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Chapter 5
From Crit to Social Critique
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An unresolved question of curriculum is 'to what degree does design and technology education (D&T education)[1] move students to critique their products and effects?' The design critique or "the crit" is common practice in various forms but it is unclear how well this transfers to social critique and action outside or beyond classrooms, laboratories, makerspaces, studios, and workshops. Indeed, it is unclear how well students are assisted with this transfer from crit to social critique. This problem of transfer is primarily a problem how well the purposes of D&T education are articulated. Apropos is the timeworn fable of three masons asked by a curious observer, "what are you doing?" The first quickly said "laying brick," the second "earning a wage"," while the third, with a pause, answered "building a cathedral" (Woodruff, 1922, p. 32).

Perhaps becoming critical depends on how conscious students are in moving from crit to critique. This is, after all, the point of *The Reflective Practitioner* (Schön, 1983). Like a mason who does not automatically transfer from the brick to the building, it is neither easy nor natural to transfer from a crit of a technological device to critique of technological determinism. The process of moving from a crit of applications to a critique of implications is no small feat but, increasingly, the stakes are high (Williams & Stables, in press).

This problem of transfer is philosophical. As often as it is said that craft, design, engineering, and technology are problematic it is countered that they are pragmatic. Implicit in this counter is a resolution that crafters, designers, engineers, and technologists should not be expected to express or act on social critique. As Kranzberg (1962) observed: "What the technologist asks is: do the means effectively reach the ends?" Somewhat sympathetically, he emphasizes, "this pragmatic formulation has been implicit in technological development since the time of the first stone implements" (p. 522). From time immemorial then, we are taught that "design is a practical activity" or "engineering is a pragmatic and practical discipline" (Dilnot, 1984, p. 12; Harrison, 1998, p. 182). Similarly, we are reminded that "science is a pragmatic, operational tool" (Rolston, 1991, p. 389). In STEM education, if not the cognate disciplines, theory is subordinate to practice. What then, do pragmatism and the pragmatic outlook accommodate, allow, or hold for D&T education? Does pragmatism disallow or disavow critique?

Recall that an important archetype is the skeptic, including the "technological skeptic" (Costanza, 2001, p. 464). Bronowski (1973/2011) captures this role: "It is important that students bring a certain ragamuffin, barefoot irreverence to their studies; they are not here to worship what is known but to question it" (pp. 341-342). On the other hand, D&T educators face stereotypes such as the economic charge of facilitating "technological indoctrination," now begun in the cradle with products such as the "Newborn-to-Toddler Apptivity Seat" (Hetzler, 1969, p. 191; Miller 2014). An implicit assumption is that by virtue of teaching D&T, educators are complicit in fulfilling students' functional and technocentric roles in the economy. Might it

[1] D&T education for this chapter refers to the scope of computer, craft, design, engineering, HCI, industrial, media, technical, and technology education.

otherwise be said that in D&T education, students are not here to worship what is made but to question it?

This chapter addresses the social critique of technology with a specific focus on how students become critical. How and why do students become skeptical or critical of specific technologies or more generally D&T? The chapter begins with a premise that social critique was explicit and inherent in D&T education from its formal inclusion in educational systems in the nineteenth century. The first section explores initial purposes of D&T education and a brief history of the crit. Neither peripheral nor secondary to other purposes, such as making and remaking, critique requires practice. The chapter proceeds to address the problem of transfer from the crit, which is integral to learning within D&T, to social critique. On one level, this is a problem of transferring activity to activism, from D&T's internal school facilities to life after or external to schools. The chapter raises critical questions for pragmatists. As Schön (1983) concludes, a detached or distanced social critique of D&T "cannot substitute for (though it may provoke) the qualified professional's [or student's] critical self-reflection" (p. 290). Schön attended to practices moving students "from technical rationality to reflection-in-action" (p. vii); this chapter attends to processes moving students from critical self-reflection to social critique.

