Fabrication Shops and Makerspaces

On Wednesday, April 29, 2020, 33 members of the UMN teaching community convened to discuss how to best translate hands-on experiences from fabrication shops and makerspaces into virtual learning. Ideas and effective practices generated during that discussion are documented here. Contact cei@umn.edu to suggest an addition to this resource.

Session Recording

- YouTube video of the session

Resources

- Shared Google folder

Facilitators and panelists:

- Molly Sanford, Fabrication Director, College of Design, Twin Cities
- Lindsey Strange, Apparel Design, College of Design, Twin Cities
- Tom Oliphant, Furniture Design, College of Design, Twin Cities

To continue connecting with colleagues systemwide, join FLASH (Fabrication Leaders And Shop Heads) even if you aren't a shop head. Email Molly Sanford (mws@umn.edu) to be added to the email list.

Core principles for virtual fabrication and making

- **Equity and access -** Recognize and address the fact that fabrication without access to campus-based shops, tools, and spaces exacerbates inequalities among learners. Survey your students about their access to resources needed to meet course goals. Provide reassurance, resources and equivalent learning options for all students.
- **Flexibility and student agency in assignments** - Mitigate resource inequities by providing flexible options (i.e., simple to advanced tech, varied ways to meet assignment objectives). Having students choose or propose what and how their project will meet course learning objectives can promote self-efficacy and creativity.
- **Embrace the messiness** - Work against the tendency for perfection by modeling and being explicit about how failures and scrappy creations are part of design and making, especially under current circumstances.

Supporting students

Address equity and access by finding out what students have and connecting them with what they need

Be aware that students learning at home are relying on their own resources and availability of work spaces which vary greatly. By surveying all students about this before the course begins and designing your course and assignments with this reality in mind, you can reassure all learners that you've got their back and have designed the course flexibly so that all students can meet the learning goals with the resources available to them.

- **Have a syllabus statement** about the ways you have designed the course to support student success and address access to resources.
- **Survey students** prior to the first day of the course about their access to materials and usable work spaces.
    - Include a preamble that reassures students about your intent to use the information to provide support, flexibility, and where possible, to lend tools and equipment (survey example).
- **Connect students with loaner equipment**
    - Tap faculty, staff, and alumni networks and U-CAN, the University of Minnesota COVID Action Network, to find and distribute tools and equipment donations to lend to students in your courses.

Building community among learners

- Use class start time to **warm up** and welcome students.
- Use **humorous polls** for engagement and loosening students up.
- Learn your students' **pets' names** by recording them in the attendance book.
- Model that **messiness is OK**, for example when kids or pets interrupt class or videos.
- Set up **drop-in times** like Annie Henley's "Mending Monday" for an opportunity to chat casually and sew together.
- **Reach out to students** since they no longer drop in to Fabrication Shops.

Doing live demos of fabrication & making

- **Set up an overhead camera** using a phone or inexpensive web camera and log in to Zoom with it.
    - At 40:00 in the discussion recording, Annie Henly demonstrates a phone set up.
    - Phil Rader demonstrates drawing using an overhead webcam set up | Wyze camera (an inexpensive video sharing solution)
    - Dr. Viktor Grigoryan's YouTube demo of how to use a gooseneck holder and smartphone as a document camera (Dr.

Ways for students to fabricate from home

- Gather material and tools donations from alumni, faculty, staff, and the community and distribute to students.
- Use fees to provide pre-cut kits that we mail out to students or arrange for socially-distanced pick up.
- For 3D printing, use a "job shop" approach where a staff member is there to make the files that students send, and ships the finished object back out or arranges for curb-side pick up.

Adaptations for moving first-year apparel design online

In Lindsey Strange's apparel design course, students design a prototype of a garment using principles they have learned. In March 2020, the course moved to remote instruction prior to students beginning their final projects. Lindsey's adaptations under these conditions can be used by instructors approaching online instruction with more time to plan.

Take stock of students' resources & remaining assignments

- Lindsey's **survey of students** found limited access to equipment & tools.
    - Two-thirds of class had a sewing machine at home.
- For the **remaining assignments**, there was a core deliverable that students could accomplish in a flexible way:
    - Use a cardboard prototype to create a finished garment.

Provide supports for learning

- Lindsey **posted links** to resources (i.e., tutorials, books, and blogs.)
- In **response to student questions**, she made short demo videos for her class and posted them to Canvas. For example, she showed how a garment from her closet was put together.
- She required students to **participate in a Canvas discussion board** where they posted on a variety of course-related topics.
- She set up **individual meetings** with each student which kept them engaged and on track.

Assignment to reverse engineer a garment found at their home

- Students selected a sleeve and made all the components of the pattern, applying accurate technical concepts.
    - **Garment dissection analysis -** Students diagrammed garment details using both hand sketching and computer sketching. They documented their research and process (though some forgot to stop and take pictures of each step of their process.

- **Mini garment adaptation** - Students lacking sufficient fabric could complete the project in miniature.
- Slideshow with assignments and an example of student sleeve pattern project

Adaptations for moving upper-level furniture design online

In Tom Oliphant's furniture design course, students produce a prototype or proof of concept using skills gained in earlier courses. One of the key adaptations in Tom's course was a reframing around the concept of resourcefulness.

Resourcefulness as core trait of every design practice

- With inspiration from a student who was a retired Air Force veteran specializing in survival skills, Tom reframed the furniture design course around resourcefulness as a way to combat the desire for perfection in the design process.

Resources

- Project inspiration from makezine.com, "19 projects to do outdoors while you need the distraction" (Caleb Kraft)
- Tutorial Origami + Projection Mapping (Joaniele Mercier)
- Women's Woodshop
  - Spoon carving workshop where attendees were provided with straight and hook knives and very clear instructions