



Proven Science Programs

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THE LAWRENCE
HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

DEVELOPING COMMUNICATION SKILLS

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

EVALUATING GROUP INTERACTION

Procedure

Use the table below to rate your group's performance. Referring to the GROUP INTERACTION (GI) Scoring Guide will help you determine on your scores.

Give evidence for your scores by answering Questions 1 and 2.

GROUP INTERACTIONS	SCORE
<i>Group stays on task and manages time efficiently</i>	
<i>Group shares opportunities</i>	

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

2. Give some examples of how your group shared opportunities to contribute to the activity. Your examples might 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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FACILITATING GROUP INTERACTION

Group work helps students build skills and is critical in helping an issue-oriented program succeed. However, group work is challenging to manage. Lack of accountability of individuals within a group, off-task conversations, and students who try to dominate the discussion are just some of the problems that occur during group interactions. The 4–2–1 cooperative approach to learning (described in Teacher Resources I, “Course Essentials”) offers a structure that helps teachers reduce, although not necessarily eradicate, some of these problems. Some strategies for facilitating group interaction are described below.

VARY STUDENT 4-2-1 GROUPS

One approach is to ensure a mix of heterogeneous and homogeneous groupings when deciding upon 4–2–1 collaborative groups for different activities. Heterogeneous groupings allow for ideas of varying sophistication and perspective, increase support for students who need more help, and give stronger students a chance to enhance their learning by providing explanations and leadership. Homogeneous groupings, on the other hand, allow you time to assist certain groups and challenge others to work more independently.

TEACH GROUP INTERACTION SKILLS

Teaching group interaction skills explicitly helps prevent problems. Teachers should begin by establishing classroom guidelines for group interactions. Rather than issuing a list of expectations for students’ behavior, obtain students’ input

in developing a list of expectations appropriate for group interaction. For example, students may suggest that it is important for group members to listen to each other, participate and share work equally, respect other people's ideas and opinions, make sure that everyone in the group understands the task or the response to a question, speak clearly but not shout, and praise outstanding contributions. Make sure they know that an "outstanding" contribution is not necessarily complex; in any analysis, it's easy for people to miss the most obvious and simple, but critical, point. With the class, abridge the list to establish three, four, or five rules that students agree are important. Post the rules in the classroom for easy reference, and encourage students to record the rules in their science notebooks. Have each student write down why it will be important to follow these rules when working within a group. Revisit and update the rules over the course of the school year as necessary. You may wish to stress a certain rule or expectation during a particular class period. For example, during one class you might focus students on listening to each other by having them restate what one person said before adding another idea. The Student Sheets described below can be used to support and develop group interactions.

GROUP INTERACTION STUDENT SHEET 1

Having students evaluate the ability of their group to work together also improves group interaction skills. Group Interaction Student Sheet 1, "Evaluating Group Interaction," at the end of this section implements that goal. The Student Sheet helps students improve their ability to work with others by allowing them to self-assess their interactions when working in groups. SEPUP recommends that you distribute the Student Sheet before students begin group work. This is an opportunity to discuss the criteria and expectations for successful group work. At the end of class, ask students to self-assess their work as a group by selecting the level that best describes their work together and to support their rating with descriptive evidence. This allows students to identify and discuss ways to improve their interactions as a group. Use this form to focus on selected group skills early in the year and on overall group skills as the year progresses.

GROUP INTERACTION STUDENT SHEET 2

Group Interaction Student Sheet 2, "Developing Communication Skills," is an additional tool to help students build effective communication skills. This Student Sheet promotes positive and productive classroom discourse by suggesting how students might express disagreement, seek clarification or more information, or build on each other's ideas. The suggestions are in the form of sentence starters with which students initiate comments to each other. Sentence starters might be employed anytime students participate in an extended discussion or

plan an investigation or presentation, or discuss information presented in text and graphics. To gradually incorporate this strategy into students' group work, introduce one section of sentence starters at a time. Begin by projecting a copy of the sentence starters. This sheet can also be found in Appendix E Literacy Strategies of the Student Book.

