Chapter 2
A Critical Reflection on the Nature of Science Construct:
A Call for Worldview Integration

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ABSTRACT

This chapter is an account of the process and conclusions that emerged from the author's personal critical reflection of her enculturation into and understanding of the nature of science. The critical reflection focuses on how the present nature of science construct that informs science education standards is limited by a Western, mechanistic worldview that impedes educators' ability to achieve culturally sustaining pedagogy. One necessary step toward addressing this challenge is to include more organic and holistic worldviews in the nature of science, worldviews that are embraced by Indigenous science traditions as well as quantum thinking. The author proposes a framework to problematize the epistemological underpinnings of science in order to achieve science education spaces that are culturally sustaining.

INTRODUCTION

> *Science knowledge can describe consequences of actions, but is not responsible for society's decisions.*
> —NGSS Lead States, *Next Generation Science Standards*

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Each person, human or no, is bound to every other in a reciprocal relationship. Just as all beings have a duty to me, I have a duty to them…An integral part of a human's education is to know those duties and how to perform them.

—Kimmerer, *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants*

A recent study by Jones (2025), suggests that science teachers' conceptions of the nature of science (NOS) continue to align with Western mechanistic views. Additionally, Jones found that teachers' needed support to learn how science influences society and to understand science's potential to serve as a critical space. Science teachers and teacher educators play an important role in perpetuating a Western-dominated view of science; however, my experiences and observations suggest that they have limited opportunities and resources to critically reflect on this construct. Throughout my career in science—from undergraduate training and a role as a laboratory research technician, to nearly two decades as a secondary science teacher and now as a science teacher educator—I have rarely questioned the NOS. As someone who was trained into a narrow, noncultural, and apolitical view of science through formal education and professional experiences, I would have rejected the idea of science as violent or extractive just two decades ago, considering such claims hyperbolic or misinformed. Western science was the only framework I was taught and therefore the only approach I knew. It was only through exposure to diverse perspectives from scholars, scientists, philosophers, and historians representing a wide range of identities and epistemologies that I began to question the assumptions and stances underpinning the scientific worldview I had inherited. These assumptions served not only to limit my understanding, but also to silence possibilities for a more unified and culturally sustaining vision of science.

My identity as a White woman, who is the daughter of working-class Portuguese immigrants, who began school as a multilingual learner, and who was the first in my family to attend a four-year college and eventually earn an advanced degree, greatly influences my personal journey. I enter my work in science education knowing at my core that the opportunities I have had—opportunities my parents and grandparents dreamed of when they immigrated to the United States—have come at a tremendous cost to many, especially the Indigenous Peoples who were violently dispossessed of their land and their ability to sustain their lifeways as a result of colonialization. Indigenous wisdom and knowledge, which I have gained from Indigenous scholars and lessons taught by members of the Narragansett Indian Tribe of Rhode Island, have greatly shaped my conceptions of science and culturally sustaining science pedagogy. As a result, each day I strive to understand what it means to stand in solidarity with the Indigenous nations and tribes who have been caretakers of this land