_____	<b>4.</b>
_____	_____	<b>5.</b>

# Three-level Reading Guide Template

1. Check the statements below that you think reflect the reading. Sometimes, the exact words found in the reading are used. At other times, other words may be used to communicate the same meaning.

\_\_\_\_\_ **a.**

\_\_\_\_\_ **b.**

\_\_\_\_\_ **c.**

\_\_\_\_\_ **d.**

2. Check the statements below that you think represent the intended meaning of the reading.

\_\_\_\_\_ **a.**

\_\_\_\_\_ **b.**

\_\_\_\_\_ **c.**

\_\_\_\_\_ **d.**

3. Check the statements below that you agree with, and be ready to support your choices with ideas from the reading and from your own knowledge and ideas.

\_\_\_\_\_ **a.**

\_\_\_\_\_ **b.**

\_\_\_\_\_ **c.**

## Developing Communication Skills

<b>Communicating</b>	<b>Sentence Starters</b>
<b>To better understand</b>	<p>One point that was not clear to me was ...</p> <p>Are you saying that ...</p> <p>Can you please clarify?</p>
<b>To share an idea</b>	<p>Another idea is to ...</p> <p>What if we tried ...</p> <p>I have an idea, we could try ...</p>
<b>To disagree</b>	<p>I see your point, but what about ...</p> <p>Another way of looking at it is ...</p> <p>I'm still not convinced that ...</p>
<b>To challenge</b>	<p>How did you reach your conclusion?</p> <p>What makes you think that?</p> <p>How does it explain ...</p>
<b>To look for feedback</b>	<p>What would you do to improve this?</p> <p>Does this make sense?</p> <p>How could my idea be improved?</p>
<b>To provide positive feedback</b>	<p>One strength is ...</p> <p>Your idea is good because ...</p>
<b>To provide constructive feedback</b>	<p>The argument would be stronger if ...</p> <p>Another way to do it would be ...</p> <p>What if you said it like this ...</p>

## Scoring Guide: Group Interaction (GI)

### What to Look For

Group members work together as a team and the ideas of all members were valued and weighed in working toward the common goal.

<b>Level 4</b> <i>Above and beyond</i>	Group members accomplish Level 3 and go beyond in some significant way such as: <ul style="list-style-type: none"><li>· actively asking questions about each others' ideas.</li><li>· actively helping each other accomplish the task.</li><li>· building on each other's ideas.</li></ul>
<b>Level 3</b> <i>Complete and correct</i>	All group members participated and respectfully consider each others' ideas.
<b>Level 2</b> <i>Almost there</i>	Unequal group participation OR group respectfully considered some, but not all, ideas.
<b>Level 1</b> <i>On your way</i>	Significantly unequal group participation OR group totally disregarded some members' comments and ideas.
<b>Level 0</b>	Members did not work together OR single individual does entire task.
<b>X</b>	Student had no opportunity to respond.

Activity \_\_\_\_\_ Group Members \_\_\_\_\_ Date \_\_\_\_\_

Your Name \_\_\_\_\_

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## Evaluating Group Interaction

### PROCEDURE

Use the table below to rate your group's performance. Use the GROUP INTERACTION (GI) scoring guide to help you decide on your scores. Give evidence for your scores by answering Questions 1 and 2.

<b>Group Interactions</b>	<b>Score</b>
Group stays on task and manages time efficiently.	
Group shares opportunities.	

1. Give some examples of how you managed the task and time efficiently.

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2. Give some examples of how your group shared opportunities to contribute to the activity. Your examples may include times when you or your group members respected and treated others with courtesy; helped each other do the work; shared the work (not having one person do all of the work alone); or stayed open-minded and willing to compromise.

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