Purposes and Practices

Historically, D&T education was founded on a critique of prevailing purposes and practices of education (Dewey, 1904, p. 443; Woodward, 1882, pp. 627-628). Responsive to the aims of arts & crafts (A&C) and modern design in the nineteenth and early twentieth century, this critique of prevailing education was extended to a critique of apprenticeship practices in the trades and ultimately to modern industry. Like A&C, D&T education was established on a premise that it could humanize the machine (Triggs, 1902, pp. 147-158, 184-185).

Through the nineteenth century, discontent with prevailing aims of education was fairly resolved with an inclusion of material, practical, and social aims. Defenders of classical aims felt helpless against trends. "The last demand of the industrial spirit is that all education shall be lowered to its material aims," one classicist bemoaned in the mid 1880s; "for lowered it will be if all distinction is removed in academic honor between an education for the sake of the mind itself and an education dependent on and limited to material and practical aims" (Warner, 1884, p. 223). However, advocates of manual training at the time established aims more lofty than base. "The labor question" of capital's ill-distribution of wealth would be "settled by nothing short of revolution," an analyst reasoned. "This revolution, however, will be peaceful: there will be no lawlessness, no destruction of property, nobody would be maimed, nobody would be killed. The revolution is to be effected through the manual training school" (Jacobson, 1888, pp. 24-25; *Science* Editors, 1887, p. 197).

Manual training (MT) specialists had nonetheless reconciled with prevailing aims (McKinney, 1919). The aims of manual training were formalized through *Slöjd* in Sweden, primarily through the work of Salomon (1888, pp. 185-188), who differentiated between the "formal" (e.g., development of "mental and physical powers") and "material" (e.g., "acquisition of general dexterity") (p. 202) (Butler, 1887, p. 256). Similarly, in establishing and sustaining the first MT school the United States (US) in 1880, Woodward wanted to balance cultural, social, and vocational aims (Coates, 1923, pp. 71-75). As he emphasized in 1882: "it is my intention to improve every opportunity to declare that in educating the hand we do not neglect the mind" (quoted in Coates, 1923, p. 75). "We do not manufacture articles for sale," Woodward (1882) asserted, "nor do we pretend to fully teach particular trades" (p. 629). Downplaying the practical,

Woodward (1903) later clarified that "manual training, as we have it in the high school, is a culture study" (p. 72).

By the turn of the century, as Woodward (1903) suggests, the cultural and social purposes of D&T education were as important as the practical purpose (McKinney, 1919). Dopp (1902) clarified that D&T education "will train the child to control machinery rather than be controlled by it" (p. 171). Understanding a machine, she emphasizes, requires teaching a student "its purpose, how constructed, how controlled, and how used for the amelioration of society." She continues: "these are the problems that the school should undertake to teach him to grapple with, rather than to occupy him with activities that tend to render him as automatic, as unfeeling, as a part of the machine itself" (p. 171). Dopp clarifies that this particular "intelligence" includes recognition of how the material relates to the cultural or social and implications of products (p. 172). The Massachusetts Commission on Industrial and Technical Education referred to this as "industrial intelligence," meaning "mental power to see beyond the task which occupies the hands for the moment to the operations which have proceeded and to those which will follow it— power to take in the whole process, knowledge of materials, ideas of cost, ideas of organization, business sense, and a conscience which recognizes obligations" (Wright, Reed & Golden, 1906, p. 5).

"Industrial intelligence," or what was reframed as "technological literacy" (Dakers, 2006, 2014; Petrina, 2014), was basically developed through two interrelated instructional methods: demonstration (the demo) and critique (the crit). On the first method, D&T educators generally concurred: "In any attempt to describe the practice of an art [or technology] the briefest demonstration is of more value than the most elaborate statement. The demonstration can be made concrete and specific, the statement must often be general" (Haney, 1905, p. 179). Sentiment held that "before manual work of the true type can be given its rightful place in the schools, the general public must cease its idolatrous worship of the book" (Hervey, 1908, p. 328). The demo also manifested as a model, proof of concept, or demonstration of a design idea, which is integral to D&T education as well.

