

Abstract

The Cooper Union Summer STEM program has been an outreach experience to help high school students immerse in college level engineering design and experience. Each year, the six week program consisted of 120 hours of project-based learning, with sections grounded in different engineering challenges. Starting in 2015, Cooper Union started offering the “Makerspace” as a new section to address demand for modern technologies and skill sets, such as rapid prototyping, microcontroller projects, 3D printing, laser cutting, and computer aided design.

This paper presents a case study of the development of Makerspace sections offered in 2015-2018, in the context of inquiry, problem, and project based learning. Each year, varying degrees of inventorship, entrepreneurship, and Human Centered Design helped students acquire real-world engineering educational experiences. Teams of three to five students produced minimum viable products by identifying a problem statement, collecting user feedback and creating a working prototype. Students often learned on a case-by-case basis in order to meet the demands of their project. Makerspace concluded with a formal presentation to all other sections of the program and students took optional surveys to assess their skills and interest in engineering. The Makerspace teaching model was able to spur student learning of engineering skills, validated by student growth and confidence in manufacturing, electronics, entrepreneurship, and design skills. Recommendations were offered to continue building the Makerspace curriculum for future iterations.