

Narrative and Science Education: Building Links to Students' Lives Using Story

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Abstract:

There is a growing understanding of the importance of narrative in learning (Bruner, 1996; Connelly & Clandinin, 1988). This paper explores the significance of narrative to science education. We argue that since students learn, in part, through their narrative identity and its connection to their world, narrative must be an element of higher educational science classes. This connection, we argue, can help not only to motivate students to learn about science, but also to foster understanding of the moral implications of scientific practice. We conclude our discussion with a series of specific comments about what narrative practice might look like in a higher educational science classroom.

Key Words:

Science education; narrative; learning; teaching; identity; connection; higher education.

Introduction

This paper explores the connection between narrative and science education. We argue that narrative is a practice involving knowing, identity and rationality. In other words, narrative is one of the ways in which agents construct their knowledge of the world around them, their understanding of themselves, and their interlocution with other persons. This understanding, if applied to conceptions of science education, has the potential to foster strong links between student experience and understanding. Narrative can be seen as a way of knowing about what scientists believe and do, and a way of knowing how that belief and action fit into one's life. In technical terms, narrative knowing bridges structure and agency by allowing for reflexivity (Giddens, 1992). Our conversations about science in schools, we will argue, must consider this. If we wish students to take up science in their lives, we argue that science must first become part of their narrative experience. We will begin by outlining the concepts we will employ in our discussion. Then we will posit our argument for the centrality of narrative practice in science learning via a discussion of the work of Habermas (1971, 1981, 1987), Fisher

(1985) and Ricoeur (1992). Third and finally, we will discuss what might characterize a higher educational science classroom involved in narrative practice by drawing on Bruffee (1999).

Concepts of Narrative

Narrative is conventionally defined as “the representation in art of an event or story; also: an example of such a representation” (Merriam-Webster, 2008). In philosophical terms, however, there is a great deal more to be said. Our concept of narrative begins with two elements: narrative identity and narrative knowing.

Bruner (1996) explains that narrative helps to construct one's identity in the world by providing models of identity and agency through the stories of one's cultural context. To say that one is a teacher, for instance, is to invoke a particular sort of character that is defined at least partially by the cultural understanding of that character one's community shares. Teachers have certain characteristics, in the public imagination, and one's life as a teacher is importantly impacted by these expectations (some of which one might very well internalize). This conception posits narrative as a form of identity construction – hence our use of the term *narrative identity*. Ricoeur (1992) explains that narrative identity construction involves coming to know one's story and realizing that one's narrative is changing in ways partly controlled through one's words and actions. Since agents take part in the narratives of those around them, this process also involves an important relational dimension.

One could also understand narrative as a way of constructing claims to *knowledge*¹ – a concept invoked by our use of the term *narrative knowing*. Hopkins (1994), for instance, argues that narrative is a form of knowing through experience that reflects the flexibility and complexity of life. Ask an undergraduate chemistry student how it is that she knows the boiling temperature of substance X is Y and she might very well respond by saying, “when I heated X in the lab this week, it boiled when the thermometer reached Y degrees.” In this case, her small narrative about her experiment includes her truth claim (that X boils at Y degrees), her warrant for that truth claim (she boiled X at Y degrees), and a connection demonstrating how those two pieces of knowledge fit into her life (she did this during her lab this week).

The interplay between this student's truth claim, warrant and life experience is pedagogically significant – even if our example appears somewhat superficial at first glance. The student knows what she knows because of her understanding of an experience of her life. As such examples become more intricate, the argument becomes much more complex. The central point remains the same, however, and one might (by extension) say something similar of more ambiguous instances of scientific learning.

One of the ways that students come to understand what they learn in school is by coming to see that learning as part of their life experience. Students need to connect their learning to the past, present and future and understand the curriculum as a life course made up of relationships (Connelly & Clandinin, 1988). This is true, as we will

¹ There is an important epistemological debate regarding whether or not narratives constitute *prima facie* instances of knowledge about education. We do not address this debate here. For a discussion of this debate see Fenstermacher (1994).

argue in depth shortly, even of scientific learning. As Fisher (1985) argues, “there is no genre, including technical communication, that is not an episode in the story of life (a part of the ‘conversation’)” (p. 347.).

In a broader context, it is also important to examine the manner in which different narratives fit together. Tilly (2006) uses the example of the narratives surrounding the attacks on September 11, 2001. The originally dominant narrative (in much American media) involved the claim that the attackers hated the value of freedom itself, while subsequent narratives sometimes focused on the global disenfranchisement of many Muslim communities. To understand the significance of this event requires an understanding of the nature and interaction of these two narratives (and surely a great deal more). This way of knowing situates narrative as a meta-paradigm (Fisher, 1985) – an overarching way of knowing that examines the interconnected stories of life. Narratives, in this sense, are a form of social influence.

