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Nurturing argumentation and discourse

Argument and discourse are central to the work of scientists as well as to the advancement of science. The practice of engaging in argument from evidence is included in *A Framework for K–12 Science Education* and the *Next Generation Science Standards* to improve students' critical thinking and reasoning abilities and to deepen their understanding of science concepts and the nature of science (NRC 2012, Achieve Inc. 2013).

Unfortunately, as *Taking Science to School* points out, argumentation is rarely part of our classroom instruction (Duschl, Schweingruber, and Shouse 2007). While some teachers may not be comfortable departing from traditional teacher-dominated interactions where straightforward questions are asked seeking expected answers from students, science instruction must change to conform more closely to the now-established *Framework* and *NGSS*.

This issue of *Science Scope* contains an excellent collection of articles on the subject of argumentation and discourse that provides specific information to help you begin to implement this essential component of *NGSS*. Several of the articles also provide information for teachers about setting expectations and norms in the classroom employment of argumentation and discourse.

I would like to add some observations from years of trial and error with implementing student-to-student interactions and argumentation in my own teaching:

- Getting middle school students to understand the difference between scientific argument and “talk,” and everyday argument and “talk” is not easy! It requires patience and persistence to establish and maintain explicit but nonthreatening discourse guidelines that promote student responsibility, tolerance, and the use of evidence and scientific language.
- Since most of your students have had little foundational experience with argumentation and discourse in the earlier grades, many of them will not immediately master these skills; but just because they don't seem to be making adequate progress, you should not abandon your efforts, nor allow yourself to revert to the more comfortable, traditional, initiate-response-evaluate format of teacher-student interaction.
- Stay the course! Teach students the elements of a sound argument and insist that they use them in classroom writing and speaking. Give constructive feedback often, design improvement exercises, and always encourage *all* students, not just the more assertive or vocal, to participate and become proficient in discourse and argumentation skills.
- Students must be provided with frequent opportunities to practice argumentation and discourse. Do not simply end lab activities and research projects by collecting lab reports to be graded and returned to individual students or by having a regimented, ubiquitous presentation of results: Reach for wider student learning by requiring students to engage in non-teacher-mediated, peer-to-peer talk or debate that uses evidence from their labs or research.

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