12. Critical Making

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Definition and Background

Critical making is a practice that unites critical thinking and hands-on experiments to encourage learning by doing. Drawing from constructionist approaches to project-based learning, critical making explores the relationships between technologies, art, design, and social issues by making things. According to Matt Ratto (2011), critical making aims "to use material forms of engagement with technologies to supplement and extend critical reflection and, in doing so, to reconnect our lived experiences with technologies to social and conceptual critique" (n.p.).

Critical making unites two sometimes disconnected modes of inquiry—critical thinking and material production. Often, critical thinking describes abstract, internal, linguistically based modes of analysis. In contrast, making generally refers to goal-driven, embodied, material production that focuses on creating a working *prototype*. However, designers critically engage with ideas, and thinkers use material experimentation to work out concepts. Critical making acknowledges an intertwined process that links object-making to academic scholarship and theory-based practices. In making prototypes, iterating on designs, and experimenting with technologies, makers often learn more about the theories, concepts, and innovative possibilities of technical and professional communication. Originally a pedagogical practice, critical making has been adapted as a research program, method of inquiry, and a methodology that continues to shape emerging research practices.

Although the term *critical making* gained popularity in 2009 (Ratto, 2011), the DNA of the critical making process is woven throughout the history of design thinking and technical communication. As mentioned in the introduction of this collection, the mid-twentieth-century origins of design as a science emerged in response to growing social and environmental needs (Fuller, 2019). However, designers often encountered "wicked problems" that resisted clear definitions or formulaic solutions (Rittel & Webber, 1973, p. 160). Design as a discipline shifted towards a more user-centered approach that works out problems by making things—bringing together doing and thinking in the iterative design thinking process.

Similarly, technical communicators have always been "reflective problem-solvers"—working with multiple tools, technologies, cultures, and materials to "identify and solve corporate problems" while also developing innovative solutions to both corporate and social issues (Johnson-Eilola & Selber, 2013, p. 3; Hailey et al., 2010, p. 139). Technical and professional communication (TPC) emphasizes user-centered design thinking that challenges a "one-size fits all" approach. Like

critical making, TPC promotes design as a process that changes to address diverse social, ethical, material, and environmental situations.

Design thinking, TPC, and critical making each focus on complex problem-solving, social awareness, and an iterative process of doing and thinking. However, critical making places more emphasis on process, shifting the focus from problem-solving or completing deliverables to the learning process that occurs as participants engage new socio-technical literacies. Rather than a specific design format or method, critical making highlights what you can learn from the practice of design.

▋ Design Application

With regard to technical communication, critical making is similar to what Liza Potts (2015) describes as "experience architecture," an "emerging practice that draws together issues of information design, information architecture, interaction design, and *usability* studies to assess and build products, services, and processes" (p. 256, emphasis added). However, instead of focusing on end products or deliverables, critical making emphasizes the making process. Critical making does not always begin with a set research question or end with a textual report. Instead, making practices often challenge usability and work with *failure* as a part of the research process. Critical making emphasizes the embodied acts of making as key to *iterative* design, where participants can explore how changes to design, methods, and materials not only solve problems, but also invite questions like "What happens if . . . ?"

Similar to practices of critical/speculative design (Dunne & Raby, 2013) or *participatory design*, the hands-on practice of critical making usurps the production of "effective" or "comfortable" *user-centered design* (Opel & Rhodes, 2018) and often works to translate social or political questions into a material form in order to demonstrate the complex relationships between technology and society. Through critical making, designers and scholars can experiment with alternative approaches, materials, and goals—learning by doing while also acknowledging the many different users, networks, and environments that change how a product (or process) might work. As such, definitions of critical making vary because the process changes with each project or inquiry.

For example, at the 2018 "Control the Controller" workshop in Rotterdam, participants deconstructed and reassembled game and remote controllers to learn more about how mechanics mediate human-computer interaction (Groten & van der Kooij, 2018). Buttons, scrolling bars, gestures, even voice commands assume a type of access and ability, and the mechanisms control how people can engage various technologies. In breaking down the material components of a controller, the participants can evaluate assumptions about access and consider how design affects communication and engagement. In addition, participants were able to draft innovative new designs and brainstorm about how different tools or access

methods might appeal to different communities. The critical making process creates opportunities to understand not just technical aspects, but how technologies shape social, cultural, political, and economic values.

◼ Pedagogical Integration

In part, critical making emerged in response to the widespread popularity of maker movements and the growing availability of digital tools through the Internet of Things. The development of Web 2.0 alongside advances in digital tools such as 3D printing, CAD software, and Arduino microcontrollers (to name a few) created new communities of makers tinkering with technology. As more people started to participate in digital design and fabrication, scholars across disciplines such as information technology, writing, design, engineering, and communication began to investigate how to critically use these new tools for more than "copy, paste, make" (Dunne, A., & Raby, F., 2013; Hertz, 2012; Oliver et al., 2011; Purdy, 2014; Ratto, 2011; Ratto et al., 2014; Sengers et al., 2005).

While DIY collectives and maker labs continue to encourage people to "make stuff," critical making encourages people to consider why, how, and to what effect making impacts society. According to Matt Ratto (2011), critical making aims "to use material forms of engagement with technologies to supplement and extend critical reflection and, in doing so, to reconnect our lived experiences with technologies to social and conceptual critique" (n.p.). Critical makers are not merely interested in creating a prototype and singling out the technical. Instead, instructors may encourage a social-science approach that balances the technical with the social and advocates for making interventions into emerging technical landscapes. As Jason Tham (2021) notes, critical making and design thinking encourage innovative approaches to problem-solving that promote critical reflection and *social justice* advocacy. Through making things, students can learn more about how tools and technologies shape technical and professional communication and ultimately influence meaning making practices.

A signature application of critical making in the classroom is the design challenge exercise. A design challenge presents its participants with a complex social problem and requires them to ideate and prototype radical solutions with the goal of *testing* them outside the lab at a later stage. While the traditional design challenge focuses on the effectiveness of the final solution, the critical design challenge steers the participants' attention from the so-called practical aspects of design—i.e., costs, supplies, viability—to the critical dimensions of *ethics*, social justice, and user advocacy. Participants have opportunities to collaborate, work through the wicked problems associated with design, and experiment with diverse problem-solving methods. This approach can be integrated into technical and professional communication instruction where students tackle complex social problems from the communicative standpoint.

Increasingly, technical and professional communicators tinker with technologies to figure out how to best design and deliver information. These jobs are "no longer just about translating complex technical information for everyday users but instead solving problems through communication and material resources" (Tham, 2021, p. 2). Critical making challenges technical and professional communicators to pay attention to both product and process and better understand the social aspects of iterative design practices. Technical communicators play a key role in framing how users interact with content and engage technologies (Swarts, 2020). They have to consider content strategy, user experience, accessibility, community engagement, market needs and **constraints**, as well as the social and technical components that will affect communication. The "what happens if" questions of critical making help communicators develop innovative approaches that add value to professional environments. Whether composing a professional document or building a video game, a critical making approach encourages communicators to consider not just format, content, or tools, but also workflow, **collaborative** opportunities, and how to package information to make an impact.

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