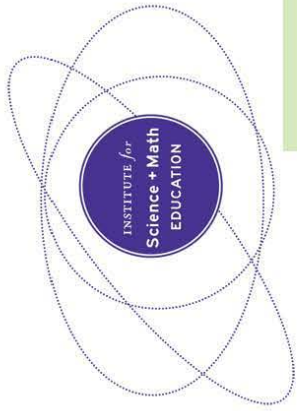


Student Talk Flowchart and Protocols

These resources are designed to help educators foster student talk in the science classroom. This document is best used with STEM Teaching Tool #35, "How can I foster curiosity and learning in my classroom? Through talk!" found at stemteachingtools.org/brief/35.

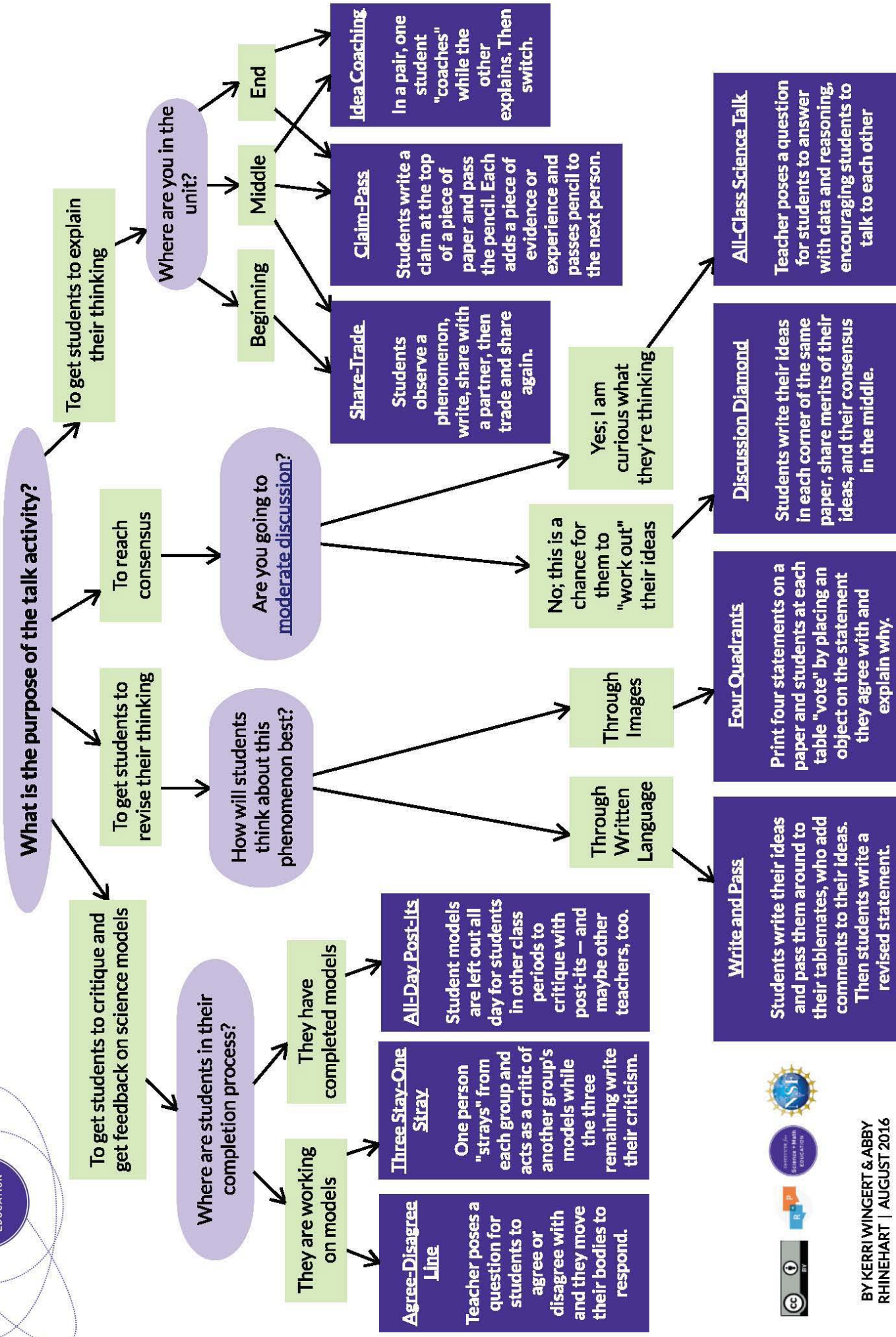
After reading that STEM Teaching Tool, use the flowchart in this document to determine which classroom protocol best fits your planned lesson, then read the description of the activity on the following pages.