Like the demo, the crit has a history dating back to antiquity and was made core to D&T education in the nineteenth and early twentieth centuries. Popularized in the Ecole des Beaux-Arts in France and refined in the Bauhaus in Germany (Anthony, 1991, pp. 8-26; Flynn, 2005), the crit found common practice in the schools. In MT the crit was documented in 1886 as follows:

> When the lesson is concluded the whir of the machinery ceases, and a great silence falls upon the class as the students assemble about the instructor, each presenting [her or] his piece of work. This is the moment of friendly criticism. The instructor handles each specimen, comments upon the character of the workmanship, points out its defects, and calls for criticisms from the class. These are freely given. There is an animated discussion, involving explanations on the part of the instructor of the various causes of defects, and suggestions as to suitable methods of amendment. (Ham, 1886, p. 44)

Teachers were often trained in giving and receiving a crit or "a lesson which is to be criticised by competent authority for the benefit of her [or his] fellow-students" (Teachers in training, 1888, p. 517). According to an observer in the United Kingdom (UK) in 1888, "criticism lessons, familiarly termed 'crits,' are a weekly institution in the Training College, and are looked forward to with dread by the victims. It is an ordeal to stand there and give your lesson in the presence of

critics" (Teachers in Training, 1888, p. 519). This insight acknowledges power and tension in the crit among the student, peers, and teachers (Anthony, 1997, 1991).

For primary school D&T, the crit was adjusted to the recitation, which, as Dewey (1900) defined it, "becomes the social clearing-house, where experiences and ideas are exchanged and subjected to criticism, where misconceptions are corrected, and new lines of thought and inquiry are set up" (p. 65). Through the crit, "specific effort should be made to develop power to judge according to definite standards," an expert advised (Haney, 1905, p. 190). Ideally, depending on the aim and level, students and teachers adjusted as necessary in a spirit of mutual improvement. In the demo, the teacher models design or production practices while in the crit models criticism or critique (Haney, 1905).

From Crit to Social Critique

Schön (1983) defines design as "a reflective conversation with the materials of a situation" and distinguishes between "language of designing" and "language about designing" (pp. 172, 80, 81). Through what processes do students become conversant with both the materials *and* the situation, however limited and expansive? While Schön's (1983, 1984, 1985, 1992a) exemplar or paradigmatic case is the architecture studio or workshop, the concern is with language of and about design *and* technology used as crafters, designers, engineers, technicians, and technologists learn and work. This resolves in debates over emphases on making versus knowing or procedural knowledge versus declarative (or propositional) knowledge (Martin & Owen-Jackson, 2013). Schön observes that the language *of* designing includes "names of elements, features, relations, and actions, and of norms used to evaluate problems, consequences, and implications" (pp. 95-97). This repertoire is meant "to fulfill a variety of constructive, descriptive, and normative functions" (p. 97). The language *about* designing is metacognitive and often articulated as "fragments of a theory about the design [and make] process" (1984, p. 7). He (1984) elaborates: "In the passages back and forth among the languages of appreciation, performance and theory of designing, student and studio master pass, in their reciprocal reflection-in action, from one domain of attention to another, and from one level of description to another" (p. 7). Labs, makerspaces, studios, and workshops require "students to spend a great deal of time talking about their design, talking to other students, talking to professors [or teachers] at desk crits [individual crit], and, of course, talking at jury [group crit] presentations" (Stevens, 1995, p. 118).

Schön (1984) reiterates that the "passages back and forth among the languages" of designing and making become relevant and specific in the "context of action" (p. 7). He emphasizes that

> there is no magical dividing line between the studio [or workshop] and the world outside it. The student does not suddenly understand, when she steps into the studio, what she had found obscure while she remained outside it. Nevertheless, master [or teacher] and student can begin their reflective dialogue about design, designing and learning to design, once the student has begun to design [and make]. What happens to make this possible? (p. 7)

In an example drawn from Simmonds' (1978, 1981) case study, Schön (1984) notes how in the process of a crit, the teacher "Quist has reflected critically on [the student] Petra's framing of the problem. He has conducted an on-the-spot drawing experiment in reframing the problem" (p. 5).

