Fab Lab Design Brief

LED Night Light

Mr. Brandon Prentice
Intermediate Unit 1
3rd - 5th Grade

Summary

This lesson is all about showing students at the intermediate level how to create their very own unique night light. They will be shown how to use basic software features to etch and cut out either glass or clear acrylic. The wooden bases themselves can either be cut out with the laser or from a CNC milling machine depending on which is more available. During the final steps of assembly is when students can also form an understanding of +&- wiring when it comes to connecting the LED strip to the 9V battery. **Estimated Time: Four (1 hour) Days**

Standards

Standards for Technological Literacy:

1. STL8.3-5.D - Requirements for a design include such factors as the desired elements and features of a product or system or the limits that are placed on the design.
2. STL9.3-5.D - When designing an object, it is important to be creative and consider all ideas.
3. STL12.3-5.D - Follow step-by-step directions to assemble a product.
4. STL12.3-5.E - Select and safely use tools, products, and systems for specific tasks.

State Academic Standards for Science, Technology and Engineering Education:

1. PA.3.4.5.C2 - Describe how design, as a dynamic process of steps, can be performed in different sequences and repeated.
2. PA.3.4.5.D3 - Determine if the human use of a product or system creates positive or negative results.
3. PA.3.4.5.E3 - Explain how tools, machines, products, and systems use energy in order to do work.
4. PA.3.4.5.E4 - Describe how the use of symbols, measurements, and drawings promotes clear communication by providing a common language to express ideas.

Objectives

1) Students will understand the different features of design software and how it can be easily used to their needs.
2) Students will apply the ability to and manipulate geometry to produce a 3D model.
3) Students will analyze the different material and software setup features to carry out tasks.

Chevron Human Energy | FABLAB THE INTERMEDIATE UNIT 1 | The Intermediate Unit 1

Name: _____ **Date:** _____

LED Night Light Project

Create your own unique night light! Whether you cut out shapes or burn a image/text onto glass, you can make whatever kind of LED light you want. Just follow these easy step-by-step instructions below.

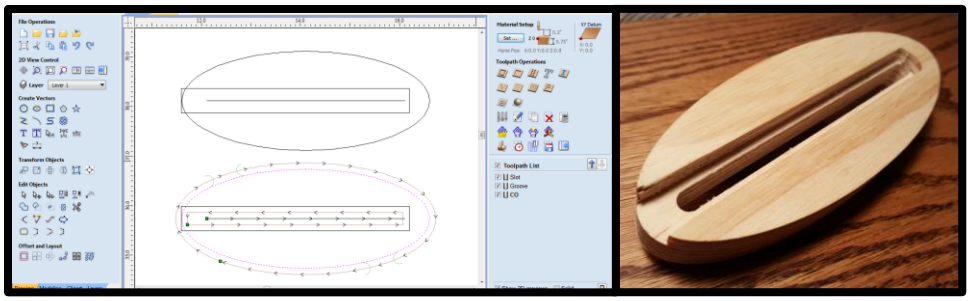
Day 1: Create a Wooden Base

If a wooden base is not already provided, use the sizes below to draw out the basic shapes on Vcarve Pro to then cut out using our CNC Shopbot.

Circle: 5” x 2”

Slot: 4” Line Legnth

Groove: 4.6” x 1/2”



Days 2&3: Design and Etch a Laser Raster/Vector for the Glass

This is the true creative portion of the project. Use everything that you want to learn about Adobe Illustrator’s basic graphic/text features from your teacher or fab lab manager on making your glass really exciting and eye-popping! You are able to simply copy and paste images online for your design.

Day 4: LED Light Strip/Putting It All Together

LED Strip: Once you cut the right size light strip you need for your night light, attach it to the connector wire. *Make sure after when you connect the plug-in to the other end, that the + and – symbols match each other*. **DO NOT** remove the backing of the LED to expose adhesive.

Assembly: Using a soldering iron, solder the positive and negative wires to the +/- of the LED strip. Make sure to test the LEDs with a 9V battery to make sure it's properly connected. Lastly, you will need to hot glue the LED strip inside the wooden mount, properly securing it from falling out.

Resources:

12V Flexible LED Strip Lights

8mm 2pin DC Connector Wire Cable

9V Battery Connectors

1/4" x 12" x 24" Glass or Clear Acrylic (18-24 per sheet)

3/4" x 4' x 8' PDF or Plywood (200+ per sheet)

LED Night Light Rubric

Name: _____ Date: _____

Students are to use the following rubric to target expectations and achievement to complete the LED night light project.

Points	7 - 8	5 - 6	3 - 4	1 - 2	Score
Required Elements	The night light stand has all the features that were required.	Most of the required features are included for the night light.	The night light was missing a few features.	More than half of the required features are missing.	
Creativity	The student's night light was designed very well.	The student's design was designed typical.	The student's night light was designed below average.	The student's night light was designed very poorly.	
Appearance	The appearance of the night light is exceptionally attractive	The designs are mostly attractive and neat.	The designs are not well thought out or organized.	The appearance of the designs are messy and unpractical.	
Construction	Construction is very symmetrical and square. Everything lines up.	Construction is solid and mostly square. Most components line up.	Not very solid. Out of square in places. Parts don't line up.	Construction is poor. Nothing lines up or is square. Joints are not solid.	
LED Hook-Up	The LED lightstrip is properly installed and connected well.	Some of the LEDs shows interference when shining through glass	The LED was not Installed well or properly.	The LED was installed poorly and barely shines through glass.	

Total Score: /40