Fab Lab Design Brief
3D Printing for Beginners

Mr. Brandon Prentice
Intermediate Unit 1
K - 2nd Grade

Summary

This is an introductory lesson on all the basic principles needed to use a 3D printer. Follow step-by-step on how to create a small and time-efficient project to help introduce the concept to your class. This sample project simply introduces your class to the design software and process needed to create more unique structures of their own in the future. One consideration to this lesson though is 3D printing time for each student. Every student project can take anywhere between 5-40mins, depending on the size of the project. **Estimated Time: Four (1 hour) Days**

Standards

Standards for Technological Literacy:

1. STL2.K-2.E – People plan in order to get things done.
2. STL3.K-2.A – The study of technology uses many of the same ideas and skills as other subjects.
3. STL8.K-2.B - Design is a creative process.
4. STL9.K-2.B - Expressing ideas to others verbally and through sketches and models is an important part of the design process.
5. STL10.K-2.A - Asking questions and making observations helps a person to figure out how things work.
6. STL11.K-2.C - Investigate how things are made and how they can be improved.

Objectives

1) Students will understand the basic features of design software and how it can be easily used to their needs.
2) Students will apply the ability to manipulate geometry to produce a 3D model.
3) Students will create models that show relationships in STEM.

3D Printing for Beginners

Have your very own 3D printed object! By using the very simple tinkercad software from the website, you can have your own 3D project in minutes. Follow the instructions and handouts below and start tinkering today!

Days 1&2: Learning the Software

Before you start any 3D Print, it is important to learn how to set up your 3D drawing. Start by typing in www.tinkercad.com in your web browser.

You will begin by first signing in to an account already provided by the fab lab manager. Every student must then click "*Create Project*" on the left hand side. Once the project shows up, every student must click "*Add a Description*" to change their project title to their name.

***Once you're done with this part, you may move on to the project handout.**

Days 3&4: Saving Files for Ultimaker/Printing Time

*After the handout has been completed

Saving it as a .STL file

- Click "**Design**" on the top left side and then click "**Download for 3D Printing**"
- Click "**STL**"
- Ask the teacher or Fab Lab Manager to save it to a group Thumb Drive or SD Card.
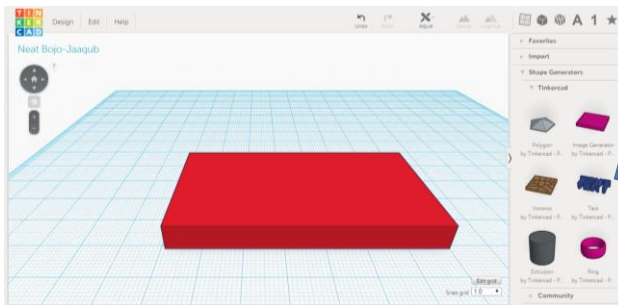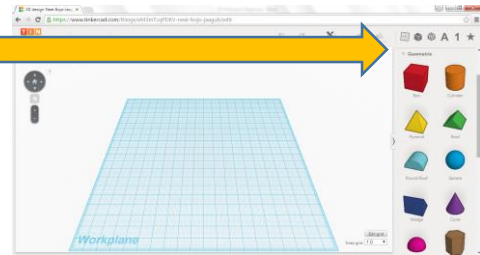
Everything else is done on Cura; the 3D printing software for the Ultimaker 2 Printer that reads .STL files. The Fab Lab Manager or trained teacher will then print out the files.
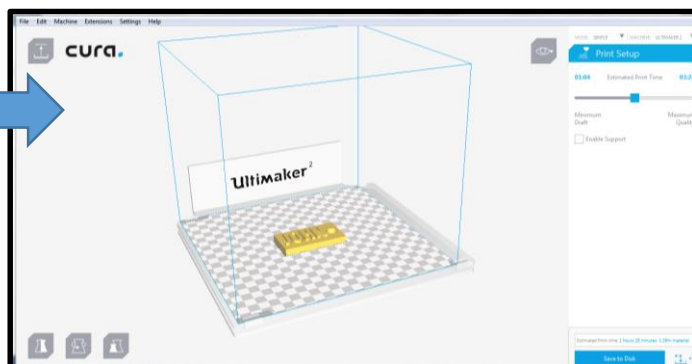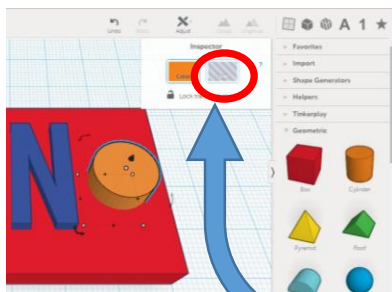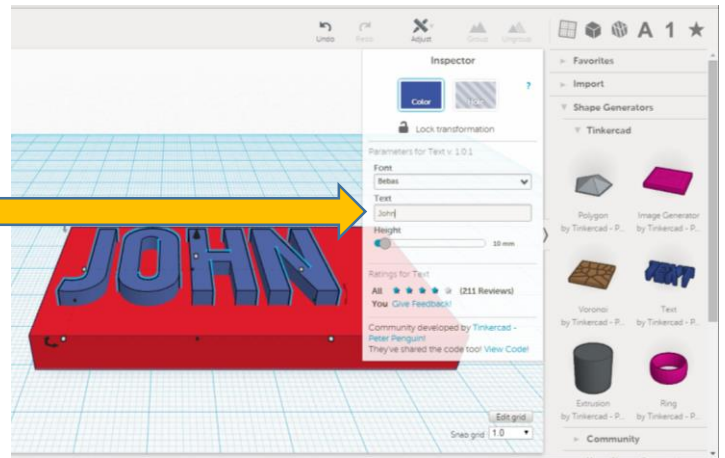
3D Printed Keychain

Ultimaker

1. Start by creating a basic "**Geometric**" shape.

2. Once you place your shape, change the size to whatever you like.

3. Add Text by clicking "**Shape Generators**" then "**Tinkercad**". You will then choose the "**TEXT**" symbol.

4. Place your text and then type your name or initials in the box shown here.

5. Next is making the hole that will connect the keychain to the ring. Go back to the "**Geometric**" section and create a "**Cylinder**" shape.

6. Make sure the Cylinder is small enough and is high enough to go through the keychain. Your last step is to click "**Hole**" after selecting and placing the cylinder shown here.

You're Done!!

3D Printed Object(s) Rubric

Name: _____ **Date:** _____

Students are to use the following rubric to target expectations and achievement to complete the 3D printed project(s).

Points	7-8	5-6	3-4	1-2	Score
Required Elements/ Participation	Time was used well to create multiple 3D project(s).	The student kept somewhat busy with at least one of the object(s).	The student was a little distracted throughout the lesson.	The student did not use his/her time well when making the project(s).	
Creativity	The student's 3D object(s) was designed very well.	The student's 3D object(s) was designed typical.	The student's 3D object(s) was designed below average.	The student's 3D object(s) was designed very poorly.	
3D Appearance	The appearance of the 3D project(s) is exceptionally attractive	The 3D object(s) are mostly attractive and neat.	The 3D object(s) are not well thought out or organized.	The appearance of the 3D object(s) are messy and unpractical.	

Total Score: **/24**