

Chapter 13

Teaching in a Makerspace: The Pedagogical Practices of Makerspace Instructors

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ABSTRACT

This chapter provides an in-depth study of the teaching practices of instructors who primarily guide and facilitate learning in a makerspace. With a close look at the pedagogical practices that govern teaching and learning in the maker classroom, this study presents instructors who modeled these frameworks. In addition to their own knowledge base and expertise, they were able to efficiently and effectively integrate multi-resources in a unique learning environment while helping learners succeed and adopt the maker mindset. Makerspaces are changing how we perceive learning and teaching. Instructors highlighted in this chapter put forth activities and learning goals that were learner centered and interesting to various learning needs. They designed and created a learning environment that safeguarded learners and allowed them to experiment with ideas and materials, creating different iterations of learning and redefining what success and failure means.

INTRODUCTION

The call for all educators to create learning environments that implement teaching strategies, which not only helps student master content, but also learn essential 21st century skills has been echoed by many (Partnership for 21st Century Learning (P21), 2019; Wagner, 2008; Washor & Mojkowski, 2013). Makerspaces are learning environments that proponents argue will help educators tackle such issues and hopefully reform education (Dougherty, 2013; Honey & Kanter 2013; Martinez & Stager 2013; Petrich, Wilkinson, & Bevan, 2013). Defined as spaces where individuals can freely make, tinker, innovate, and create, makerspaces have become a phenomenon (Dougherty, 2005). Makerspaces call for educators to foster the maker mindset among learners; the mindset that students can turn ideas into creative realities, and use the knowledge gained to be innovators (Honey & Kanter, 2013). A making and tinkering

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mindset, within these spaces, strives to help learners learn through making. As a rising trend, makerspaces are positively pushed in order to provide spaces that bring out and sustain the curiosity of young minds instead of stifling them by extrinsic goals and expectations as called for in many schools settings (Honey & Kanter, 2013). Makerspaces are designed to be supportive, challenging, and engage learners in meaningful activities, which in turn, rekindle their natural motivation to learn (Honey & Kanter, 2013).

Pure Instructionism is a pedagogy, which equips students with skill sets needed; however, with the evolution of learning spaces and technology integration, skills required of learners has changed. With Instructionism pedagogy, there exists two set of students: 1. Ones who succeed academically in areas they were told and who have been limited to explore and reach their full potential and 2. Those that struggle in specific academic areas. Those students may have given up due to a low self-esteem or due to others' opinions, which may hinder their ability to reach their full potential (Martinez & Stager, 2013). Making in the makerspaces strives to remedy this and provide opportunity for growth in one's full potential for all students. With the evolving technology, not only have opportunities for integration become imminent, making and tinkering has also become much easier.

Many studies have focused on the connection between learning and making in the makerspaces, but none have really delved into the teaching strategies within makerspaces that makes them so successful. The purpose of this qualitative case study was to examine the pedagogical practices of makerspace instructors in both formal and informal makerspaces.

A REVIEW OF LITERATURE

The Maker Movement

The maker movement is characterized with the idea that people are makers and creators rather than consumers and it has recently become a social, technological, and economic development (Brahms & Werner, 2013). The maker movement has given rise to makerspaces, tinkering studios, technical shops, and FabLabs which are generally spaces where making takes place. The way educators, students, and instructors view and see learning is being reinvented and transformed by the maker movement (Brahms & Werner, 2013). The evolution of new technology such as 3D printing, microcontrollers, laser engravings, robotics, physical computing, and fabrications has recently seen the movement rise in the digital setting allowing users and learners to innovate, create, and tinker (Petrich et al., 2013). According to Martinez and Stager (2013), the maker movement is "an active process of building, designing, and innovating with tools and materials to produce shareable artifacts...as a naturally rich and authentic learning trajectory" (p. 32). Additionally, makerspaces, inspired by the do it yourself (DIY) maker movement phenomena, have loosely been defined as "physical location where people gather to share resources and knowledge, work on projects, network, and build with technology" (Hackerspaces, 2015, para. 1). Makers generally take things apart, put things together in a new way, and find it intrinsically rewarding to do so (Kalil, 2013, p. 15). It is, therefore, a very hands-on, learn by doing movement.

Honey and Kanter (2013) observed that the maker movement has the potential to transform education and foster a "make mindset" among students (p. 5). The movement has the potential to promote creativity, problem solving, collaboration, and self-expression; skills that are vital to succeed in the 21st century environment (Kalil, 2013, p. 16). Makerspaces provide tools and space in a community environment--a library, community center, private organization, or campus (Honey & Kanter, 2013). Most makerspaces

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