

Chapter 2

Discourse of Integrating Science and Literacy

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ABSTRACT

The authors start this chapter with a reconceptualization of science literacy and proceed to discuss why science literacy matters and why discourse in various forms matters to science literacy. Then, drawing on their recent research study on science literacy integration, the authors center on the teacher-student interactive discourses revolving around science concepts and literacy skills. They particularly examined some of the seemingly off-topic classroom dialogues. Doing so aims to explore how the potential opportunities of science literacy integration can be discursively co-constructed by the teacher and the students in naturally occurring classroom activities. Further, doing so aims to show science literacy integration can become more enjoyable to students. Meanwhile, the authors advocate that both science and literacy teachers should see themselves as teachers of language as well as examine and think how their classroom discourse can be orchestrated for the purposes of integrating science and literacy.

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We need to begin by examining the nature of the language experience in the dialogue between teacher and class . . . By its very nature a lesson is a verbal encounter through which the teacher draws information from the class, elaborates and generalizes it, and produces a synthesis. His skill is in selecting, prompting, improving, and generally orchestrating the exchange. (Bullock, 1975, p. 141)

INTRODUCTION

Science learning is not simply doing science. Along with the hands-on practical work, talking, reading, and writing constitute a large part of the science-learning process and product (Greenleaf, et al., 2011; Lemke, 2001; Lang, Drake, & Olson, 2006; Wellington & Osborne, 2001). Science-literacy integration is also characterized as doing, talking, reading, and writing, with all forms of graphic organizers, pictures, and illustrations. To a great extent, science literacy functions as a set of discourse (Pearson, Moje, & Greenleaf, 2010; Wellington & Osborne, 2001) the discipline-specific “language-in-use” (Bloome & Clark, 2006) or languaging (Bloome & Beauchemin, 2016) featuring all kinds of semiotic systems (Lemke, 2001). In this chapter, the authors start with a reconceptualization of science literacy and proceed to discuss why science literacy matters, and why discourse in various forms matters to science literacy. Then, drawing on their recent research on science literacy in elementary school, the authors center on teacher-student interactive discourses revolving around science concepts and literacy skills. Particularly examined were some of the seemingly off-topic classroom dialogues, by which the authors also attempt to explore how potential opportunities for science-literacy integration can be discursively co-constructed by teacher and students in naturally occurring classroom activities. Doing so aims to show that science-literacy integration can become more enjoyable for students, especially those at young ages. Meanwhile, the authors advocate both science and literacy teachers seeing themselves as teachers of language, as well as examining and thinking about orchestrating their classroom discourse for the purposes of integrating science and literacy (Wellington & Osborne, 2001).

Science Literacy

Scientific literacy is defined in this chapter as the literacy, knowledge, competence, and practices demanded for the learning and application of scientific concepts and content in discipline-specific and interdisciplinary contexts. More specifically, both the National Science Education Standards (1999) and the new Next Generation Science Standards (2013) emphasize that science learning requires an individual to identify and ask questions; collect, analyze, and interpret data from various sources and through different venues (both first-hand and second-hand investigations); explore solutions; make evidence-grounded arguments; and communicate and present findings in different forms. Both national standards and our definition indicate that active science learning requires not only doing, but also talking, reading, and writing.

Discourse in Science-Literacy Integration

Numerous recent studies on science and literacy integration have affirmed the reciprocal supportive relationship between literacy and science (Greenleaf, et al., 2011; Pearson, et al., 2010). Further, the American Association for the Advancement of Science highlights the significance of scientific literacy to

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