Teaching Design and Innovation Online

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idea to impact

Here we share tips for transitioning your in-person design and innovation class to a virtualized format, from fostering teamwork to designing hands-on activities (at home). Don't forget to check page two for the best tools to use to foster an empathetic, collaborative environment for your students.

Collaboration, Team Work & Hands-On Activities

Ideas for Fostering Collaboration & Teamwork

- Assign students groups and buddy systems
- Smaller breakouts are a great way to get to know students, and for the students to get to know each other; informally drop in and out of breakouts in Zoom.
- Host multiple small breakout groups to have students work through a complex problem.
- Host small group discussions with design teams at a time that works for the team.
- Wiki pages to host student work, so all students can benefit from seeing each other's work.
- Ship materials to students so they can build out parts. Students can then ship that part to the next person on the team, or their sponsor, to continue building it.
- When writing proposals and design briefs, all stakeholders can be on a phone call, generating ideas and working in a document as a group.
- Create breakouts for collaboration on research, critiques, concept development, and prototyping. To boost team cohesiveness, groups should participate in group phone conversations. Helpful collaboration tools include Mural digital workspace and Wiki groups.
- To replace fabrication time, set up an instruction period where students can create together for three hours (with cameras trained on their hands) while chatting and listening to music. Encourage questions and informal discussion!
- Two key components predict whether a team will be successful: empathy (with teammates) and accountability (what am I working on/what is my job?) Encourage students to share good news, bad news, and/or something they're looking forward to. Ask students to give you a weekly account of what they've done, how many hours they spent on it, and what the next steps are.
- Graduate student feedback indicates that meeting synchronously for 45 mins is enough—students just need to check in with instructors and get help, if necessary.

Ideas for Supporting Hands-on Activities and Making

- Partner with Teknikio https://www.teknikio.com/ to customize and mail out kits of materials. Supplies can be curated and projects framed around those supplies.
- Focus on video storytelling and storyboarding: "At the end of the day, this is what design is. The models and prototypes we create are all about communicating and telling a stories about how things work and how people interact with them."
- Rethink empathy and customer discovery. One approach: Send a list of materials and assemble instructions to all users, then walk through the paper prototyping.
- Provide asynchronous video feedback on project presentations, asking for iteration.

Tools for Teaching Design and Innovation Online

Design & Fabrication Tools

- **Algodoo** (physical simulations) http://www.algodoo.com/
- **CREO** (product design & development) https://www.ptc.com/en/academic-program/academic-products/free-software
- **Tinkercad** (virtualizing arduino connections; good for students of all ages) https://www.tinkercad.com/
- **Fusion 360** (cloud-based 3D CAD/CAM software) https://www.autodesk.com/products/fusion-360/students-teachers-educators
- **Solidworks/SOLIDWORKS 3D Designer** (design and engineering analysis suite) https://www.solidworks.com/solution/job-functions/educators
- **Onshape** (The Google Drive of CAD, where people can collaborate remotely in cloud-based format; teams can edit the same file at the same time) https://www.onshape.com/education-plan
- **Yed** (quickly and effectively generate high-quality diagrams) https://www.yworks.com/products/yed
- **GitHub** (development platform for hosting/reviewing code, managing projects, and building software) https://github.com/
- **Canva** (free design tool for creating social graphics, presentations, posters) https://www.canva.com/education/
- **Shapeways (**3D printing on-demand) https://www.shapeways.com/
- **Teknikio** (Customized kits for making) https://www.teknikio.com/
- **SendCutSend** (lasercut and delivered parts) https://sendcutsend.com/
- **Crello** (free design tool to create animations and graphics for social and web) https://crello.com/

Collaboration & Productivity Tools

- **Zoom** (video communication) https://zoom.us/
- **Blue Jeans** (video conferencing) https://www.bluejeans.com/
- **Collaborate Ultra** (Real-time video conferencing tool for sharing files, applications, and virtual whiteboard) https://help.blackboard.com/Collaborate/Ultra
- **WebEx** (host—and embed in your LMS—live lectures, class discussions, file sharing, office hours) https://www.webex.com/industries/education.html
- **Screencast-o-matic** (create, edit and share screencast videos) https://screencast-o-matic.com/
- **Google Suite** (tools for student collaboration) https://edu.google.com/products/gsuite-for-education
- **Milanote** (digital bulletin-boarding) https://milanote.com/
- **Miro** (group brainstorming/whiteboarding) https://miro.com/
- **Google Jamboard** (group brainstorming) https://edu.google.com/products/jamboard
- **Mural** (group brainstorming and critiques) https://mural.co/
- **Slido** (real-time participation during lectures) https://www.sli.do/
- **Loop Back** (channel any sound from any app to any other app) https://rogueamoeba.com/loopback
- **Discord** (voice, video and text communication platform) https://discord.com/
- **Microsoft Teams** (communication and collaboration platform with chat, video meetings, file storage, and application integration) https://www.microsoft.com/en-us/education/products/teams/default.aspx
- **Slack** (team collaboration platform) https://slack.com/
- **GroupMe** (mobile phone messaging app) https://groupme.com/en-US/
- **WhatsApp** (cross-platform messaging and voice-over-IP service) https://www.whatsapp.com/
- **GroupMap** (collaborative decision making tool) https://www.groupmap.com/
- **Lynda.com** (teach students how to use tools) https://www.lynda.com/