These resources were developed by the University of Washington Institute for Science + Math Education as part of the Research + Practice Collaboratory and supported by the National Science Foundation (DUE-1238253, DRL-1626365).



Talk Activities Flowchart

Which talk activities can I use with my students?



STUDENT TALK PROTOCOL DESCRIPTIONS

Purpose: To Elicit Student Argument from Evidence or Experience - Critiquing Ideas

Three Stay, One Stray:

Setup: Students sit in four-person teams. Each team has **their model** and a **feedback form** at their table. If available, students could use table tents for accepting criticism or praise.

1. One person from each group is designated as the wandering critic.
2. The wandering critic "strays" to another group's model.
3. Each group must explain their model to the visiting critic.
4. The critic can ask questions about the model.
5. The wandering critic returns and tells their group about the model they saw.
6. Steps 1-5 can be repeated with a new critic.
7. Groups can revise their models based on what they've learned.

STUDENT TALK PROTOCOL DESCRIPTIONS (CONTINUED)

Purpose: To Elicit Student Argument from Evidence or Experience - Critiquing Ideas

All-Day Post-Its:

Setup: Students have an almost-final product that they are ready to share for public critique. They tape these products up around the room. Teachers may have already checked over this work, as well, to understand the range of students' ideas. [Here are some tools for recognizing students' range of thinking.](#)

1. Students make their models or explanations public (on a poster or another form of representation).
2. Students' work is left out for 24 hours.
3. During the time they are left out, each student from your other classes must leave at least one comment on a post-it note on a model. Consider encouraging students to include their name and support students with sentence starters for constructive criticism, such as:
 - a. I liked how you included ___ because ___.
 - b. Have you considered adding ___ to show ___?
 - c. Are you planning to show ___?
4. If time allows, other teachers could come in and make comments on the models, as well.

STUDENT TALK PROTOCOL DESCRIPTIONS (CONTINUED)

Purpose: To Elicit Student Argument from Evidence or Experience - Revising Ideas

Write & Pass:

Setup: Students each have a **loose piece of paper, a writing utensil**, and some phenomenon or demonstration to make sense of. The teacher must have a provocative question that students can each answer. It helps if students have had practice giving each other criticism or pushing others' thinking. They may do peer editing often in Language Arts class – you might draw on that experience.

1. Divide students into groups of four.
2. The teacher posts a question that students must answer with an explanation.
3. Students each write their own ideas on a loose piece of paper.
4. Then the papers are all passed to the left.
5. Each student silently reads the student's response (and any of the other students' comments, on iterating rounds of this process).
6. Each student writes suggestions directly onto the original copy to help make their peers' ideas sharper and clearer.
7. Repeat the pass-read-edit until each student gets to read and comment on each others' ideas.
8. The original author of each statement reads their peers comments and writes a refined, final statement at the bottom of the paper to turn in.

** To add more physical activity to the lesson, papers can also be taped to the wall or desks and students can move around to add their thinking.

