Chapter 6
Getting to "Know" STEAM

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EXECUTIVE SUMMARY

This chapter describes the evolution of an arts-integrated approach to science curriculum inquiry which has been evolving since the 1990s—before the national science standards, the acronym STEM, much less STEAM, appeared across educational horizons. It reads as ethnography and has been performed in community, in association with the most caring of souls, with the goal of achieving a more inclusive/empowering, aesthetic science education, and a deep appreciation of the importance of the creative arts in the science learning process. It presents two research-based iterations of STEAM education in practice: 1) the creation of arts-integrated middle school ocean science curricula and 2) the development of a pedagogical tool called the "Know"tation as a way for teachers and students to make learning visible and integrate the languages of science throughout the process of inquiry. The cases described here apply many features of the STEAM model developed in Chapter 2 of this book.

INTRODUCTION

How can educators engage those students who struggle to read and for whom science informational text seems particularly threatening? I encountered this same challenge myself with my very first teaching job, which tasked me with teaching physics to thirty-five older ninth graders, who had previously failed the class. The football coach, their former teacher, dubbed them his "dummy class." "Don't expect too much from them," he cautioned. I was astonished. Certainly, no one in that class was stupid! Yet, they had most definitely been made to *feel* that way through tracking,

neglect, and marginalization. The real kicker was that the more affluent students up the hall in the "gifted science class" had a nice lab with equipment and space to do experiments. My class and I, on the other hand, had thirty-five desks crammed into rows in a small corner classroom and an old textbook none of my students could read. I was so mad I could spit, but I was also lucky. I had been trained in the arts, and I knew how to tell a story through drawing. I used that as a way to connect, with language we could all understand. Together, we drew and played with funny little cars, which we rolled down those crummy old textbooks. These kids started passing, and I started to get a sense of what it meant to *design* a science curriculum as an artist might.

What I did not realize then, as I do now from study of Elliot Eisner, John Dewey, Johann Pestalozzi, Maxine Greene, Richard Siegesmund, Liora Bresler, Bruce Uhrmacher, and other arts education researchers is that what I had observed in my students and myself was an *aesthetic* transformation. Uhrmacher (2010) noted that a student who acquires "aesthetic capital" may feel or act differently in a good and positive way. As a brand-new teacher, I was so transformed by the way an artistic pedagogy turned around previously failing students that I set out to change science education. Ah, to be 25 again! I applied to MEd program at the University of Hawaii, where I took graduate level classes in both the visual and performing arts as well as art and science curriculum theory. I became determined to identify the common language that science and art share and developed an experimental curriculum called Teaching Science through the Arts (TSTA) at a time before the acronym STEM had become popularized (Koester, 1989). I researched, developed, and then field-tested curricula for teaching science through the creative arts of drawing, poetry, music, dance, creative drama, and fictional literature. In my master's thesis, I tentatively proposed that virtually any area of K-12 science could be taught through the arts. The lesson planning objective, I reasoned, was to match the art form to the dynamics of the science content being taught. Right away I recognized that a science teacher who would implement the TSTA model would need to either personally acquire basic skills in multiple art forms and/or collaborate with an art teacher specialist. Because I had significant arts training, I managed to create and field-test about fifteen TSTA lessons as part of my final thesis. However, I did not have near enough data to propose a *theory* about best practices for teaching science through the arts. That process has taken nearly two more decades.

What follows is a true story that narrates the transformation of a science teacher into a researcher and the evolution of an idea into a curriculum model that is still growing and developing.

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