To seriously attend to these two elements of narrative (narrative identity and narrative knowing) within a classroom requires what we have elsewhere called narrative practice (Burns & Rathbone, 2010). Narrative practice requires, in short, that the participants in a classroom attend to the role of narrative construction in their lives as part of the daily classroom experience. Narrative, on this understanding, is not merely a pedagogical method but is rather a way of living both inside and outside of school. What this might look like varies depending on the details of the context in question. Before we can specify our image of narrative practice in the post-secondary science classroom, however, some important explication must first take place. For this reason we will now move to outline the more theoretical element of our argument for the importance of narrative in science learning. This argument will then lead us to a discussion of how narrative science learning might be more specifically contextualized. We begin our theoretical discussion with Habermas.

Habermas: Communicative Rationality and Science

Habermas (1971) examines the connection between scientific theory and philosophies of life. He argues that human interests - specifically those contributing to emancipation - should be used to mediate the instrumental nature of science. He contends, in other words, that science should be understood within the frame of the human interests it is used to pursue, rather than as a process of mere fact accumulation. This connection, it is claimed, can begin to undermine the harmfully detached perspective intrinsic to traditional positivistic approaches to science. This traditional approach, he argues, focuses on the selection of technically efficient methods for the manipulation of nature, rather than on a form of analysis that involves reasoning about ends as well as means. This argument has been likened to Aristotle's distinction between *techne* and *praxis* (Bohman & Rehg, 2007). The difference, in both cases, is the lack of ends-based reasoning in the former and the presence of such reasoning in the latter. When one is reasoning with both means and ends in mind, a broader sort of understanding and analysis is at play. One must ask not only what might be efficacious but also what such efficiency is in pursuit of – and whether particular pursuits are indeed more praiseworthy than others.

In making arguments like this, one Habermas (1981) seeks to raise awareness of the connections between science and the values of society more broadly. While the claim that science takes place within a value system is surely less polemical today than it was thirty years ago,² this understanding is still very much worth noting. The significance of this element of Habermas's argument stems, not just from the truth status of this claim, but also from the implications he draws from it – specifically, the account of rationality he places at the intersection of science and social values. This account of rationality is called *communicative rationality*. It is through communicative rationality, he argues, that a common understanding of the goals of science and the goals of society can be achieved.

Communicative rationality starts with the assumption that raising validity claims is both the basis for social bonds (Habermas, 1981) and a central element in the explanation of social change. Agents deliberate about the concerns that interest them in the socially defined environments they inhabit (their *lifeworld*). This deliberation, contrary to some postmodern arguments, enables interlocutors to collectively reflect upon norms and the reasons that give them validity through argumentation. The search for ethical norms is made possible by aiming for the ideal speech situation, which is characterized by the bracketing of relationships of power. One seeks, in this case, to foster a form of conversation in which power dynamics do not play a role in adjudicating claims. Ideas are accepted or rejected solely on the basis of their ability to compel in light of jointly acceptable rational standards and not by, for example, appeal to some sort of social authority (such as the epistemic authority of some persons over others).

Braaten (1991) and others recognize this approach as a way forward from the disconnected social theory and political apathy that often characterize life in an increasingly complex contemporary society. Habermas' (1987) explication of communicative rationality recognizes the complex and contextual lifeworld, filled with human interests, which we actually inhabit. He moves away from seeing the problems of modernity merely as economic structures (as in Marx, 1972) or an iron cage of bureaucracy promoted through instrumental rationality (as in Weber, 1946). He posits, in place of these understandings, the possibility of a form of discourse that permits citizens to jointly consider those values they wish to pursue and those reasons they wish to accept.

The implications of these arguments for our understanding of science are significant. Habermas advances an understanding of science and society that sees citizens engaging in reasoned reflection on the relationship between the interests they set for their community, and the tasks undertaken within scientific practice. The decision about what scientific discoveries mean, and what scientific truth claims amount to, is subject to the consideration of such citizens and is not merely the privileged understanding of a professional scientist working apart from his or her surrounding community. There are interests and ideological understandings at play in research and such elements of scientific practice must be named and made the subject of the communicative rationality

² More recent work by scholars such as Harding (1991) has resulted increased awareness of the important interplay between scientific values and the values of the surrounding society.

of the surrounding polity so that the members of that polity can decide what significance scientific practice has to their pursuit of good lives.

This much, though, is simply a brief philosophical summary. As we move to discuss the true focus of this paper – the implication of this view of science and society for educators – we must move beyond Habermas to Fisher's related work. It is to this task that we now turn.

Fisher and Narrative Rationality

Fisher's (1985) discussion takes Habermas' communicative rationality and extends it to include narrative rationality. The formal argumentation involved in exercising communicative rationality is supplemented under this understanding with narrative analysis of the stories that guide our lives. In fairness to Habermas (1981), whose focus is on the public sphere more broadly, this conception works most powerfully with much smaller scale interaction (such as that which takes place in classrooms).

