

Because Public Understanding of Science (PUS) draws on so many traditions, there is an almost infinite scope for theoretical and practical activity. One of the problems is that too often the activities are widely separated from the theory: the practitioners come mainly from the community of active or retired scientists or are professional journalists or broadcasters, while those engaged in researching their activity and its consequences tend to come from the social sciences and humanities. Too often, too, the activist is unaware that anyone has tried to reflect on what has been done while the researcher is interested only in recording and criticizing. One reason why activists sometimes behave as though they subscribe to the deficit model of PUS is that this model describes a simple problem that is easy to solve: their task is to fill the presumed gap in the knowledge of the people who attend their talk, read their article, or tune into their broadcast. Researchers, on the other hand, are increasingly lending their weight to the conclusion that what is being addressed by science in the public sphere is less like a vacuum and more like a complicated synergy of deeply embedded cultural themes and awkward issues such as trust and belief. This picture is much more difficult to specify, and its needs are not easily satisfied.

Jane Gregory & Steve Miller (1998)

*Science in Public: Communication, Culture and Credibility*

As the years rolled on, the sociological treatments of scientific knowledge seemed to me to become more insular, more disconnected from those early concerns about the human impact of science. As theory about the practice of science has become more sophisticated, it has become less accessible to scientists and activists. Still, it seems radical enough in principle. It seems that it should be possible to develop some radical applications from the critical theory. ... Bluntly speaking, my view is that much of this professional work on the critique of science can be interpreted as a process of taking over the insights of the radical critics, recasting them in an academic and sanitised mould, and pursuing the dilemmas internal to the resulting intellectual terrain. ... Many of the radical science activists have been driven by their commitments to a more democratic, egalitarian and peaceful society, and have worked through various social movements, including the labour movement, the environmental movement, the peace movement and the feminist movement. Many of the academic analysts of science share some of the same goals. But they differ in method: they prepare their critiques for classrooms, professional conferences and journals.

Brian Martin (1993)

When the Critique of Science Becomes Academic

## Table of Contents

|   |     |
|---|-----|
| Section One: Practice   | 1   |
| The story of the <i>Choices and Challenges</i> Project                    |     |
| Section Two: Theory   | 15  |
| The structuring frameworks of nontraditional science education            |     |
| Section Three: Practice   | 28  |
| Structuring <i>Choices and Challenges</i>                                 |     |
| Section Four: Theory  | 37  |
| Science and Technology Studies  |     |
| – Reimagining the relationship between science, technology and the public |     |
| Section Five: Practice  | 57  |
| What would STS add to <i>Choices and Challenges</i> ?                     |     |
| Section Six: Theory and Practice  | 76  |
| Doing the “hard work” of theory and practice at the same time             |     |
| Postscript:   | 95  |
| Reflections on nontraditional science education and STS                   |     |
| Works Cited   | 102 |
| Appendix A: <i>Choices and Challenges</i> Forum 2000 Website              | 111 |
| Appendix B: <i>Choices and Challenges</i> Forums and Funding 1985-2000    | 112 |
| Curriculum Vitae  | 121 |

## Figures

|  |    |
|--|----|
| Figure 1.1<br>Sample Schedule, <i>Choices and Challenges</i> Forum | 6  |
| Figure 1.2<br>11.9.00 Forum Description                            | 7  |
| Figure 1.3<br>Press Release, <i>Pig in the Middle</i> , 10.24.00   | 12 |
| Figure 3.1<br>Sample Schedule, <i>Choices and Challenges</i> Forum | 36 |
| Figure 6.1<br>Nussbaum's Central Human Functional Capabilities     | 84 |

## Preface

This project is composed of a series of reflections or snapshots, if you will, taken from both sides of the theory | practice mirror. It is a partial mapping of my negotiations during the last two years as both a local, nontraditional science education project coordinator and as an “emerging, young scholar” working within the field of Science & Technology Studies (STS). It points to the difficulty of “doing” theory and practice at the same time. While affirming that there is no easy solution to the hard work of situating local, nontraditional science education practices within a critical theoretical tradition such as STS, this project also provides recommendations for a new framework to conceptualize a more productive interaction between the practice of nontraditional science education and the theory of STS.

I share this case study of the *Choices and Challenges* Project with you in the hope that it will serve as a ‘point of entry’ (Smith 1987) for a broader discussion about the relationship between theory and practice at sites of nontraditional science education. I would also like to make clear that being involved with the *Choices and Challenges* Project continues to be a rewarding experience. In what follows, I examine the project critically because I share with its director and founder, Doris T. Zallen, the recognition of the importance of projects like it in the world.

## A Comment on Organization

What follows is organized as an experiment.

To further reflect that this project is part of an ongoing process of sensemaking (Weick 1979), what follows will be told in multiple voices: theorist and practitioner will both be represented as actors. These voices will interact, disagree, and exhibit other qualities that persons participating in a conversation do. I take as one point of inspiration Bruno Latour's *Aramis or the Love of Technology* (1996). I take as a second point of inspiration all the voices in my head. At this point, I also would like to thank the many people who have participated in this dialogue with me during the last year – and to take full responsibility for the flaws that remain in what follows.

The first section begins to tell the story of my work over the past two years as an organizer of a nontraditional science education project at Virginia Tech – the *Choices and Challenges* Project – aimed simultaneously at public, professional, and student populations. This short autobiography is located in a broader narrative about the project, itself. This practice-driven location – that is, my continuing work as part of the *Choices and Challenges* Project – is the environment from which I began to explore the theories and practices of nontraditional science education more broadly approximately a year ago. In a way, it is always on my mind.

