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Expanding repertoires for narrative engagement in science education

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Preamble

Most of my writing in recent years has been experimental. Like Laurel Richardson (2001), 'I write because I want to find something out. I write in order to learn something that I did not know before I wrote it' (p. 35). I write *essays*, where I use the term 'essay' not only as a noun but also as a verb – to attempt, to try, to test – in order to draw attention to the process of 'essaying' rather than to the 'finished' product signified by the noun. In conceptual inquiry an essay can serve a similar function to the experiment in empirical research – a disciplined and methodic way of investigating a question, problem or issue – although I find more appropriate analogies for my work in the experimental arts than in the experimental sciences.¹ Both 'essay' and the related term 'assay' come to English speakers through the French *essayer* from the Latin *exigere*, to weigh. Thus I write essays as *narrative experiments* – to test ideas, to 'weigh' them up, to give me (and eventually, I hope, my colleagues) a sense of their worth. For me, writing an essay – whether it is for a conference presentation, a scholarly journal, or a book – is a mode of inquiry: most of the time, I do not know what the 'thesis' of the completed essay will be when I begin to write (for an extended example see Gough, 2004).

Writing narrative experiments involves risks. Experiments do not always 'work'. When I offered this paper I anticipated that I would apply the argument outlined below to a specific and significant contemporary issue to which science education is expected to speak, namely, climate change. I expected that I would be able to demonstrate a number of partialities and distortions in the narrative statements that science educators privilege when they seek to engage learners in the larger 'story' of climate change and that I would be able to suggest examples of other ways of producing narratives of climate change that might ameliorate these partialities and distortions. For a variety of reasons, I was unable to do this. As a substitute, I link this paper to a very recently completed chapter (Gough, 2007) that offers a different but complementary strategy for expanding repertoires for narrative engagement in science education.

Narrative distortions and partialities in science education

The problem I address in this paper is situated within a continuing program of curriculum inquiry that explores the applications of narrative and poststructuralist theorising to both the practice and philosophy of science education. Initially my research focused on the adequacy of representing science to learners via the most common repositories of science stories in (Western, Anglophone) school science education, namely, documentary media (especially the

¹ For example, in a 1950 interview, the abstract expressionist painter Jackson Pollock was asked: 'Then you don't actually have a preconceived image of a canvas in your mind?' He replied: 'Well, not exactly – no – because it hasn't been created, you see. Something new – it's quite different from working, say, from a still life where you set up objects and work directly from them' (quoted in William Pinar, 1994, p. 7). Richardson (2001) makes a parallel point about writing as research: 'I was taught... as perhaps you were, too, not to write until I knew what I wanted to say, until my points were organized and outlined. No surprise, this static writing model coheres with mechanistic scientism, quantitative research, and entombed scholarship' (p. 35).

science textbook and its journalistic equivalents in other media) and the ‘theatre’ of school laboratory work (see, for example, Gough, 1993a, 1993b, 1998, and commentary on this work by John Weaver, 1999). More recently (see, for example, Gough, 2001, 2006), I have explored the potential for producing more defensible stories of science by enacting a philosophy of science education informed and inspired by Donna Haraway’s (1997) ‘invented category of semantics, *diffractions*’ (p. 16) and by Gilles Deleuze and Félix Guattari’s (1987) figurations of rhizomatic and nomadic thought. These lines of inquiry share many of the research interests that James Donnelly (2004) describes as ‘humanizing science education’, especially those concerned with promoting ‘qualities of independent judgement and interpretation’ (p. 763) among learners.

In this paper I specifically address the problem of the production (and reproduction) of the types of story that, in Sandra Harding’s (1993) words, fail to expose students to ‘the fully historical character of the results of scientific research’ (p. 1). Such stories include those that science historian Douglas Allchin (2003) calls ‘scientific myth-conceptions’, which he very deliberately distinguishes from *misconceptions* (p. 330). Allchin uses several familiar examples – Gregor Mendel, H. B. D. Kettlewell, Alexander Fleming, Ignaz Semmelweis, and William Harvey – to demonstrate how many science educators and communicators (especially textbook authors and journalists) frame historical stories of science in the rhetorical architecture of myth, ‘which misleads students about how science derives its authority’ (p. 329). Because he focuses on stories of individual scientists, Allchin’s examples of scientific myth-conceptions are principally those that Catherine Milne (1998) identifies as ‘heroic science stories’.

