

## Chapter 17

# Making Success: Researching a School District's Integration of the Maker Movement Into Its Middle and High School

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### ABSTRACT

*Increasingly, the maker movement has been pointed to as a means of bringing more innovation and creativity into education. As an educational program, making has pressed educators to question entrenched beliefs and assumptions about the structure of activities, lessons, and classes, pushing them to embrace a more student and experience driven learning environment. "Making Success" was a two-year research project to investigate and describe the integration of making into one school district's middle and high school. The starting point of the research was to learn and describe the critical characteristics and capacities that allowed TRSD to integrate making so deeply into its secondary schools. A key lesson of the project was that many interconnected ideas and people played important roles in the initiative to bring about success.*

DOI: 10.4018/978-1-6684-6295-9.ch017

## **INTRODUCTION**

Making is one of the more recent initiatives espoused as a potential remedy for the persisting challenges of the United States of America (U.S) schools. Educators, researchers, and policy makers have initiated countless efforts to improve U.S. education and workforce development in Science Technology Engineering and Mathematics (STEM) (Cuban, 2018; Elmore, 2000). Increasingly, the maker movement has been implemented in U.S. schools to provide learning opportunities that spark student interest in STEM. As a teaching practice, *making* is a set of activities that uses high and low technologies to design, construct, test, and revise objects while integrating a range of disciplines (Bevan, 2017; Halverson & Sheridan, 2014; Peppler & Bender, 2013). Making has pressed educators to question entrenched beliefs and assumptions about the structure of activities, lessons, and classes, pushing them to embrace a more student and experience driven learning environment.

Found in both formal and informal education settings, makerspaces are the material representation of the Maker Movement. Makerspaces house the resources used to foster and support making. The Fabrication Laboratory (Fab Lab), from the Massachusetts Institute of Technology (MIT), is perhaps the most often cited example of a makerspace, particularly regarding the promotion of high end technology (e.g., 3D printers, laser cutters, etc.). Nonetheless, a makerspace can be any space where making is promoted.

Although making has become well accepted in U.S. education, the maker movement is not without critics. In the U.S, making is often depicted in its most narrow and branded version as mostly a pursuit of white, middle-class, male hobbyists with an abundance of technical knowhow, experience, and resources to create an array of artifacts (Barton, Tan, & Greenberg, 2017; Vossoughi, Hooper, & Escude, 2016). Critics have also cited a number of difficulties and challenges related to making: the considerable time it takes for educators to learn how to use the technology in the makerspace; how to connect making to the curriculum in a meaningful way; how to address constant battles with technology (e.g. troubleshooting) and students' misuses of technology; the transdisciplinary nature of making (e.g. some teachers may feel comfortable with some overlapping of crafting and computing, but others don't); and questions about how to assess making, especially for projects that are not finished within timeframes that work for the school or that fail altogether (Stevenson et al., 2019; Fields et al, 2017; Resnick & Rosenbaum, 2013).

On the one hand, many of these challenges are illustrations of how schools, steeped in traditional structures, procedures, and policies are often the antithesis of the energy and engagement of the maker movement. Making, with an uncommon popular appeal to different educational actors, such as students, parents, school teachers and leadership, policy makers, and researchers, may represent a unique opportunity to implement progressive changes at schools: more experiential, student-centered, real world connected approaches that were historically promoted by Rousseau (1961), Dewey (1902), Freinet (1993), Montessori (1912), Piaget (1964), and Vygotsky (1978) (Martinez & Stager, 2013). Thus, educators can learn much from research of a school district's extensive integration of making in its schools.

This chapter is organized as follows. First, the authors present the background on their theoretical framework for the study of the maker movement and how that relates to practice. Second, the school district and context of the study are described. Third, researchers describe the data collected, how it was analyzed and interpreted, and the limitations of the study. Fourth, the researchers present findings organized by the primary actors of the study: leadership, teachers, and students. Lastly, a discussion and conclusion are presented.

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