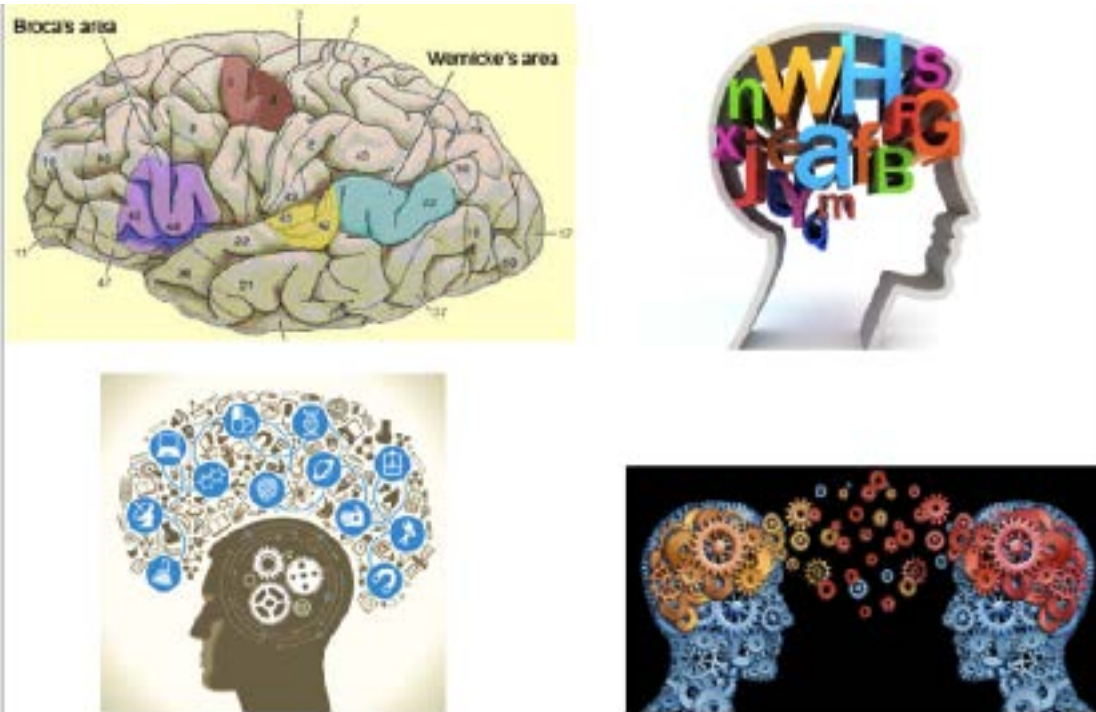
STUDENT TALK PROTOCOL DESCRIPTIONS (CONTINUED)

Purpose: To Elicit Student Argument from Evidence or Experience - Revising Ideas

Four Quadrants/Voting Chips

Setup: This is a good way for students to explain what they have seen in a demonstration or how it relates to the anchoring phenomenon. Print **four slightly different statements related to the model** on a paper (example below). Provide each table with four **BINGO chips, beans, or plastic markers**.

1. Have a student from each small group or table read the four statements aloud and place the paper with the statements on it in the middle of the table.
2. Going in turn, have each student state which of the four statements they most agree with and why.
3. No one may interrupt whichever student is speaking.
4. When the speaker is finished, he or she places a BINGO chip on the statement they most agree with.
5. Going in turn, each of the other three team members states their beliefs and places a BINGO chip.
6. As a whole room, tally how many chips there are for each statement and ask students to clarify their thinking to each other. Use talk moves from [Michaels and O'Connor's Talk Science Primer](#) to ask students to elaborate and clarify their thinking. If needed, each student can write his or her ideas at the end of class in their science journal.



Which of these "models" best explains how you think students learn language?

STUDENT TALK PROTOCOL DESCRIPTIONS (CONTINUED)

Purpose: To Elicit Student Argument from Evidence or Experience - Reaching Consensus

Agree-Disagree Line:

Setup: Students will need a common experience, such as a lab activity, in order to do this whole-class activity. Teacher puts signs at opposite ends of the classroom indicating two possible explanations for what happened.