However, there are many other types of story – including those that Milne (1998) categorises as ‘discovery’, ‘declarative’ and ‘politically correct’ (p. 175) – that distort science and mislead students. Of particular concern to me are stories that contribute to what Harding (1993) calls an increasingly visible form of ‘scientific illiteracy’, namely, ‘the Eurocentrism or androcentrism of many scientists, policymakers, and other highly educated citizens that severely limits public understanding of science as a fully social process’ (p. 1). My concern arises, in part, from working extensively with science education researchers in southern Africa between 1998 and 2004, and seeing at first hand how Eurocentrism and androcentrism exacerbate the inequalities, conflicts and instabilities that constitute science education in this region. Here I will use literary critic Gerard Genette’s (1980) framework for analysing narrative discourse to explore some of the conditions and circumstances that foster the production and reproduction of particular types of partiality and distortion in science stories.

Repertoires of narrative production

Genette (1980) uses his framework to analyse distinctions among literary works but, as Carola Conle (2003) demonstrates, it can be applied to many types of narrative materials and activities, including those that constitute educational curricula. Conle writes:

Genette prompts me to look at narrative from three perspectives, each affording me a different view: I may focus on rhetorical moves that create a particular ‘narrative’ or ‘narrative statement’; I may also focus on events and situations that are being described, that is, on the ‘story’ that is being told, given that the same events can be told in different ways; and of course there has to be the actual ‘telling,’ *without which there would be no statement, and perhaps not even a story to tell* (p. 5; my emphasis).

Critics of the partial and misleading science stories told through science education focus chiefly on the disjunctions between two of these three facets of narrative, namely, a particular *narrative statement* and the larger *story* of the succession of historical events that are the

subject of the statement – the ‘totality of actions and situations, taken in themselves, without regard to the medium, linguistic or other, through which knowledge of the totality comes to us’ (Genette, 1980, p. 25). For example, Allchin compares the narrative statements that textbook authors and science journalists make about Alexander Fleming’s ‘discovery’ of penicillin with the much larger and more complex history of penicillin as both bacteriological tool and antibiotic medicine in which Fleming played just one part.

In this paper I want to draw attention to the significance of Genette’s (1980) third facet of narrative, namely, the act of ‘narrating’ – the act of constructing a narrative statement from a story through telling, writing or filming (etc.). Conle (2003) illustrates the interplay of all three facets through the example of an oral account given by a Holocaust survivor to high school students. She notes that a survivor of the Holocaust clearly has a *story* but is unlikely to be willing or able to tell it all, and the *act of narrating* any given *narrative statement* will include the situation and circumstances in which such an act take place:

The Holocaust survivor that spoke to students told me that, of course, different audiences prompt him to tell his story differently. Differences in the age of the audience, the arrangements made by the school for the setting in which he speaks, the relationships he begins to feel with his audience as he speaks, and the presence of other survivors all affect the telling. Also, as he tells his story more and more often, different tellings affect the way he understands the story he has to tell. The act of narrating therefore is tremendously important. We may understand our own story differently and create different narrative statements about a particular story in different situations (p. 6).

Genette’s analytic framework suggests to me that the particular types of partialities and distortions found in narrative statements in science education are at least partly a function of the limited repertoires of narrative production upon which science educators draw. For example, most commercial publishers constrain textbook authors to conform to certain generic expectations which, in the case of science education textbooks, continue to privilege the narrative style that Joseph Schwab (1963) described more than forty years ago as a ‘rhetoric of conclusions’ (p. 39). I will thus argue that science educators should deliberately seek to expand the repertoires of narrative production from which they select narrative statements from the larger stories/histories of science. For example, Matthew Weinstein (2006) explores a ‘scientific multiliteracy’ by analysing the writing practices of groups other than scientists and science educators who engage science, such as writers who are ‘guinea pigs’ – professional human research subjects who derive part of their income by signing up for medical experiments – and science fiction fans who produce their own texts in response to the narratives they love. I argue that these and other narrative practices offer possibilities for expanding the variety and range of narrative statements that we can select from any of the ‘big stories’ of science that we want to make available to learners.

Expanding repertoires

One relatively commonplace way in which science educators supplement textbook treatments of subject matters is to refer students to science media reports. However, in the linked paper (Gough, 2007) I argue that positioning scientific media reports as some sort of desirable Other to science textbooks leaves unanswered the question of whether either type of text addresses the Eurocentrism and/or androcentrism to which Harding (1993) refers. In this linked paper, I use the treatment of malaria in science textbooks and news media to probe this issue further. Go to:

http://www.latrobe.edu.au/oent/Staff/gough_papers/noelg_Atweh_etal_2007_Ch4_proof3.pdf

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