Teacher Resource on Questioning Strategies and Promoting Science Talk in Classroom Discussions

What is Science Talk?

Science talk is the use of relevant academic language and scientific vocabulary to convey understanding. Science talk (also referred to as science discourse) describes the meaningful dialogue between two or more people in the classroom (preferably peer-to-peer discourse rather than teacher-directed). The practice of science talk refers to both the students speaking and the engaged role of the listener.

Students are accustomed to speaking directly to the teacher leader, not each other, with the shortest allowable answers which do not express their full understanding. Retrain the class to converse with each other and share more thoughtful answers. The following strategies can improve science talk in your classroom.

Where to Find Science Talk Tips and Strategies in the Green Ninja Curriculum

Use of norms, inclusivity, discourse guidance, and questioning strategies outlined below can be found embedded in lesson *Activities* and *Access & Equity* sections throughout the curriculum. To help students build their science talk practice, tips and strategies are similar across the three-year curriculum but are tailored for appropriate grade-level progression.

Setting Up a Successful Science Talk Culture in the Classroom

Utilizing academic language and scientific vocabulary, in writing and discussion, takes practice and refinement throughout the school year. When creating your classroom culture (i.e., code of conduct, rules, etc.) for the year, include norms that support practicing science talk. Allow students to contribute to defining this culture. It will create a higher level of accountability from everyone. As science talk progresses throughout the year, return to these expectations and revise them as needed. Use these examples to guide student contributions:

- The goal of science talk is to present valid claims, ideas, or arguments backed by evidence.
- The goal is not to prove someone right or wrong.
- More than one explanation is possible and alternatives should be examined.
- You can disagree with an idea, not with a person. (Provide sentence frames to use when respectfully disagreeing.)
- Define the responsibilities of the audience as active listening, critical thinking, and asking clarifying questions.
- Practicing science talk can be messy. It is OK to use everyday language in combination with academic language and scientific vocabulary. (The importance of bridging everyday and academic language is described below.)
- Use new vocabulary in complex sentences when discussing or writing.
- Define what it means to think, talk, and write 'like a scientist'. (This may require you to breakdown the stereotypes of who students think of as a scientist. Create a more inclusive model reflective of the students race, background, gender, etc.)

Using Student's Everyday Language as a Bridge to Science Talk

The colloquial language students use to discuss everyday topics is very different from what would be overheard from a group of scientists discussing a recent discovery or investigation. It is important to validate the various levels of English language mastery as a tool, rather than an obstacle, for practicing their science talk.

Traditionally, science learned in schools has been actively decontextualized from the student's everyday experience. This makes it hard for many students to find relevance in their science learning. Explain to your

students that all types of knowledge, language, and experience are welcome in the classroom. Encourage the use of everyday language when beginning investigations of new science topics and build in scientific vocabulary, thinking, and expression of ideas. Throughout a lesson sequence, work with students to skillfully incorporate more academic language in their communication and make scientific thinking more visible.

Always remember that each student brings their own interpretations of cultural and societal norms when it comes to speaking, sharing, and questioning aloud. Work with students to create the space for everyone to be successful.

Strategies for Promoting Science Talk and Student-to-Student Discourse
The following strategies explained below are used throughout the Green Ninja curriculum and can be utilized in any additional activities that promotes authentic science talk.

- **Diversify discussion formats.** Encourage student-to-student interactions in full class discussions and utilize small group or partner talk more often than teacher-to-student didactic techniques.
- **Ask open-ended questions.** Shift your practice from the over-used and under-performing initiate-response-evaluate (IRE) strategy to practices that encourage students to make their own claims, debate a point, offer alternative points of view, or share new interpretations.
- **Wait longer for responses.** The average teacher waits only 1.5 seconds before requiring student responses to a prompt. Try giving them 5-7 seconds of 'wait time' to think critically, utilize new academic language, and formulate more meaningful responses.
- **Encourage (not demand) more from them.** Ask students to continue their response with questioning strategies such as, "Can you say more about ___?" or "What do you mean by ___?"
- **Re-voicing and rephrasing techniques.** If a student response somewhat off-topic or full of extraneous detail, clarify by re-voicing the key elements. Try using, "So I am hearing you say ____ [use their words]. Did I get that right?"
- **Incorporate new vocabulary.** Encourage the use of academic language by pointing out that a response can be restated with scientific vocabulary. Give that student time to practice restating their response.
- **Press for further evidence and reasoning.** Assist students in deepening their responses by asking, "Can you give an example?", "Why do you think that?", "Does your claim fit with what we have observed (or the data we collected)?", or "Is that always true?".
- **Be the guide on the side.** Students respond directly to the teacher, regardless of other student's contributions. Retrain them to discuss directly with one another by making eye contact, shifting their posture, or other social/physical cues.
- **Encourage active listening.** Scaffold student's responses by asking, "Can someone restate what _____ [student's name] just said?", "What did your partner tell you?" [After a pair-share activity], "Do you have any questions for ____ [student's name]?" As students grow more accustomed to this type of exchange, let them utilize the probing, pressing, and re-voicing techniques during small group discussions.
- **Have patience.** Creating a classroom with authentic science talk doesn't happen overnight. You and the students are all un-learning engrained habits and replacing them with more meaningful interactions. Expect that it could take a whole semester (one to three months) to see the change take hold.