1. The teacher asks students to think about the demonstration they just saw.
2. The teacher goes to each sign (on opposite sides of the room) and explains them as necessary.
3. The teacher then asks students to think about which sign they think best explains what they witnessed.
4. Students stand up and move toward the explanation they most agree with, based on their certainty. For example, students who are not sure should stand in the middle of the room, students who are really sure stand directly beneath the sign, and students who have another explanation can stay in their seats.
5. Students make their thinking public by:
 - a. grouping with the people near them and writing to explain what they think happened in their own words.
 - b. sharing their ideas by speaking to the entire class passing a "microphone" or talking stick to share their ideas. You can invite discussion by using teacher talk moves from the the "Talk Science Primer."
6. Students are free to move around the room as their ideas change. The following quote might be helpful: "In order to learn one must change one's mind" -Orson Scott Card
7. At the end of class, you can facilitate a debriefing session where students share what (if anything) made them change their minds: their friends' ideas, the evidence offered, the emotion people spoke with, how sure they seemed, etc. *This can be a good opportunity for students to talk about what makes people believe certain statements, such as forcefulness of tone, gender, or ethnicity.*

STUDENT TALK PROTOCOL DESCRIPTIONS (CONTINUED)

Purpose: To Elicit Student Argument from Evidence or Experience - Reaching Consensus

All-Class Science Talk:

Setup: The teacher must develop an open-ended question that students can use experience or a data set to answer.

1. The teacher poses a question for students to answer.
2. If necessary, give students time to think or write.
3. The teacher asks students to turn their bodies toward the center of the room for a Science Talk.
4. The teacher explains:
 - a. "in a Science Talk, knowledge is held by your fellow scientists, and you should talk to each other. The goal of a Science Talk is to help each other understand a phenomenon. You can help your fellow scientists understand by: sharing results, using data, being as clear as possible, and listen carefully to deeply understand what your fellow scientists are saying.
5. Teacher facilitates the student discussion by using [Michaels and O'Connor's Talk Science Primer](#) and avoiding telling answers or asking closed-ended questions.
6. Optional: At the end of the Science Talk, students can record their thinking.

Optional: At the end of the science talk, students can record their thinking, document the evolution of their thinking, or talk about what made them change their mind at any point.

Expert Tip: Try to take an open-minded stance during all discourse activities, but especially whole-class ones. Research shows that teachers often subtly privilege students who "talk like scientists" by using mainstream or standard English. This should be a space for all students to be free to share, not just ideas of students you agree with.

STUDENT TALK PROTOCOL DESCRIPTIONS (CONTINUED)

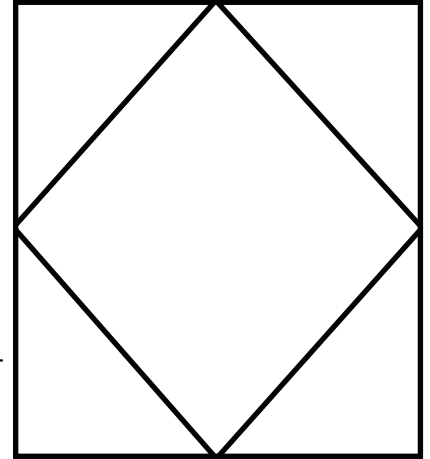
Purpose: To Elicit Student Argument from Evidence or Experience - Reaching Consensus

Discussion Diamond:

Setup: Each small group or table needs a copy of a graphic organizer that looks like the image to the right. Each student will write one of the triangular “corners” of the organizer.

1. The teacher poses a question that students can answer with data.
2. All students get three minutes to think and write their thoughts in their respective corner.
3. The students take turns explaining their ideas to each other (all students must share).
4. The students discuss what their consensus view might be and write their consensus view in the middle.

Notes: 1. This makes a good formative assessment artifact. 2. Coming to a consensus is really hard work and can be really emotional. Remind students that coming to a consensus is about arguing *about ideas*, not arguing *with people*. You might have to scaffold participation even further and hold class debriefs about how the argument process itself went for different groups.



STUDENT TALK PROTOCOL DESCRIPTIONS (CONTINUED)

Purpose: To Generate Students' Initial or Final Explanations of a Model

Share-Trade:

When you give students an open-ended question, share-trade can help students refine their ideas and their language over time.