Although the crit can be Kafkaesque at times, without the teacher's feedback or modeling, one student acknowledged "you don't know where you are and have no basis for evaluation. You hang onto the inflection of the tone of voice in your crit to discover if something is really wrong" (p. 5). Schön (1984) continues:

> Only as he or she immerses him or herself in the studio experience, the experience of trying to design [and make], can he or she create the conditions in which to begin to understand what the studio master says and does. But this immersion carries, often, a perceived risk of a high order. Immersing oneself in the strange and demanding world of the studio, the student tends to experience a loss of competence, control, and confidence. And he or she cannot judge the value of taking such a risk until having actually taken it. (p. 6)

Like the demo and project, the crit is important for D&T learning. The concern here is with the language of designing and making that addresses "norms used to evaluate problems, consequences, and implications" and how the crit proceeds to social critique.

If the process of designing and making is defined as "a reflective conversation with the materials of a situation" (Schön, 1983, p. 172) then questions are raised about the scope of a design and make "situation." Schön (1983) begins *The Reflective Practitioner* by recognizing the changing scope of "situations of practice" for designing and making, which are increasingly characterized by "uncertainty, instability, uniqueness, and value conflicts" (p. 14). "Practitioners are frequently embroiled in conflicts of values, goals, purposes, and interests," he acknowledges. For instance, "teachers are faced with pressures for increased efficiency in the context of contracting budgets, demands that they rigorously 'teach the basics,' exhortations to encourage creativity, build citizenship, help students to examine their values" (p. 17). Given increasingly problematic situations, including global warming and waste generation, crafters, designers, engineers, and technologists invariably face a "crisis of confidence" that focuses ethics on decisions to reduce "'messes' to manageable plans" (p. 18). Ockham's razor is necessary for finding, managing, and resolving design problems but at what price? Within a crit, students and teachers can quickly rule out social critique but at what cost to ethically anticipating consequences and implications of D&T?

> Beyond learning processes of ethical reasoning, design students are to be assisted in seeing that such reasoning processes are embodied in larger structures of action. In the delineation of reasons, the role of the design instructor is critical. Causes are constituted as the design student defines a design project. Situations are not simply the objective conditions or facts; rather, situations come into being as the student questions the facts from some point of view. (d'Anjou, 2010, p. 103)

Situatedness is problematic (Gregg, 1994). What is included and excluded from a situation and crit involves a series of decisions that raise questions of ethics at each step. Demystifying these decisions, Schön's work (1983, 1984, 1985, 1987) can be understood as an empirical inquiry into moving students from crit to situated critique of D&T.

Beginning with a critique of technical rationality, Schön (1983) demonstrates how readily practitioners and students fall into traps of its mystique (Waks, 2001). Technical rationality suggests that "professional activity consists in instrumental problem solving made rigorous by

the application of scientific theory and technique" (p. 21). Practitioners have an interest in preserving this "mystique of practical competence" but this comes at a cost (p. vii). "Many practitioners, locked into a view of themselves as technical experts, find nothing in the world of practice to occasion reflection," Schön (1983) argues. "They have become too skillful at techniques of selective inattention, junk categories, and situational control, techniques which they use to preserve the constancy of their knowledge-in-practice" (p. 69). Observing and recording practices, such as crits, demystifies what students and teachers actually do and say in in laboratories, makerspaces, studios, and workshops. Schön (1983) is nonetheless skeptical of "radical demystification" or social critique, which tends to have "a utopian vision, one of liberation from the domination of established interests and professional elite" (p. 288). By stripping away the "emperor's new clothes" of D&T knowledge to reveal its "empty claims," social critiques basically dismiss the fact or potential that D&T practitioners "do know something worth knowing, a limited something that is inherently describable" (pp. 288, 289). Social critique may mystify D&T practice that much more. "In this sense," Schön (1983) cautions, "both professional and counter-professional may be mystifiers. And in this sense, demystification is not a showing up of the falsity of the practitioner's claims to knowledge but a bid to undertake the often arduous task of opening it up to inquiry" (p. 289) (see also, Latour, 2004).

