

Abstract

In this essay I present five passages in a pedagogical journey that has led from teaching undergraduate science-in-society courses to running a graduate program in critical thinking and reflective practice for teachers and other mid-career professionals. I have shaped these passages to expose some of my struggles—conceptual and practical—in learning to decenter pedagogy and to provide space and support for students to develop as critical thinkers. The key challenge I highlight is of helping people make knowledge and practice from insights and experience that they are not prepared, at first, to acknowledge. In a self-exemplifying style, each passage raises some questions for further inquiry or discussion. My hope is that the essay as a whole stimulates readers to grapple with issues they were not aware they faced and to generate questions beyond those I present.

The most important parts of any conversation are those that neither party could have imagined before starting. -- William Isaacs (1999)

In the mid-1980s I was teaching science in its social context as a new faculty member at a non-traditional undergraduate college. I began an ecology course with a brief review of our place in space before I asked students to map their geographical positions and origins. One student, "K," did not come back to earth with the rest of us, but remained off in her own thoughts. Some minutes later she raised her hand: "I always knew the sun, not the earth, was the center of the solar system, but do you mean to say..." K paused, then continued. "I'd never thought about the sun not being the center of the universe." From K's tone, it was clear that she was not simply rehearsing a new piece of knowledge. She was also observing that she had not thought about the issue but now she saw as obvious that the universe was not sun-centered. What other retrospectively obvious questions had she not been asking? What other reconceptualizations might follow? These questions pointed her along the path I hoped my students would take as critical thinkers—grappling with issues they had not been aware they faced, generating questions beyond those I had presented, becoming open to reconceptualization, and accepting that their teacher should not be at the center of their learning.

My own pedagogical journey has led from teaching these undergraduate science-in-society courses to running a graduate program in critical thinking and reflective practice for teachers and other mid-career professionals. (A parallel journey in ecological and environmental research is described elsewhere, Taylor 2005.) In this essay I present five passages from this journey. I have shaped these to expose some of my struggles—conceptual and practical—in learning to decenter my pedagogy and provide space and support for students to develop as critical thinkers. Each passage raises some questions that I leave open for further inquiry or discussion. I hope, moreover, that the passages and questions stimulate readers to grapple with issues you were not aware you faced and to generate questions beyond those I present.

Of course, I cannot create for readers the experience of participating in a classroom activity or semester-long process. Nor can you divert me from the steps ahead or inject other considerations. If you could, I expect some readers would slow me down to ask for more detail about the situations I describe or for more explication of my line of thinking in relation to that of other writers. Indeed, it is one of the central tensions of my teaching and writing that I want to open up questions and point to greater complexity of relevant considerations even when I know that some members of my audiences would prefer a tight analysis shaped to address their specific concerns and background. In acknowledgement of these tensions, this essay is accompanied by a web-based forum for readers to engage or witness the author in conversation. This experiment befits the central pedagogical challenge the essay raises, namely, helping people make knowledge and practice from insights and experience that they are not prepared, at first, to acknowledge.

1. Becoming aware of the forces that hold us or release us

Since childhood star gazing in rural Australia I had known about the sun's marginal place in the Milky Way so I felt some superiority when K admitted that she had not realized this. To my chagrin, I subsequently discovered my own retrospectively obvious question about our place in space. I was reading Sally Ride's book on the space shuttle to my child, when I came to her description of astronauts regaining weight as they descended (Ride 1986). The idea conveyed was that weightlessness was a result of distance from the earth. Yet the space shuttle orbits only 300 kilometers up where the earth's gravity is still 90% of its strength down on the surface. So I started thinking about how to explain weightlessness correctly in a children's book. Try this—think of swinging an object around on the end of a piece of string. To make it go faster, you have to pull harder; if you do not hold on tight, the object flies off into the neighbor's yard. Astronauts travel around the earth fast—at 7.5 kilometers per second. They feel weightless because all of the earth's gravitational attraction on them goes to keep them from flying off into space. The earth's pull on the astronauts is like your pulling on the string—but, while you may let go, gravity never stops acting. When the space shuttle slows down on its return to earth, less of gravity's force goes to keeping the astronauts circling the earth and what is left over is experienced as weight regained.

After rehearsing this explanation a few times, another kind of weightlessness occurred to me. The sun's gravitational attraction is keeping me circling around it—at 30 kilometers/second I figured out. On the earth I feel weightless with respect to the sun's gravity, but that force is acting nevertheless. I had never thought about this; I had considered myself a passenger on the earth, which the sun's gravity was keeping in orbit around it. I then realized that I am also zooming around the Milky Way galaxy, not as a passenger in the solar system, which the galaxy's gravitational attraction was keeping in orbit around it, but because the galaxy's gravity is keeping me orbiting around its center. It made me feel woozy to think

of the sun and the rest of the galaxy "paying attention to me" all the time, keeping me circling at enormous speed through space—at over 200 kilometers/second, I soon learned. I wondered if every molecule in the galaxy was attracting every molecule of my body every moment. Was there some other way to think about gravity? Perhaps a further radical reconceptualization awaited me, possibly involving wooziness-inducing Einsteinian concepts such as curved space-time.

In recent years I have started courses and workshops on critical thinking by relating the reconceptualizations that occurred to K and myself. I usually follow the story with an activity. My goal is to have people respond to story and bring insights to the surface about how people can generate questions about issues they were not aware they faced. The activity begins, therefore, with a freewriting exercise (Elbow 1981) in which each of us writes for ten minutes starting from this lead off: "When I entertain the idea that I haven't been asking some 'obvious' questions that might have led to radical reconceptualizations, the thoughts/ feelings/ experiences that come to mind include..." After this writing, we pair up and describe situations in which we "saw something in a fresh way that made us wonder why we previously accepted what we had." We then list on the board short phrases capturing what made the "re-seeing" possible. The factors mentioned differ from one time to the next, but they always represent a diverse mix of mental, emotional, situational, and relational items, e.g, "relaxed frame of mind," "annoyed with this culture," "forgetting," "using a different vocabulary," and so on. I conclude the activity by simply noting the challenge, which is common to many other questions in education, of acknowledging and mobilizing the diversity inherent in any group. Recently, however, now that I have lists from several occasions, I have started to wonder whether the factors could be synthesized into general directions. Would future audiences gain from my cutting through the diversity and presenting the synthesis—or does this run against the grain of facilitating thinking about re-seeing?