

Are You Up for the Challenge? A 3D Modeling Bootcamp for Early High School Students (Resource Exchange)

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Steven Miller

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Context:

Ninth grade student interns were challenged to submit a project for the university first-year engineering course, the introductory course for all engineering majors. Unlike the college freshmen who had an entire semester, these high school interns had one month to complete their projects. Actually, 4 Fridays!

Response:

STEM education faculty created a bootcamp of school day-sized sessions (15 hours total) to teach students modeling and prototyping. We selected appropriate software taking into consideration entry-to-use and conducted lab tours and mini-lectures about equipment and materials. We aligned training with the makerspace facilities of engineering so that students would have congruence between equipment options.

Goals

1. Introduce students to software modeling and 3D printing using appropriate software.
2. Teach lab safety that students can use in prototyping.
3. Support application of engineering design process to small batch manufacturing.

Schedule	Day A (5 hours)	Day B (5 hours)	Day C (5 hours)	Day D (5 hours)
9 930	Intros/Goals	Tinkercad Boolean Operations, Sweeping Operations	Student teams work on projects (remotely or in session)	Presentations of solutions
10 1030	Lab Safety Lab Tour	Challenge 1: Create school logo		How to plan a 3D print
11 1130	Concept Intro LUNCH	Challenge 2: Logo with personalization		Multipiece/tolerance practice project (A) Create a puzzle (B) Add a logo to a cup
12 1230	3D Demo Tinkercad Intro	Lunch		Design of challenge project
1 130	3D Printing Intro & Design	Revision of Logos		Revision of challenge project



Challenge: The design challenge was to design a product with two distinct functions that can be used while on vacation. Final prototype must be 25% 3D printed materials, have a budget of less than \$40, fit in a six-inch cube, be easily stored and transported, and safe.

Concepts covered:

- Multiview
- Scale
- Planes
- Boolean operations



Scan Me!

Materials Necessary:

1. Chromebooks
2. Corded mice
3. Tinkercad accounts
4. 3D printers
5. Filament

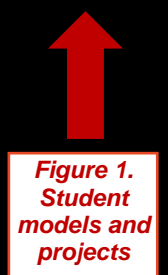


Figure 1.
Student models and projects