Model for students how a sentence starter might work if they were using it in a conversation. Then give students five minutes to practice with the sentence starter in a conversation with their partners. Follow this by encouraging them to use one or two sentence starters during their group work for the day. SEPUP recommends that you provide copies for the students to refer to or to keep a copy of the Student Sheet projected or posted so students can refer to it as they work.

APPOINT GROUP FACILITATORS.

During some activities, it can be helpful to appoint group facilitators: one student in each group who is responsible for making sure that every member of the group has a chance to share their ideas without interruption. By taking turns facilitating group interactions, all students begin to take responsibility for their group and identify ways to better work together. As students work in groups, watch for signs that any group is experiencing trouble. Be sure that students know that they can discreetly let you know as soon as there is a problem. Early troubleshooting helps avoid conflict among students.

USE TEACHER DISCUSSION STARTERS

Generating class discussions in which students engage in discourse with one another can be challenging. The following Teacher Discussion Starters, with examples, are intended to be used by the teacher when facilitating a whole-class or group discussion in order to help students develop appropriate skills and habits:

Ask students to rephrase or repeat what another student said.

- “Who can repeat what Andre just said or put it into their own words?”
- (After a partner talk) “What did your partner say?”

Ask students to agree/disagree with another student and explain their reason.

- “Do you agree/disagree? (And why?)”
- “What do people think about what Hannah said?”
- “Does anyone want to respond to that idea?”

Ask students to add on to what another student said.

- “Who can add on to the idea that Omar is building?”
- “Can anyone take that suggestion and push it a little further?”

Ask students to explain what someone else means.

- “Who can explain what Bo means when she says that?”
- “Who thinks they could explain why Diana came up with that answer?”
- “Why do you think he said that?”

USE ELICIT, PROBE AND CHALLENGE QUESTIONS TO FOSTER DISCUSSION

ELICIT QUESTIONS

When Used? At the start of a lesson or the introduction of a new topic.

To Whom: Multiple students, often the whole class or a group of students.

Purpose: To elicit students’ prior knowledge about and experiences with a concept, and their initial ideas and predictions relevant to the lesson.

Elicit questions reveal a variety of different student ideas rather than one “right answer.” The goal of Elicit questions is to learn about student thinking and ways of making sense, whether their ideas are scientifically accurate or not. Student responses often reveal misconceptions, which can help inform later instruction. Elicit questions also help engage students in the lesson, helping them see the connections between their own ideas of what they will study during the lesson. Students are also able to see that different people have different ideas. This sets up a “need” to find out which ideas are best.

Language Used: Phrased in everyday language that will make sense to the students, even before they begin a unit of study. Avoid using scientific terminology with which students are not very familiar.

Examples:

- Right now, we are just getting out our ideas. For now, these are just our predictions about _____. Later, we will gather some evidence to see if we can support or challenge any of our predictions.
- As you listen to different ideas, think about which ideas you agree with and which you disagree with. Think about your reasons. Do you have evidence to support your idea?
- Why do you think the surface of the Earth is not totally flat?
- In what ways do rivers cause changes in the surface of the Earth?
- What makes one kind of car safer than another?
- What is the relationship between temperature and energy?
- How do you know if something is living?

- What determines how rapidly chemicals will interact?
- Why aren't there elephants in the wild in Chicago?
- How does your body maintain its internal environment in the face of external stress?

PROBE QUESTIONS

When Used? Throughout the lesson, asked repeatedly.

To Whom: Directed to an individual student who has already provided an answer or offered an idea during whole-class discussion, during small-group work, or as students work individually.

Purpose: To get more information about a student's thinking and understanding around a topic.

