INTRODUCTION

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I remember moving into my graduate student office at Syracuse University in 1979 as if it was yesterday. Directly across the hall was another graduate student office with the door closed. On the door was an index card with the following quote:

> Nothing happened in 1945 except that we changed the scale of our indifference to man; and conscience, in revenge, for an instant became immediate to us. Before the immediacy fades in a sequence of televised atomic tests, let us acknowledge our subject for what it is: civilization face to face with its own implications. The implications are both the industrial slum which Nagasaki was before it was bombed, and the ashy desolation which the bomb made of the slum. And civilization asks of both ruins, 'Is You Is Or Is You Ain't Ma Baby?' [1]

The quotation focused around an individual's viewing and reaction to the destruction in Nagasaki following the dropping of a nuclear bomb. The quote was from Bronowski's *Science and Human Values* and it was pasted to the door of Dana Zeidler's office. What goes around comes around in educational circles and I was unavoidably reminded of the quotation on Dana's door when reading this volume in preparation for the writing of this *Foreword.* I am not simply reminiscing about my first day as a PhD student, but rather I think the Bronowski quote cuts to the core of the text you are about to read.

I remember growing up in New York during the 1950s and 60s, and starting to see concerns about natural resources surfacing in newspapers and on TV. I remember an interview with Jane Fonda on TV, sometime during the 60s where she adamantly described a not so pleasant future if we Americans continued to burn fossil fuels without regard for the environment. I really didn't understand what the fuss was about, but I was a Jane Fonda fan. I had seen *Barbarella.* I do remember that immediately after finishing the interview she got back into her chauffeured limousine and drove away, probably to another interview about the environment. In

[1] As Bronowski was observing the after-effects of the first atomic blast, a ship's loudspeaker in Nagasaki harbor broadcast popular dance tunes from the 1940's. One song was entitled "Is You Is Or Is you Ain't Ma Baby?" See: Bronowski, J. (1965). *Science and human values.* New York: Harper & Row, Publishers.

D.L. Zeidler (ed.),
The Role of Moral Reasoning on Socioscientific Issues and Discourse in Science Education, 1-4.

my mind, I thought this to be an interesting contradiction. However, I wasn't interested enough to think about it much during the remainder of the day, month, or year. I liked the movie *Barbarella.*

During my first few years as a faculty member at Oregon State University, I was interviewing a ninth grade student in Harrisburg, Oregon about his views on science. The student seemed to understand that scientific knowledge was tentative so, playing devil's advocate, I asked him if and how science influenced any decisions he made. After all, he believed all knowledge was subject to change. The ninth grade student replied, "Let me put it to you this way, I won't go out and play with nuclear waste, but I'll still eat my Twinkies." It reminded me a bit of Jane Fonda years ago. About five years later, I observed a teacher in Philomath, Oregon attempting to bring relevancy into her classroom by having the students debate the pros and cons of attempts to rescue the spotted owl from extinction. The debate was a disaster with little science learned, but much learned about human nature when an emotionally charged issue is at hand. In my mind, there is a common theme that runs through my reminiscing. That theme is that nothing has changed. People remain people. Unfortunately, this theme should not translate into the observation that neither has the public school science curriculum changed, at least when it comes to the inclusion. Quite simply, if actions are manifestations of beliefs, we continue to believe that if students posses more in-depth subject matter knowledge on a scientifically-based social issue they will make more informed decisions. We have continued over the years to ignore the complexity of humans when it comes to making decisions that affect our lives, livelihood, culture, and country.

The goal of scientific literacy or the development of an informed citizenry is not new. Neither is the use of socioscientific issues in science instruction. Indeed, few would debate that students' abilities to grapple with such real world problems is a hallmark of what we desire for ALL as a consequence of science curriculum. This edited volume marks the first in-depth attempt to elaborate the full theoretical and practical complexity of attempting to focus science curriculum around socio-scientific issues.

Zeidler, and invited authors, have appropriately used moral reasoning as a reference point and missing component to discuss the intricacies of achieving the goal of scientific literacy. In the opening section, readers are provided with an extensive review of the research related on moral reasoning, addressing past, present, and future. The natural conclusion is that student reasoning ability is not enough to accomplish the goals of current reform efforts and this conclusion provides a smooth transition into a series of chapters that explicate all the other factors that contribute to the development of functional scientific literacy.

Section II focuses on nature of science and its relationship to students' handling of socioscientific issues. The three chapters clearly point to the complexity of this relation ship as well as the points of contention that exist among researchers on nature of science and the inclusion of socioscientific issues in science instruction. Rather than nature of science influencing moral reasoning or vice versa, the complex relationship is quite possibly shown to be reciprocal.

Section III of the volume primarily focuses on the increasingly important area of argumentation and discourse in the classroom. Zeidler, Osborne, Erduran, Simon, and Monk do an excellent job of establishing potential standards for the evaluation

of the arguments used by students during the consideration of socioscientific issues. And, critical to the techniques addressed in this are the considerations presented by Duschl in his contributed chapter. Berkowitz and Simmons present science educators with a perspective that is not typically included in the mainstream, science education literature: character education. Although the chapter reminded me of the lipservice provided to moral character by the *Cardinal Principles of Secondary Education* in 1917, the authors clearly and concisely present an in-depth review of the literature, a review that validly represents the complexity of character education.

In many ways Section IV brings the volume full circle by emphasizing the importance of cultural values and the role they play in students' decisions on scientific issues, not to mention the role such values play in a teacher's decision to attempt to provide *Science for All*. Perhaps the most vexing problem facing teachers who choose to use socioscientific issues in science instruction, is student diversity and how this diversity manifests itself in a wide variety of strongly held values and beliefs that can not be ignored if education is to be inclusionary and fair to ALL students.

This text provides a good balance of theoretical research and practical advise for teachers. Section V provides a variety of approaches classroom teachers can use to address students' moral development and socioscientific issues. Finally, in Section VI, Zeidler and Lewis review what has been done as well as acknowledge all the work that still remains.

It is my hope and prediction that readers of this volume will become energized to seriously address the multi-faceted problems and challenges associated with helping students achieve functional scientific literacy. However, with enthusiasm (as in prior attempts) often come inadvertent omissions that can serve to critically compromise the best of intentions. So, as you read and carefully consider the conclusions and recommendations presented in the following pages, I offer as cautions/concerns what I offered graduate students considering the use of socioscientific issues in their classrooms at the beginning of my career. These cautions/concerns fall into two categories: teacher knowledge/skills and issue selection.

Teacher Knowledge/Skills

1. Does the teacher possess in-depth knowledge of the science involved in the socioscientific issue?
2. Does the teacher possess in-depth knowledge of moral and ethical development of his/her students and how to enhance such development?
3. Does the teacher possess in-depth knowledge of argumentation and how to evaluate the quality of arguments?

Socioscientific Issue Selection

1. Is the issue truly scientifically based? That is, was the issue caused by the advancement of science and/or technology and will students learn science by considering the issue? For example, the debate about evolution and

creationism is not really the result of the development of scientific knowledge.

2. Is the issue developmentally appropriate for students? Can six grade students meaningfully discuss in-vitro fertilization or abortion?
3. Is the issue too polarizing to allow for productive discussion? Don't forget the emotionally charged topic of spotted owls in Philomath, Oregon.
4. Can you allow students to arrive at a decision different from your personal beliefs and can you fairly grade students who come to a decision that is different from what you believe? Remember, if you are using a true issue there is no single correct answer.

Whenever we teach science and the complex set of personal and societal factors that encircle the knowledge itself, we must ask, "Is You Is Or Is You Ain't Ma Baby?"

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