1. Each student writes their individual thoughts.
2. Students stand up with their ideas on paper and move around the room.
3. Each student finds someone they don't know very well and forms a partnership with them. To form a partnership, students must high five.
4. With their partners, students share their ideas and trade papers.
5. Each student is now responsible for sharing the ideas of the person they just spoke with, even if they don't agree with those ideas. This isn't a time for them to critique their partners' ideas.
6. Students form partnerships three or four times so they see and explain multiple ideas.
7. Students return to their seats and write a final explanation or idea.

NOTE: Paige Keely prompts [like this one for middle school biology](#) can be helpful to get initial ideas out. For example, if students are working with heat energy and phase changes, you could use an image of a snowman in a jacket with the question: What will happen to the snowman? Three explanations can be given in thought bubbles, and your students choose the thought bubble they think is most accurate, and they share-trade their explanations.

STUDENT TALK PROTOCOL DESCRIPTIONS (CONTINUED)

Purpose: To Generate Students' Initial or Final Explanations of a Model

Claim-Pass:

Setup: Each small group or table needs one piece of paper and one pencil.

1. One person in each group writes a claim (can be provided by the teacher or not) at the top of a paper with the pencil in response to a recent observation of a phenomenon.
2. The student who wrote passes the paper and the pencil it to the left.
3. The person with the paper writes one piece of *evidence* that supports the claim under the claim
4. The paper and pencil are passed to the left.

NOTE: The other students in the group can support each writer by offering *ideas*, but the writer gets to make the ultimate decision about what to write. Emphasize that this is about getting good ideas on paper, and that misspelling is okay. This write-pass continues until the group is out of evidence. Note: students can add *counter-evidence*, also, if you note a special place on the page, such as beneath a line two-thirds of the way down the page.

STUDENT TALK PROTOCOL DESCRIPTIONS (CONTINUED)

Purpose: To Generate Students' Initial or Final Explanations of a Model

Idea Coaching

Pre-teaching (just for the first time you use idea coaching)

1. Brainstorm, as a class, the characteristics of a good coach. "Patient, responds to what you need, stays on the sideline during the game, supports you to do your best, loyal, supportive, etc."
2. Tell students, "Now you are going to coach each other with science ideas. When you are the coach, your ideas have to stay on the sideline. Your job will be to listen carefully to your partner to help them move their ideas forward, to be the best scientist they can be."
3. If possible, model this, using a student as an explainer and the teacher as a coach. Ask something easy, like, "Could you explain how you got to school today?" The teacher/coach should press for detail, especially around unclear terms or parts that aren't fleshed out.
4. If possible, the teacher should add some commentary about how he or she is making decisions about what to ask. For example, call a quick time-out and explain, "Wow. It's really hard not to tell the explainer how I got to school today, but I'm trying really hard to get ideas out of my explainer." Also, "I'm not telling the explainer that their ideas are bad, or why I might think they're bad, if I did."
5. You can test this out as a whole class with an easy question to practice. For example, you could ask, "What would your dream job be like?"
6. You can also have students edit the conversation prompts so they sound more authentically teen-like.

For regular, everyday idea coaching:

7. Ask students to pair up. Pass out the conversation table tents to the coaches.
8. Coaches can self-select who goes first, with the most confident student explaining first to seed the other student with ideas, or you can say, "The person closest to the window goes first," etc.
9. Designate an open-ended, explanatory question that students should talk through. It is helpful if this is about something students have already thought about or examined. A good point to do this is after a lab, demo, or observation. One question could be, "What did this lab teach us about pressure/respiration/ convection/etc.?"
10. Present the question you want students to talk about in their pairs. Repeat it once so everyone can hear.
11. Give the room time to think about it. (A few seconds is fine, but you could expand this to a pre-write if you prefer.)
12. Ask the idea coaches to begin coaching. The rest of the students are explainers.
13. Move through the room and listen carefully. Try not to interrupt.
14. When the conversations slow, ask the explainers to tell something helpful their coach did.
15. Have the coaches give their explainers a "very coachy high five." or tell the explainers, "You're my MVP!" (or something similarly goofy but supportive).
16. Switch coaches and repeat.
17. Ask students to nominate a coach of the day or to reflect again on their coaching practice. Emphasize to students that really listening to each other is very, very hard – especially if you have a big idea of your own.

