# Getting to "Know" STEAM

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## EXECUTIVE SUMMARY

*This chapter describes the evolution of a personalized, arts-integrated approach to science curriculum inquiry which has been evolving since the 1990s—before even 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 learning process. It presents two research-based iterations in 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 in this chapter apply many features of the STEAM model developed in Chapter 1 of this book.*

## INTRODUCTION

How can we engage those students who struggle to read and for whom science informational text seems particularly threatening? I myself encountered this same challenge in my very first teaching job, where I was tasked with teaching physics to 35 older ninth graders who had previously failed the class. The football coach, their former teacher, declared that they were his "dummy class." "Don't expect too much from them," he said matter-of-factly. I was astonished. Certainly no one in that class was stupid! Yet, they had most definitely had 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. We, on the other hand, had 35 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 draw and to tell a story, and so 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 text books. 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. I myself, a brand new teacher, 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 the 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 ways in which science and art share a common language and developed an experimental curriculum I called Teaching Science through the Arts—TSTA – at a time before even 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 off, 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 nearly 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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