Making Time for Science Talk

By Mark J. Gagnon and Sandra K. Abell

"A friend of mine who teaches fifth grade claims that discussion in science is key for her students' learning. I've tried discussion with my third graders, but it takes up a lot of time, and I don't think they get that much out of reporting what they found to each other. Am I missing something about the role of talking in science class?"

Do elementary students benefit from classroom talk?

Cognitive scientists (Donovan and Bransford 2005) conclude that when teachers "simply give students the knowledge to incorporate, the practice and skill development of doing one's own mental search is shortchanged" (p. 579), but when students engage in classroom talk, they "become better at monitoring and questioning their own thinking" (p. 577). Science education researchers claim that elementary students have the ability to use science talk to explain, clarify, and justify what they have learned. In a study of British 10- and 11-year-olds, Sorsby (1999) found that students used the strategies of clarifying, reconciling, and persuading others during discussions. Furthermore, students use their everyday language to help them reason and make sense of science. In a study of a sixth-grade urban, multiage, bilingual classroom, Warren et al. (2001) described how the "science circle" was structured to allow students to ask questions, challenge each other, ask for clarification, tell stories, and even joke. The students' everyday language was a deep intellectual resource that helped them to argue, categorize, organize, and theorize about science phenomena. However, not all classroom science talk leads to such results.

What kind of "talk" are we talking about?

Researchers who study science talk find that most classroom discussions limit students' opportunities for sense making. Carlsen (1992) found that the structure of classroom science talk commonly followed "sequences of Initiation (usually a teacher question), Response (usually a student answer), and Evaluation (explicit feedback concerning the student's answer)" (p. 17). Lemke (1990) called this pattern "Triadic Dialogue" and asserted that this typical classroom structure is used to maintain control, not to help students generate science understanding. This "authoritative" approach (Mortimer 1998) encourages students to guess what the teacher is thinking, not to think on their own. Yet science discussions, if enacted differently, can help students learn science. Wertsch and Toma (1995) analyzed the kinds of talk in a Japanese fifth-grade classroom. They found that some talk served the authoritative function of conveying information, while "dialogic" talk helped students to generate meaning.

How can dialogue help students think about science?

According to Lemke (1990), "True Dialogue occurs when teachers ask questions to which they do not presume to already know the 'correct answer'" (p. 55). In dialogic science discussions, the students generate meaning from the classroom talk, rather than merely recite or report. Dialogic discussion is characterized by student spontaneity—comparing, expanding, and revising the ideas of others; and offering tentative explanations. Gallas (1995) found that her first and second

graders could propose, support, expand, and revise their science theories, and in doing so, generate new meanings. Gee (1997) described types of sense-making discussion found in a second-grade classroom where students designed and carried out investigations about plants. For example, in "Design and Discovery Debate" students discussed the success of the components of their investigations. In "Anomaly Talk," students recognized unexpected outcomes. "Explaining Talk," the deepest kind of sense-making discussion, occurred when students interpreted their data through dialogue with each other. Such dialogue can occur when teachers make time and space for it, in the form of "science talks" (Gallas 1995), "scientists meetings" (Reardon 1993), or "science circles" (Warren et al. 2001).

How can teachers structure and facilitate scientific discussions?

Elementary classroom teacher researchers Karen Gallas (1995) and Jean Reardon (1993) found that classroom science talk is a rich source of student thinking. Yet guiding dialogic discussions can be challenging for teachers. Here are some helpful strategies to get started on creating a classroom where science talk is valued and practiced (see also Gibbons 2002).

- Hold discussions following a shared science exploration;
- Ask open-ended questions that require thoughtful discussion;
- Give students time to think about a topic by assigning a discussion topic for after recess or the next day;
- Provide discussion rules, including directions on how to listen;
- Ask students to discuss their ideas in teams before opening discussion to the entire class;
- Structure discussions so that all students have the opportunity to participate;
- Provide scaffolding for student talk by asking for clarification, probing for more information, and modeling science talk for the speaker;
- Instead of playing the role of evaluator after student responses, listen and wait for other students to respond.

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