The fundamental idea behind narrative rationality is that stories are, in fact, a source of reasons and can thus be a source of rational justification. In this context, Fisher moves away from the abstraction of norms which is characteristic of formal rationality towards the formation of knowledge in relation to identity. This formation takes place through reasoning regarding our living stories. That is, Fisher considers the possibility that stories agents share might form the basis for reasoning in the same way that generalized propositional reasons are often understood to.

While somewhat esoteric in origin this belief accords quite strongly with the common understanding of human experience. When charities seek to raise awareness about the impact of global poverty, for example, they do not only provide generalized statistical data about the relevant manifestation of poverty. They also provide personal stories and vignettes from the actual victims of poverty. The suffering that characterizes these stories is expected to elicit a response in those who hear or see them being conveyed. These narratives are understood, in other words, as moral reasons unto themselves. One acts because one is compelled by the story of another's suffering.

What one does about that suffering depends very much on the view one has of the relationship between its victims and oneself. Possible actions depend, in other words, on the way in which one understands the place of other persons within one's personal narrative. This way of examining moral relations through attempting to understand the role of particular others in one's personal story relates to Ricoeur's (1992) concept of narrative identity. We understand ourselves through our stories about where we fit into the world and relate to others. The knowledge we claim to have is tied to these understandings as we attempt to discern the meaning of particular facts or discoveries within our worldview and experience. Conversation between interlocutors is thus at its most meaningful when we seriously attend to the place of narrative within public and personal life. To put the point succinctly, we understand ourselves through narrative identity, we draw extensively upon narrative knowledge, and we ought to seriously consider the ways in which we deploy narrative rationally.

Bruffee, Narrative and Science Education

How is it that a science classroom might embody these ideas about the centrality of narrative? What are some of the activities or characteristics that might define a post-secondary science classroom engaged in narrative practice?

Bruffee (1999) provides a good starting point when he questions the way that education occurs in most universities today. His solution is to explore collaborative learning and to use this learning as way to shift emphasis from the gaining of facts to meaningful engagement in knowledge exploration. In the context of narrative education (Hopkins, 1994) that exploration occurs not only through the subject matter, but also through one's storied experience.

This leads to the relatively unremarkable conclusion that wholly didactic science lessons, such as are still traditional in university environments, are insufficient. What is novel about this line of reasoning, however, is the way in which it directs us to possible solutions. The conventional and general critique of didacticism holds that students need to be more engaged in their learning. This engagement can take many forms: discovery learning, problem solving, or study centered on practical issues (among many other possibilities). Narrative analysis offers us substantive philosophical detail regarding what exactly these kinds of pedagogy should entail.

The arguments we have discussed in this paper indicate that student engagement must involve not only more active cognitive processes (i.e. not the mere recording of scientific knowledge through notes), but also an internalization of the relevance of such knowledge. Here relevance is not reducible to instrumental practicality, as the common use of the term might connote, but is rather characterized by an understanding of the values and experiences to which particular forms of scientific knowledge could be connected.

Bruffee (1999) examines one possible avenue for this sort of learning in his discussion of consensus groups. Consensus groups can be used to explore the non-foundational aspects of knowledge such as those described above. One could ask a group of students, for example, to determine the sort of scientific knowledge they would require to solve a particular problem in their community related to the course's content. The resultant discussion (if helped along with appropriate questioning and probing) would ensure that whatever didactic content was eventually provided, the students would have already established its relevance and narrative meaning. They would know, at all times, what the content has to do with their lives because they themselves decided that they needed it in order to solve a pertinent problem.

There are, however, difficulties intrinsic to this method. One requires small groups with heterogeneity sufficient to encourage exploration by disturbing conformity of thought (or group think). Conversely, groups must also be characterized by homogeneity sufficient to ensure that those within the group know what each other are saying. These problems are familiar. They are, indeed, central problems within pluralistic democracy. The similarity is substantive, as we are speaking (in effect) about the democratization of the university science class.

This kind of class represents a transformation of the student body into a community of epistemic explorers. Bruffee (1999) argues that this transformation involves assimilation into communities of knowledge whose boundaries change with the understandings of those who participate. He describes how conventional forms of teaching can actively thwart communications between, and within, communities of knowledge by taking away students' responsibility for their own learning. Bruffee argues that conventional forms of teaching - such as lectures, critique of writing and even the Socratic method - place the power of knowing in the expertise of teachers rather than in the exploration of knowledge by students.

This discussion relates back to Habermas' concept of the public sphere and his attempt to move away from dependence on scientific expertise to a more public knowledge of science. Indeed, it could be said that the relationship between the science teacher and student epistemically mirrors the one between the scientist and citizen. If the citizen and the student are to view science as personally meaningful, each needs to exist in a community that takes up science in the lived, narrative fashion we have described. Humans live and understand their lives through conversations about the stories they experience. If we want students to take up science in a serious way, we need to take seriously the ongoing stories those students are living. We need to give them some form of self-authorship.

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