

# 3Doodler<sup>®</sup> EDU

## Design Challenge

### Is It Art? Is It Engineering?

#### Facilitator's Guide

#### 🚩 The Challenge

Using the 3Doodler and plastic strands, explore how to distinguish where the line between art and engineering blurs.

#### 👁️ Overview

⌚ **Total Time: 100 minutes (2 Class Periods) + Homework Assignment**

This Challenge asks participants to explore art and engineering and try to distinguish where they cross. Fabricated objects such as game pieces, eye glasses or utensils can be used as examples of artistic expression that are also engineered (i.e. functional).

## ⌘ Challenge Background

### 💡 Take It Further

Look at the differences between handmade and machine-made by investigating objects fabricated via 3D printing and then replicated free-hand using the 3Doodler pen. How was the process different? Did one feel more like engineering or art over the other? How is the 3Doodler an introduction to 3D printing?



Fig. 1



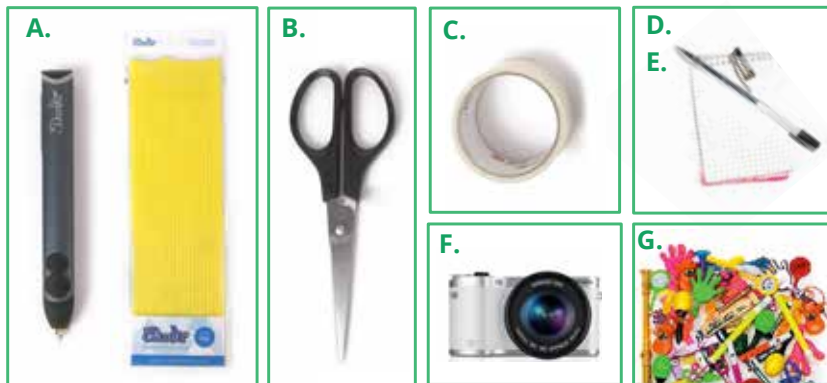
Fig. 2

Technomad Steven K. Roberts once said, "Art without engineering is dreaming. Engineering without art is calculating." Roberts is famous for spending eight years peddling 17,000 miles across the United States on a computerized and networked bicycle. The American artist Alexander Calder stated, "To an engineer, good enough means perfect. With an artist, there's no such thing as perfect." Calder was known for making the first three-dimensional line drawings using wire to make mobiles. Where is the art vs. engineering line drawn for you?

## ✂ Materials & Tools

### 🕒 Before You Start Doodling

We recommend using a DoodlePad or clear tape placed over paper as a foundation to keep your Doodles in place and so that you can peel them off with ease.



- A.** 3Doodler Pens and Plastic Strands of various colors (one per student, or have students work in pairs or small groups)
- B.** Tools (from your 3Doodler box) plus needle-nose pliers or scissors for snipping plastic ends
- C.** Clear plastic tape or DoodlePad for Doodling foundation
- D.** Paper for Doodling foundation and extra sketching/note-taking space
- E.** Drawing utensils (markers, pens or pencils)
- F.** Camera or video recording device to document the Challenge and results
- G.** A wide variety of objects with moving and non-moving parts (enough for groups/students to have one of each)

## 📋 Challenge Organization

### 📷 Challenge Documentation

Take photos & videos of your process using a camera. Document what to do and what not to do. Share your experience with the online community using #3DoodlerEDU!

Challenges are organized into 50-minute periods so they can fit into a traditional classroom structure, or be combined into a single workshop with breaks in between activities. This Challenge is designed to have participants work in short sprints to quickly explore the concepts.

## 🖥️ Class 1: Investigate, Design & Build

🕒 Total Time: 50 min.

### 🔍 Investigate (🕒 10 min.)

#### ✂️ Remember to Snip Those Ends

We recommend pliers or scissors for snipping plastic ends. Make sure to keep your plastic ends clean to prevent clogs and jams. Snip plastic after removing it from the 3Doodler pen to make sure it's clean for the next time.

