imaginarium
DENVER PUBLIC SCHOOLS INNOVATION LAB

Community Innovator Impact Report

Project Name: Colorado Maker Hub
Design Challenge Winner, February 2016

Elise of Colorado Maker Hub (Formally Mobile Maker Space at the 2016 Design Challenge)

Executive Summary

Colorado Maker Hub was a Design Challenge winner in February 2016 and was awarded $10,000 to implement a project designed to bring a mobile maker station into educational settings to address the dissatisfaction with learning focused on 'teaching to the test' and shift toward more hands-on, curiosity-driven learning that utilizes 21st century tools. The project was led by Elise Van Dyne, who has spent several years organizing events in the maker industry and recognized a need among teachers and students alike to bring this type of learning to the classroom.

After completing site visits of existing makerspaces, surveying Imaginarium educators, and testing an initial prototype, Colorado Maker Hub developed a minimum viable product (MVP) of the mobile maker station, IdeaLabGo. This version mirrored the maker-experience found in permanent makerspaces while addressing the key learning from the prototype testing: 1) offering a full set of 'maker' resources, and 2) allowing teachers to bring the activities into their own space to integrate with the full (un-siloed) learning environment. The test site used grant funds to purchase the MVP IdeaLabGo and is currently bringing the mobile maker-experience to different schools and other educational events.

Although Colorado Maker Hub was able to verify the need for the mobile maker station as a solution and develop a working prototype, they also learned that the ideal solution required more than simply placing a mobile maker station in a school setting. The finding was that the solution was most effective when the IdeaLabGo was paired with hands-on training from Colorado Maker Hub and curated project materials to serve as guidelines for implementation. The team determined that they were unable to balance the time and resources required to scale the project any further. At the time of this report, Colorado Maker Hub was in the process of developing a DIY Maker Space resource to be shared, free of cost, with any school district interested in developing a mobile makerspace. The team was also exploring opportunities to secure funding that would provide mobile maker stations for up to10 DPS schools utilizing the DIY approach.

Background On the Innovator or School,

Partnership

As a producer of several maker fairs in Denver and Fort Collins, Elise was exposed to many educators and students who were excited about the potential to bring the maker space mentality into their classroom. After a year of hearing "My students would love to build that", "How can I get the tools?", and "How can we tie this into school curriculum?," Elise came up with the concept for the mobile maker station.

Project Journey

Opportunity Statement
How might we address the deep dissatisfaction with learning (and teaching) that focuses on 'teaching to the test' and drive towards hands-on, curiosity-driven learning that uses 21st century tools in the classroom.

Colorado Maker Hub saw the opportunity to create a solution that provided maker equipment that was accessible for classrooms, easy to use, integrated to meet school safety standards, and accompanied by a foundation of projects that linked to curriculum standards. The goal of the project was to develop a fully-functioning, marketable Maker Station to be deployed in DPS.

Design Stage:
The team visited a number of elementary, middle, and high schools with existing maker spaces to develop an understanding of what was working and what wasn't working with the space. Utilizing the feedback and learning from the site visits, the team developed an initial design for the IdeaGoLab mobile station that held a range of tools/equipment, was easily moveable, and included access to curated maker projects.

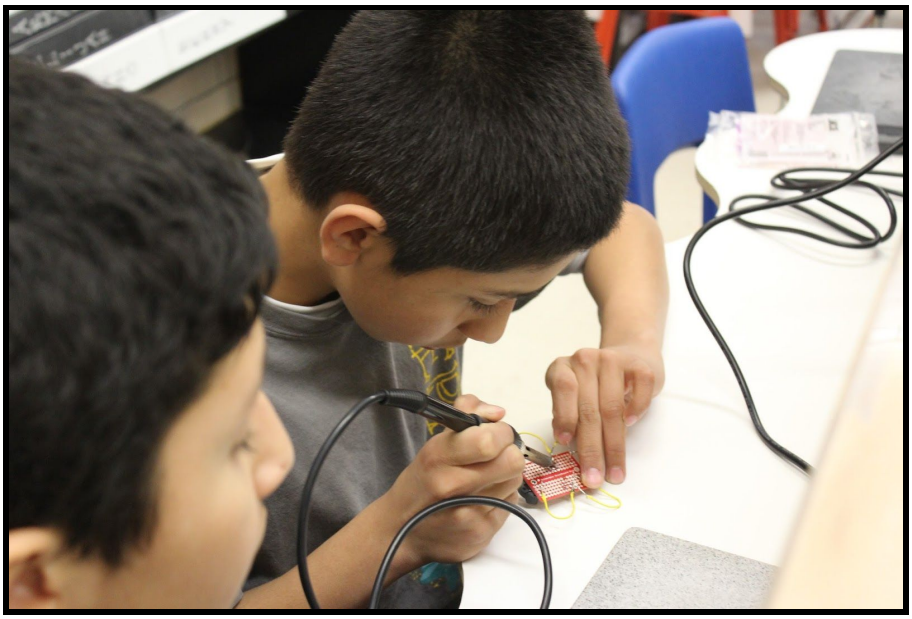
Prototype Build Out:
The team built out the initial prototype station, and tested and sourced existing equipment to curate a range of technology and other equipment needs (based on direct teacher requests pulled from grant proposals). The initial prototype also included standard makerspace tools.

Prototype Testing:
The team then took the IdeaGoLab Prototype to a number of maker faires, maker industry events, and a number of schools and other educational settings to get direct user feedback. The testing helped uncover an error in their design - that a 'box of technology' was not really a 'Maker Kit'. The team realized they needed to reassess the key elements and tools that needed to be incorporated into the next version.