The second section speaks from a position other than my direct experience as a coordinator of a nontraditional science education project. It offers a brief account of two theoretical frameworks that guide nontraditional science education practices within the United States

and the United Kingdom: Public Understanding of Science (PUS) and Scientific Literacy (SL). The aim of this section is to establish the clear need for a space within nontraditional science education practices and frameworks for a critical examination of their assumptions and principles, asking such questions as: What are the explicit and implicit goals of nontraditional science education projects? What is accomplished? and, With what larger purpose?

In this section, after providing a short history of nontraditional science education practices, I place projects motivated by or produced within the frameworks of PUS and SL within the context of large-scale “body projects” reminiscent of what Foucault (1975/1995) describes as the third phase of discipline in the history of crime and punishment: “the body subjected to training,” disciplined by forces aimed not at the body, but at the soul (1975/1995: 131). These “body projects” produce not only a specific type of sanctioned scientific expertise (that is, an expertise supportive of science and technology and state involvement in their development) in a certain segment of the population, but also a sanctioned category of ignorance. These categories, themselves, become more important than the attributes they are said to capture, as part of a larger project of rendering citizens legible to the state (Scott 1998). The goal of PUS and SL is not so much to train the public in science, but, more importantly, to be sure that the only categories in which the public fits are either a sanctioned expertise or a sanctioned ignorance. If these remain the only two categories, there is, in fact, no reason to involve the public at all in the scientific and technical decision-making process. The sanctioned expertise provides a given support for scientific and technical development; those labeled as ignorant have nothing to add to the discussion. This configuration is a model for the production of state stability.

The third section returns in focus to the *Choices and Challenges* Project. As a practitioner, I ask if the critique of nontraditional science education projects provided in the previous chapter maps on to the practices of the *Choices and Challenges* Project. Not satisfied with this theoretical explanation, I explore the institutional history and location of the project – and how the resulting organizational practices shape the practice of each forum. The need for constant fundraising and the project’s simultaneous placement as a community resource and as curriculum enrichment for an undergraduate population produce project goals consisting of replicability and the performance of balance. The constraints of *Choices and Challenges* emerge from its environment. .

In the fourth section, again, as a Science and Technology Studies (STS) scholar, I suggest that, on the contrary, the “problems” of *Choices and Challenges* are located in the definitions of science embodied in the project, and the way in which this definition structures the resulting conceptualization of the relationship between ‘science, technology, and the public’. I then explore what the field of STS has to offer towards reimagining the “problem” of ‘science, technology, and the public’ by examining what STS scholars Dorothy Nelkin, Sheila Jasanoff, and researchers working under the heading of “Critical PUS,” such as Alan Irwin and Brian Wynne have to offer. Nelkin’s work on controversy studies shows that public disputes about emerging issues in science and technology result from conflicting values and ideologies, rather than out of public ignorance – thus challenging the ‘deficit model’ of nontraditional science education. Jasanoff’s work offers an understanding of expertise in the decision-making process as simultaneously political and scientific, offering a further

explanation for the development of scientific and technical controversies. Critical PUS scholars provide a more complicated picture of science, technology, and the public, forcing a reexamination of all the terms of PUS: science, understanding, and the public. Each of these authors trouble the frameworks provided by PUS, SL, and the *Choices and Challenges* Project.

In the fifth section, speaking as a practitioner, I argue that even if *Choices and Challenges* were to attempt to incorporate the theoretical insights of STS about science, technology, and the public into its organizational practices, many of the problems I identified in the third section would remain. Where are the good examples of persons using STS to guide their practices? Here, I point to the example of Steve Fuller's program of social epistemology to show a clear example of the failure of STS in the practice of policy-making. Does STS actually provide tools that can be used immediately in the practice of *Choices and Challenges*? If not, what can I use to negotiate these theoretical insights at the level of practice?

In the final section, I speak both as a theorist and practitioner wanting to pursue the "hard work" of doing theory and practice at the same time in nontraditional science education projects like *Choices and Challenges*. I examine work from other fields working on the theory | practice gap as a way of reorientation and to see what tools *are* currently available. I suggest that we ask a series of new questions about STS and nontraditional science education, including:

- What are our projects?
- What are the goals of our projects?

- Who are the people we are working with and how should we work with them?
- What methodologies are appropriate?

Here, I draw on a number of different fields such as critical theory, feminist studies of science and technology, feminist philosophy of human rights, community health organizing, critical ethnography, and practice theory to map initial ways of approaching these questions.

Rethinking programs like *Choices and Challenges*, however, will not be easy. Measuring ‘success’ will be even more difficult. Currently, the problems of *Choices and Challenges* are not even accurately mapped – portrayals of the experience of the forums must come not from me, or other positioned like me, but from actual participants in the project. As such, before any work occurs towards changing the theory and practice of *Choices and Challenges*, I recommend that a study detailing the experience of a broad variety of publics at *Choices and Challenges* forums through both quantitative and qualitative measure be undertaken before any other work can begin.

To conclude, a postscript outlines my view of the ideal relationship between nontraditional science education projects and STS. My belief in the power of the insights of STS to transform situations of social inequity and abuse of power remains unchallenged – and questioning what counts as science and scientific expertise (as a beginning) is not an implicit or explicit goal within the established framework of *Choices and Challenges*. Changing the way science and technology are defined, represented, and enacted within the context of *Choices and Challenges* or similar projects can challenge the organization and the production of the events, the roles of educators in this organization and production, and the academic field of STS. My future work will begin from this location.