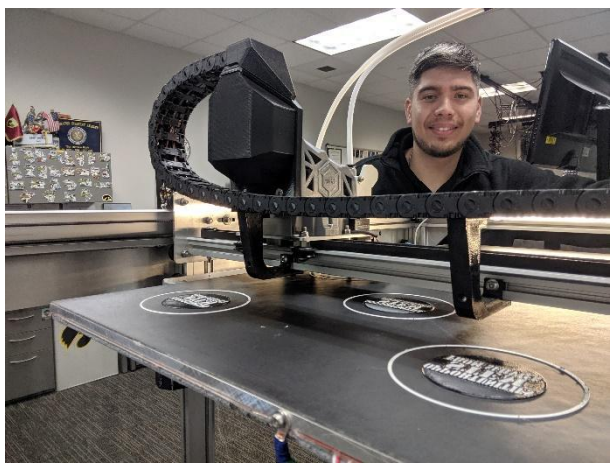
IOWA STEM TEACHER EXTERNSHIPS

CONNECTIfli CIA5S TO CAREER

Design a Product



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2019 Extern at Iowa National Guard

Part I: Overview of Workplace

Camp Dodge was established in 1909 as a training site for the Iowa Militia. It was named for Major General Grenville M. Dodge of Council Bluffs, Iowa's most famous Civil War commander.

Today Camp dodge serves as home and training facility for various operation branches of the Iowa Army National Guard and Air Guard divisions.

Part II: Workplace Focus

My externship for the Iowa National Guard included a few different components. I designed a coin to be 3-d printed finding a balance of cost and quality. This also involved a significant amount of trouble shooting with software, printer hardware, and design.

I also helped to develop some curriculum and S.T.E.M connections for their summer camp activities and simulations. Some of these connections included; frictional and heat exchange concepts involved in rappelling, reverse engineering activities/innovations with nerf guns, engineering concepts in rock climbing, and explaining the electrical and hydraulic systems that operate their training simulators.

The final part of my externship included a full week working with maintenance specialists for the army Blackhawk helicopters. These areas included NDI, sheet metal/fabrications, avionics, electronics, and mechanical systems.

I spent another 2 weeks working at the Sustainment Training Center. This center works to give soldiers the training to do their assigned MOS in a deployment simulated context. Some of these jobs include mechanics, electricians, hydraulics, and machinist specialists.

Part III: Introduce the Problem

The national guard is looking to contract a team of students to design a product. This product is to promote their S.T.E.M summer camp opportunity for students who are interested in joining the guard, problem solving, getting an education, and building their S.T.E.M career at the same time. Design and produce a product that will make use of the Iowa National Guard Logo and motto "Opportunity STEMS from service".

The guard will evaluate the product, the unit cost, the unit time for production, and the quality.

Part IV: Background

- Students will need to calculate unit production time, and cost of material. Products are to be no more than 50 cents/unit
- Students will need to create a system or method of replicating their product quickly.
- Students will need to have at least one finishing procedure to their product (sanding, staining, buffing, painting, or sealing).

Students could draw from a variety of knowledge will have to consider potential problems and solutions before beginning one of the following;

- Machining procedures to produce from steel or aluminum and use a plasma cutter or CNC mill to emboss.
- Machining procedures to produce out of wood and use a laser or CNC mill to emboss.
- Software and design skills to create a 3-d model for printing or CNC milling.
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Part V: Workplace Solution

I was given some idea about what they were looking for in design and I spent a day designing and trying different printing strategies to get the best quality, time and cost-efficient design possible. Once this was done (30 cents/unit), I was asked to try and give the coin some contrast using the Dual Extrusion feature. This presented many troubleshooting challenges with the physical printer, the print settings, and with the software/file types.

Due to us adding plastic for contrast color 2 it also required some redesigning and removal of material color 1 in order to keep the unit price the same. The final challenge was in finding the best way to configure the print settings and order of operation to save time and lower the production time for each unit and batch of units.

Part VI: Educational Pathways

Transferable skills

- Researching, analysis, time management, documentation, organization, perseverance.

Educational skills

- Design
- Computer proficiency
- Mechanical
- Modeling software proficiency
- Communication software proficiency
- Printer software proficiency