The team then produced a second version of the Prototype, which incorporated the following equipment:

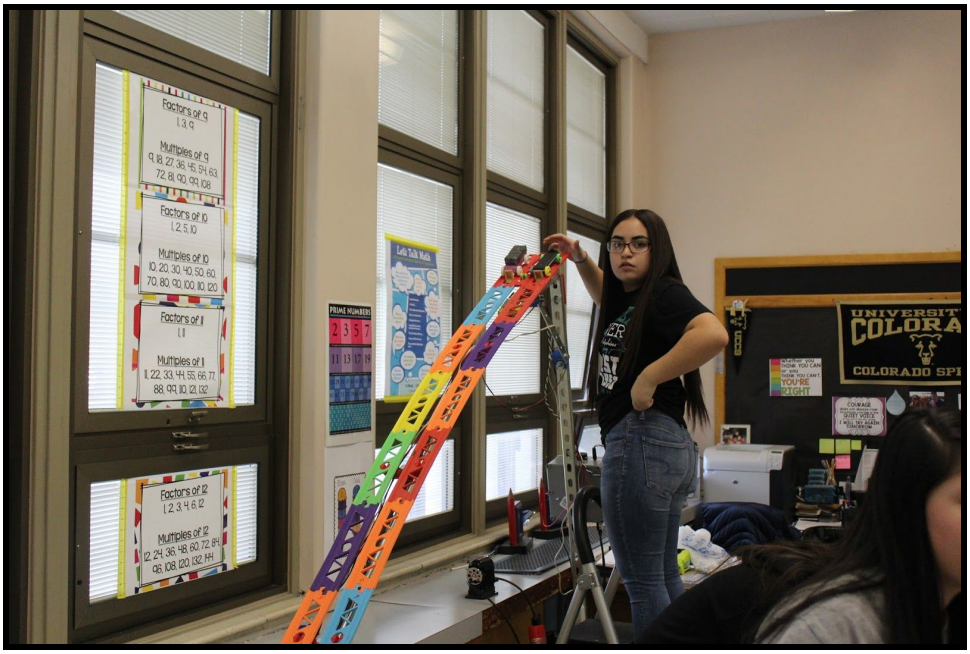
- Design software
- Electronics
- Soldering station
- 3D printing
- Cutting and engraving
- Hand tools
- Robotics
- Wood/metal working
- Sewing/textiles station

This 'Minimum Viable Product' was tested within the Loveland CreatorSpace and was shown to bring a much more valuable maker-experience to the classrooms.



A student uses the soldering station on IdeaLabGo.

Classmates at Kepner Middle School collaborating on maker projects while prototype testing IdeaLabGo.



A student demonstrates the results of her maker project at Kepner Middle School, the prototype testing site for Version 1 of IdeaLabGo.

Impact

Over the course of the partnership with the Imaginarium, Colorado Maker Hub user-tested an initial prototype of IdeaGoLab and integrated that feedback to get to a Version 2 Mobile Maker Station that was purchased by Loveland MakerSpace. This Minimum Viable Product of IdeaGoLab is currently being used to bring ongoing maker-experiences from classroom to classroom within the Thompson School District.

Overall, the project engaged over 500 teachers and students in direct project-based learning, and it is estimated that it engaged an additional 500 users through participation in other maker-industry fairs and events.

Although the Colorado Maker Hub realized they do not have the resources to achieve the initial vision for the project, they verified the demand for maker-experiences within public schools and have a plan to provide a playbook

for a DIY mobile makerspace that will be made available (for free) to any teacher, school, or district looking to integrate the maker-experience.

Success

- The IdeaLabGo was received enthusiastically at each of the test sites and teachers reported positive benefits in learning, creativity, and hands-on learning resilience - all key maker-skills targeted by Colorado Maker Hub.
- Developed a working version of the IdeaLabGo mobile maker station that is being used to provide maker-experiences for students on an ongoing basis.

Challenges and Failures

- Underestimated the amount of time and money it would take to operate at full scale.
- Lack of experience developing curriculum to accompany the product made it difficult to fully meet the needs of users (teachers need to have guidance on how to implement the maker station).
- Not having a solid curriculum partner was a major roadblock for the project.
- Relying on volunteer support made it difficult to get the team focused at one time and limited the capacity of the team.

Budget Breakdown

Prototyping materials (consumables)		$3,900.00
Equipment for Prototypes		$5,000.00
Design plans		$800.00
Design meeting supplies		$300.00
Totals		$10,000.00

Lessons Learned

- Mobility of the Makerspace is essential to fully integrating making into everyday learning, not just the first step:
    - Schools with makerspaces (non-mobile) are finding that teachers often take making materials back to their own classrooms, demonstrating a preference to do the work in their own space without added pressures of time, etc.
- Schools and teachers require a lot of professional training to effectively bring making into daily learning:
    - Testing demonstrated that IdeaLabGo cannot be effectively integrated without instructor support as teachers lack know-how of even maker basics.
- The concept of Making is a novel concept among educators and getting them to fully understand the value of IdeaLabGo takes significant marketing and education.
- There is a high demand for this type of project-based maker learning but not in the form that Colorado Maker Hub had anticipated:
    - Schools/teachers are eager to bring in the team to facilitate one-off lessons - "We had so many requests for the cart that we could be doing this every day of the week."
    - Schools have been less interested in committing to the IdeaLabGo without the curated projects and instructor support