Book review

Grant, M.C., & Fisher, D. (2010). *Reading and Writing in Science. Tools to develop disciplinary literacy*. Corwin: SAGE (100 p.)

As the authors describe in the introduction, this book is about science content literacy, a set of special requirements for those who read, write and talk about science. It is not about science content instruction but about literacy instruction applied to science. The stakes are high: "helping students to learn to access science content in a way that fosters discussion, reflection, and authorship" (p. viii). The authors specify that the book is intended for secondary school science educators. Their motivation is to help teachers in their effort to educate young people who, as upcoming citizens, will have to make decisions on a range of issues (environment, technology, energy, etc.) for which science literacy is required, which means the capacity to process and evaluate scientific information and then use it to make knowledge-based decisions.

The book comprises six chapters: The role of Language in Science, Developing and Activating Background Knowledge, Integrating Vocabulary Instruction into the Science Classroom, Reading Science Texts, Writing in Science and Assessing Student Learning in Science. The first chapter sets the stage: learning is based in language and what is required of high school students is disciplinary literacy. Disciplinary literacy is defined as "literacy skills specialized to history, science, mathematics, literature, or other subject matter" (Shanahan and Shanahan, 2008). The authors insist on differentiating disciplinary literacy applicable to English studies, as an example, from science studies.

journal of WRITING RESEARCH

Baudet, C. (2011). Reading and Writing in Science. Tools to develop disciplinary literacy. *Journal of Writing Research, 2*(3), 395-398. http://dx.doi.org/10.17239/jowr-2011.02.03.5
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"Consider disciplinary literacy in science, they say. Content in science often requires reading between the lines, visualization, the interpretation of graphs and charts, and knowledge of inquiry methods of study. It is a progress that differs greatly from that of reading The great Gatbsy or reviewing a primary source document like speech written by Frederick Douglass." To support this claim, the authors give the example of a very obscure excerpt from a technical manual related to Oil Well Derrick Stability from the U.S. Department of Labor. As it is, the excerpt is very difficult to understand, as is doesn't come with any context and is loaded with technical vocabulary.

In order to read and understand science, one needs contextual knowledge and technical vocabulary, the authors say. In chapter 2, they address the issue of contextual knowledge and how to develop and activate it in students. They consider motivation and background knowledge as "intertwining factors affecting student achievement". Different strategies are suggested to bridge the activation of prior knowledge to the development of new knowledge, such as writing prompts, sharing ideas verbally with a partner, filling in a right or true statement about scientific issues, using a What do I know/what do I want to know/what have I learned chart, among other strategies. All strategies are developed through examples of science writing. In chapter 3, the issue of technical vocabulary is tackled in detail, again with instructional examples to develop vocabulary, to help students integrate and analyse the meaning of scientific words (use of a Self-awareness chart or word cards) and also to bring students to assess relationships between words belonging to the same semantic field and to be able to draw a semantic map connecting a specific word to a series of related ones.

Chapter 4 focuses on reading science, specifically on instructional routines to help students access the meaning of science textbooks, which are described as having "the reputation of being difficult, boring and hard to comprehend." Scaffolding the reading task is the recommended approach here, starting with assessing and activating prior knowledge and addressing the discipline-specific vocabulary. The goal is to connect new knowledge to a schema, which serves as foundation for a web of knowledge. Reading science is about accessing content and connecting this content to other blocks of prior knowledge. Two reading routines are developed: reading-aloud and shared reading. Both routines are to be the teacher's task. The read-aloud protocol follows a well described five step-by-step approach of the text leading to a verbal or written summary required from the students, while the shared-reading is a metacognitive activity. During this activity, the teacher shares his thoughts about what he is reading and is interested in developing cognitive reading strategies in students. These routines are followed by collaborative and independent reading activities in class. The instructional protocol is based on the assumption that reading in science can be different from reading in other content areas because of unique text structures, vocabulary and the presentation of informational content.

Chapter 5 covers the subject of science writing. It focuses on two questions: What makes writing like a scientist different from writing like a historian or a mathematician?

How can teachers help students write within a science context? To the first question, the authors answer that "science involves the communication of ideas via written language for numerous important reasons, including (Yore, Hand & Florence, 2004) the following: - establishing detailed associations among evidence, warrants, claims, and reflective commentary; - developing and conveying mental images; - expressing ownership of intellectual properties." (p. 62) To the second question, the answer is to provide an environment that will promote "the understanding of science and inquiry, along with a working knowledge of the function of reasoning and interpretive beliefs." (p. 62) This environment will emerge by presenting students with problem-based activities that will enable them "to ask questions, seek out answers and make connections to other knowledge." (p. 63) As to writing activity per se, the scaffolding approach is once again recommended as the basis of a writing protocol, and routines are outlined: the use of sentence starters, graphic organizers, and list format to promote succinct sentences and heuristic templates. These suggestions are developed through science class writing examples and a variety of genres are explored. The writing process is presented as a series of technical routines.

In the last chapter, the authors discuss different ways of assessing student's science writing from both a formative and an evaluative perspective. Once again, examples are outlined and frameworks are suggested. Assessment is seen as a "means to retool, revise, and improve instruction and the resultant learning for students". (p. 89)

This book is easy to read, easy to use and accomplishes at least one of its purposes: increasing science teachers' awareness of the importance of enhancing literacy skills among their students and thus, making science knowledge more available, better understood and ready to use in every day life. Who doesn't need science knowledge to understand today's world?

The authors want their readers (science teachers) to enhance reading and writing skills among students in order to access science content with critical thought. Their intention is praiseworthy but they do not seem to recognise that writing is a complex activity common to every field of knowledge and that the writing process is more than a set of routines. Who doesn't need advanced literacy skills to understand the world's complexity? In what ways do reading and writing in science differ from reading and writing in geography, history or political science? Writing is a complex activity during which one has to deal with multilevel constraints and obstacles pertaining to the limitations of working memory, the resources of long-term memory, the linearity of language, topic knowledge and rhetorical goals, the capacity to retrieve background knowledge and to organize one's ideas in a coherent textual flow, just to name a few. All these constraints are common to the activity of writing, whether writing is about The Great Gatsby, fractal numbers or the trial of Canadian born Omar Khadr in Guantanamo Bay.

Writing instruction would benefit from a change of perspective; interdisciplinarity being the basic requirement to fully grasp the complexity of advanced literacy in any

disciplines. It is regrettable that this book ignores the field of writing studies and its scientific literature, in which the writing process is understood through concepts coming mainly from cognitive psychology, applied linguistics, rhetoric, education and composition studies. There is a body of knowledge on reading and writing that should be taken into account to give the reader a scientific understanding of the writing process relative to planning, text generation and revision (Bazerman, Krut, Lunsford, McCLeod, Null, Rogers, Stansell, 2010; Connely, Barnett, Dockrell, Tolmie, 2010; Brandt, 2009; Bazerman 2008; MacArthur, Graham, Fitzgerald, 2006; Barton, Hamilton, Ivanic, 2000; Levy and Ransdell, 1996). The absence of any references to writing studies in this book reflects its non-recognition outside a small community and challenges scholars in the field to reach out for more visibility.

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