Shodler EDU Design Challenge

3D High-Tech Fabrics Participant's Guide

Using the 3Doodler, plastic strands, a material of your choice and conductive thread and LEDs, create a new fabric that solves a high-tech problem under water, in space or in extreme cold or heat.

3Doodler EDU

ake It Further

Use the sample textiles created in this Design Challenge as a starting point or proof of concept for a bigger product desig project.

Fig.1

Exterior drawn Exterior provide Dool to Benchmark Interior with the Benchmark Benchmar



What is fabric? We mostly think of fabric as the cloth that makes up our jeans and t-shirts. But fabric can be very high tech. Fabric can be made to repel water, like Gore-Tex, to stop bullets, like Kevlar, or used in cell and tissue repair, like nanofibers. Fabrics can be woven, knitted, felted or melted into sheets. New trends in e-textiles incorporate electronic components, LEDs or even remote signaling into clothing, backpacks and location devices.

① 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.

& Materials & Tools



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. Wide variety of fabric scraps
- H. Plastic bags, aluminum foil or felt
- I. Yarn or string and various size sewing needles
- J. Conductive thread, tape or marker, LEDs and watch batteries.

🖉 Notes

✤ 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.

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.

■ Challenge Organization

Class 1: Investigate & Imagine

Q Investigate ([®] 25 min.)

Step 1: In teams of two, investigate the qualities of different types of fabrics.

Consider the following questions:

- How does the fabric's construction influence how it is used?
- Which fabrics are stretchy and which are stable?
- Are the fabrics translucent or opaque?
- · Does the fabric come in different thicknesses?

Step 2: Choose an extreme environment such as underwater, outerspace, extreme cold or heat, or any other extreme environment and research how different fabrics have been constructed and used in those environments.

© Imagine (⊙25 min.)

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! Step 1: With your knowledge of fabrics and your extreme environment, think of ways your fabric would be useful in that particular environment:

• What are all of the things that could go wrong in your extreme environment?

How could a new fabric supply the solution?

Step 2: Working as a team, draw out 10 quick ideas that can help you communicate or solve the problem your team will explore.

Step 3: Play with the 3Doodler and see how you would use the plastic strands to make your fabric ideas work.

🖉 Notes

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☉ Total Time: 50 min.

ut Build (☉ 50 min.)

Step 1: Decide which problem your team will solve from the fabric ideas developed during the Imagine phase.

Step 2: Working with the 3Doodler and plastic strands, as well as plastic bags or aluminum foil, conductive thread and LEDs, experiment with creating your fabric.

As you make your fabric, consider these questions:

- What kind of structure will it take?
- How will it integrate other technology?
- How will it be attached to other materials?

🖵 Class 3: Test, Present & Reflect

③ Total Time: 50 min.

I Test (⊙ 30 min.)

Step 1: Now it's time to test out your fabric for strength, flexibility and resilience.

Step 2: Make last minute improvements to your fabric based on the results of Step 1.

Step 3: Discuss how your team will present the fabric. Write up a quick summary of your research and testing methods.

& Present & Reflect (⊙20 min.)

Step 1: Present your fabric and your test findings to the whole group.

Step 2: Discuss what worked, design obstacles you faced, and how your team would improve the fabric for a future version. Provide feedback using the "I Like, I Wonder, I Wish" model. Don't forget to record video and take pictures of your final product.

🖉 Notes



Over More Information:

For further information and inspiration about the high-tech fabrics, visit:

- http://goo.gl/ls4Ssm
- http://goo.gl/XQ0mdJ

() Images:

Cover Page: https://goo.gl/E6DEJZ Fig.1: https://upload.wikimedia.org/wikipedia/commons/9/94/Goretex_schemaen.png Fig. 2: https://pixabay.com/static/uploads/photo/2015/03/11/15/19/divers-668777_960_720.jpg