**Step 1:** Write down answers to the following questions post on a board to discuss with the group:

- What makes something art?
- What makes something engineering?
- Do you see art and engineering as separate or compatible? Why?
- Would you rather be an artist or an engineer? Why?

**Step 2:** Discuss your opinions and thoughts as a group.

### ✍️ Design (🕒 15 min.)



Fig. 3



Fig. 4

**Step 1:** Look over two small three-dimensional objects. Object A should be a solid object like a chess piece or a utensil (Fig. 3). Object B should be an object with moving parts like a pair of glasses or a tape dispenser (Fig. 4).

**Step 2:** Review and identify Object A's lines, planes, shapes and mass.

**Step 3:** Draw a plan that breaks Object A down into a few manageable pieces, which you will build with the 3Doodler pen and plastic in the next step.

### 🔧 Build (🕒 25 min.)

Using 3Doodler pens and plastic strands, craft a 3Doodled drawing version of Object A.

#### 📝 Facilitator's Notes

*In Class 1, guide participants through a series of questions about the lines between art and engineering. We included a set of questions that participants can answer on sticky notes and post on the wall. Facilitate a conversation about the participants' personal feelings towards engineering and art. Have students bring in objects from their daily life, or collect items from around the room.*

#### 📝 Facilitator's Notes

*Two images have been provided as example but feel free to have participants select objects that they would like to study.*

## 📄 Homework (⌚ 50 min.)

**💡 Take It Further**  
Share your own designs with our community. To see more stencils and upload your own, visit [the3Doodler.com/projects/](http://the3Doodler.com/projects/)



Fig. 5



Fig. 6



Fig. 7

**Step 1:** Make a stencil that breaks Object B down into a few manageable pieces that you will make with the 3Doodler pen and plastic strands during Class 2.

**Step 2:** Decide how you will make this object artistic by adding or subtracting new features, changing or combining colors and shapes, or adding your own name or custom logo.

The images above use a pair of glasses as an example, showing the final manufactured item (Fig. 5) along with a stencil of the individual parts (Fig. 6) and a 3Doodled version (Fig. 7) created using a similar stencil.

### 📝 Facilitator's Notes

*At home, when they have more time, have participants review and identify Object B's lines, planes, shapes and mass and create a diagram of these features and moving parts. This could also be done as a separate full Class if preferred.*

## 🖥️ Class 2: Build, Present & Discuss

⌚ Total Time: 50 min.

### 🔧 Build (⌚ 25 min.)

With your 3Doodler pen and plastic strands, create a 3Doodled drawing version of Object B using the stencil you designed. Don't forget to add features that turn your object into something artistic.

### 🗣️ Present & Discuss (⌚ 25 min.)

Present the original and Doodled versions of Object A and Object B.

Explore the following questions:

- How did you think differently when you were drafting a simple object as compared to a complex object?
- Which feels more like art: the original object or your recreated objects using the 3Doodler?
- What could make your piece feel more like art or more like engineering?

### 📝 Facilitator's Notes

*In Class 2, participants will apply artistic principles and elements to their Doodled version of Object B. Participants can explore specific movements in art such as surrealism, modernism, deconstructionism, etc., or a historical period or current event as ways of incorporating artistic components. Participants will also present and discuss their challenges to the group, reflecting on their experience using the 3Doodler with the questions provided. Feel free to add your own questions to the Present & Discuss section.*

## 🔗 More information:

For further information about the Steven K. Roberts, visit:

- <http://teknomadics.com/2011/10/the-original-technomad/>

For further information about Alexander Calder, visit:

- <http://www.calder.org/>

## 🖼 Images:

Cover Page: <https://goo.gl/cieZyG>

Fig. 1: <http://teknomadics.com/wp-content/uploads/2011/10/Winnebiko-2.jpg>

Fig. 2: <https://goo.gl/WsiD9r>

Fig. 3: <http://goo.gl/PfTJ3F>

Fig. 4: <https://goo.gl/YcWH8N>

Fig. 5: <https://static.pexels.com/photos/39716/pexels-photo-39716.jpeg>

Fig. 6: <http://the3doodler.com/stencils/hipster-glasses/>

Fig. 7: 3Doodler Photo