Science Talk Structures, Strategies, and Checklists

Adapted from Science & Literacy: A Natural Fit by Worth, Winokur, Crissman, Heller-Winokur and Davis, 2009.

Scaffolding the Science Talk: Small group discussion (pairs, groups) should always precede large group discussion to activate thinking and maximize the likelihood of thoughtful responses in the large group. Small group discussion can serve as a scaffold for English Learners or others less inclined to speak in a large group.

Revisit classroom norms

Many teachers explicitly teach (through mini-lessons) and practice conversation norms prior to launching their first Science Talk. As always, your focus will vary, based on the strengths and challenges of your class.

Possible Norms to Include	***Possible Skills to Practice***
Mutual Respect • Attentive Listening • Openness to New Ideas	Taking turns • Listening to others • Keeping eyes on the speaker • Responding to one another • Staying on focus • Disagreeing respectfully

Characteristics of Science Talks:

- Students seated or standing in a circle facing each other (with science notebooks open to the data recorded)
- Set of explicit norms posted for all to see
- A natural flow to the conversation with a good deal of student-to-student interaction
- Many students participate, but not necessarily all students each time
- Conversation is focused on a particular idea where connections are being made

A) The Gathering Ideas Science Talk

Purpose: To make connections with students' prior knowledge while generating interest, shared ideas and questions.

- Makes connections with students' prior knowledge
- Students listen to and learn from each other
- Helps generate interest, ideas, and questions
- Is not about finding the "right answer"
- Is not a K-W-L

Teacher's Role in Gathering Ideas Science Talk

Before	• Identify a productive question • If little prior knowledge on the topic, allow for brief materials exploration
During	• Reinforce classroom norms • Encourage student-to-student talk • Encourage full participation • *May* refocus conversation, if necessary • *May* gently push for evidence or probe for deeper explanation
After	• Briefly summarize range of ideas shared (no conclusion necessary)

B) The Making Meaning Science Talk

Purpose: To draw conclusions, explain phenomenon, and raise additional questions

- Comes at end of investigation or unit, based on work already done
- Looks for patterns or relationships in data
- Involves a rigorous examination of data (from notebook or class data table) to identify what data might support a claim
- May include contradictory data or new evidence
- Is not a simple sharing-out of group results

Teacher's Role in Making Meaning Science Talk

Before	• Offer a clearly stated question (often the focus question) • Ensure that small groups have shared procedures and data beforehand
During	• Reinforce classroom norms • Maintain focus on investigation question • Push for analysis and debate • Guide discussion toward conclusion or next steps • *May* gently push for evidence or probe for deeper explanation
After	• Provide a clear synthesis statement of discussion • Gently correct misunderstandings or allow for further investigation

Student Conversation Moves

Some teachers co-develop and post helpful prompts or sentence frames. *Examples:*

Scientists CLARIFY	**Scientists QUESTION**	**Scientists AGREE**	**Scientists RESPECTFULLY DISAGREE**
Can you clarify what you mean? Can you say more about that idea? Could you show me how you got that information?	Why do you think that? I was wondering about___?	I agree with ___ because ___. My data also supports ____ because ___.	I had a different result I'd like to share. That's interesting, but my data show__. Even though you said__, I think__.

Teacher Prompts or Probes

For inviting participation	• What do you think? • How is what she saw different from what you saw? • What would you like to add to the conversation? • Can you say more about…? • What are you thinking now?
For encouraging student-student exchange	• Matt, you had a different idea than Maria. Can you share that idea? • Who can build on what ___ just said? • Whose data supports (or disagrees) with what ____ just said?
For refocusing discussion	• Keep that thought, and we'll come back to it if we have time. Right now, we need to be focused on…
*Correcting student misunderstandings**	• What evidence do you have to support that claim? • Do we have enough evidence to support that claim? What could be another explanation? • I think we need to go back and try…and see if it holds up.

******Addressing Student Misunderstandings.* Many teachers hold off on correcting misunderstandings until after the Science Talk, though they will probe students' for further evidence in the moment. In this way, teachers and students value the knowledge constructed through the discussion itself, rather than looking for the teacher to provide the correct answer.

Considerations for Planning a Science Talk:

- What scaffolds (*i.e.*, wait time, quick-writes, or think-pair-shares) will you use to support English Learners or reluctant speakers in the large group setting?
- How long can your students maintain their focus in a large group discussion?
- What is the best seating or standing arrangement that encourages focus while minimizing distractions? *For younger grades:* transition students to holding notebooks on their laps.
- What sentence frames will you use? How many will you provide? At what level of complexity? How will you phase out scaffolds to encourage independence?
- How active or passive of a facilitator do you plan to be?
- What might be expected student responses during the Science Talk?
- What questions and alternative scenarios can you think of presenting to students during the talk to challenge their thinking and get to a deeper level of understanding?

Using Science Talk for Formative Assessment

Parts adapted from: *FOSS: Structures of life.* 3rd ed. Berkeley, CA: University of California, 2012.

Teachers are constantly receiving information from their students about what they do and don't understand – on assessments, in notebook entries, and in class discussions. All of this can be used as formative assessment data. Individual written assessments are often viewed as the most reliable way to assess exactly what an individual student understands. However, due to language barriers, such as difficulties with reading comprehension, more can sometimes be revealed during small group or whole class discussions. It is important to keep in mind, when using data collected during discussions, that students can be influenced by each other, and what they express during a discussion might not be the same as what they can express individually. Nevertheless, Science Talks and Group Talks can provide some insight into how students' conceptual knowledge is developing.

Anticipate. Before a Science Talk, make a copy of the *Science Talk Class Checklist* on p. B-4 of this appendix. Fill in the date, along with the investigation and part number. Also, write down the key concept or practice that you will be listening for during the Science Talk.

Facilitate the Science Talk. Follow the steps in the FOSS Teacher Guide to prepare students for the Science Talk. Usually, a focus question helps guide the discussion. While students are speaking, discreetly take notes to help you keep track of student understanding. You can use a simple system of +, ✓, and -, along with quotes and other notes. Don't worry if this is challenging at first. It should get easier with practice.

Reflect. After class, spend a few minutes describing the trends and patterns you observed in the class's understanding of the concept on which you were focusing.

Next steps. Then, list any next steps you will take to clarify problems, or note highlights you saw in students' understandings.

Date: _____ Investigation: _____ Part: _____

Concept/Science Practice: _____

Student Name	+, ✓, - (and quotes/notes)

Other Notes:

On Reverse Side: Reflections/Next Steps