Probe questions are directed to one student who has already provided an answer or offered an idea. The teacher then follows up with this same student to probe their thinking. Sometimes a teacher asks a sequence of questions that probe the thinking of the same student before moving on. It is not designed to teach new ideas or to “lead” students to a correct answer. Probe questions help the teacher understand how a student is making sense of a topic, and they can reveal misconceptions. Probe questions help students by encouraging them to explore, share, and clarify their own ideas. This is an essential step in moving their ideas toward more scientific, evidence-based understandings.

Language Used: These questions should not introduce new language or new science ideas; rather, the goal is to build on ideas already presented by the student.

- Tell us more about that.
- What do you mean when you say ...?
- Tell me more about how you think that happens.
- So you are saying [paraphrase student response]. Tell me how I'm getting it wrong.
- Tell me how you are thinking about that.
- Can you put that idea into a complete sentence?
- Why do you say that an SUV is the safest?
- What do you mean when you say that “it moves”?
- Let me know if I'm correct or get something wrong. Are you saying...?
- Help me understand how you came to that conclusion.
- Can you put that idea into a complete sentence?

- Can you say more about the water and the rocks?
- Explain more about what you mean by “it’s the wrong environment.”
- Why do you think that?
- What’s your evidence?
- How did you arrive at that conclusion?
- Can you give us an example?

CHALLENGE QUESTIONS

When Used? Anytime during the lesson except when you are trying to elicit students’ initial ideas and predictions about a science idea or concept.

To Whom: Directed to an individual student who has already provided an answer or offered an idea during whole-class discussion, during small-group work, or as students work individually.

Purpose: To help students challenge their thinking and develop a deeper understanding of the science ideas.

Challenge questions push students to think further, to reconsider their thinking, to make a new connection, and/or to use new science vocabulary in a meaningful way. The goal is to get students thinking harder while also scaffolding or guiding their thinking towards more scientific understandings. Avoid questions or hints that lead students to the “right” answer without challenging them to really think. Such “leading” questions often come in a “fill-in-the-blank” or “yes/no” format, accompanied with hints so that students can frequently guess the right answer.

Examples:

- Add some of the new ideas we’ve been talking about to your explanation
- Explain how that happens.
- Why does that happen?
- How does that relate to the ideas we’ve been studying?
- Does it always work that way?
- How does that idea square with Sonia’s example?
- What if it had been a copper cube instead?

ADDRESS PROBLEMS WITH A GROUP IF THEY ARISE.

Sometimes the teacher can help groups solve problems by sitting with the group and allowing each person to express their concerns. Keep students focused on describing how they are feeling rather than on blaming other people. Ask them

to use “I” statements, such as, “I feel excluded when....” After all students have spoken, summarize what you heard from each of them. Things may not be as they seem; sometimes a student who appears to not be contributing is being actively or unintentionally excluded from a group by others. Ask students to take turns suggesting ways that they personally could improve the way the group is working. Do not allow them to transfer responsibility onto other people. Summarize their statements and consider their solutions. The final judgment lies with the teacher, who may still need to give some explicit guidance to ensure that the solutions are fair. Often, however, just talking through the problem helps students come to their own compromises. Encourage individuals who are having difficulty working with another student to first try talking to that person. The teacher might need to help the students practice how to state the problem to the other student. If the problem is too difficult for the student to handle alone, consider convening a group meeting with you acting as the facilitator.

9. 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.*

Scoring Guide

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

GI LEVEL 1

One pair of students insists on doing everything. They do not let the other pair do any of the testing. There is arguing about who should be doing what and how it should be done.

GI LEVEL 2

One person may be making suggestions, but the rest of the group is ignoring him/her. OR one person is completely uninvolved in the investigations.

GI LEVEL 3

All group members work cooperatively together. They discuss their findings and come to consensus on their observations and conclusions.

GI LEVEL 4

A conscious effort is made to elicit the cooperation and participation of an uninvolved group member. The other group members make sure that all ideas are heard and discussed.