Critique as intellectual work is "an attempt to give a meaning to our experience—that is, to make life more practicable" (Wilson, 1941, p. 241). As the critique of relations among people and things, social critique begs action, however mundane, radical, or revolutionary (Adorno, 1945; Marx, 1867, pp. 72-74). Marx observed that capitalist production creates "material relations between persons and social relations between things" (p. 73). Social critique focuses on how and why these relations are forged, broken, restored, or reinforced in the processes of designing and making as well as how appearances distort the reality of relations. How do we learn and teach to reduce the use value of specific design and technologies? For example, if we critique automobility, what do we do next?

> most modern land development strategies have wastefully and unfairly dispersed residences, employment, and social opportunity. It became difficult to live in many cities without a car. Such spatial dispersion— also called sprawl— subsequently led to increased land consumed for development, auto dependency, poor quality public transit, and the spatial isolation of many, but particularly less affluent urban residents and people of colour. (Crane & Schweitzer, 2003, pp. 240-241)

At what moments in D&T education is critique most anticipatory or necessary? Like universal critiques, situated critiques, social or otherwise (e.g., environmental, feminist, indigenous, spiritual, etc.), are germane to the purposes and practices of D&T (de Vries, 2005, in press; Petrina, in press; Williams & Stables, in press). Again, the challenge is moving students from the crit to critique.

Conclusion

Following Schön, researchers have attended to the arduous task of opening up D&T learning and teaching to inquiry (Compton & Harwood, 2005; Benson & Lunt, 2011; Kimbell, 1997; Kimbell & Stables, 2008). The state of research in D&T, however, suggests a disconnection between the empirical task of documenting practice and the conceptual task of

theorizing how this practice might lead to critique (de Vries & Mottier, 2006; Jones & de Vries, 2009; Williams & Stables, in press). Despite Schön's (1983, p. 315) proposal for "repertoire-building research," we do not yet have clear cases or documentation of how D&T education moves students to critique their products and effects or, more specifically, how the crit transfers to social critique. An implication is that D&T educators have not sufficiently addressed Schön's "critique of technical rationality." Perhaps fair enough, nor did Schön (1991, 1992b) or researchers in other disciplines attend to the process of moving students from the crit to critique. In contrast to becoming creative, we simply do not have empirical descriptions of students becoming critical (Carr & Kemmis, 1986; Goldstein, 2007; Selfe, 1999). Part of the challenge is overcoming assumptions that, compared to creativity, criticism and critique are easy and can be taken for granted (Latour, 2004). If the process of designing and making is a reflective "dialogue with the phenomena of a particular site" then how does the crit incorporate critiques of D&T as phenomena for discussion over a setting, site, or situation (Schön, 1988, p. 182)?

Albeit with much more to be done, researchers have criticized the crit, on one hand, and critiqued designing and making, on the other. The crit induces problems, be they culture, gender, or power, and is subject to reform in one way or another (Anthony, 1987, 1991; Flynn, 2005). Similarly, "staying close to the phenomena of inquiry," as Schön (1992b, p. 137), recommends, researchers have critiqued the practices of learning and teaching how and why to design, make, and unmake things. They pointed out contradictions inherent in conservative or naïve learning and teaching about D&T processes and products that have disruptive or radical consequences. For instance, eco-critiques address parallels between over-production in D&T workshops and over-consumption in the world (e.g., Elshof, 2009; Pavlova, 2009; Petrina, 2000; Stables & Keirl, 2015; Wicklein, 2001); feminist critiques detail the gendered nature of D&T curriculum and built environments (e.g., Braundy, 2012; MacDowell, 2015; O'Riley, 2003; Zuga, 1999); indigenous critiques juxtapose the ironic stagnation of projects in D&T against the novelty of wisdom found in the land (e.g., Cole & O'Riley, 2015; Gumbo, 2015; Seeman, 2015); and critiques of curriculum and instruction indicate the potential of critical pedagogy, awareness, and critical thinking (e.g., Barlex, 2015; Keirl, 2015; McLaren, 2012). These types of critiques are essential to avoid reproducing the old in the "new shop class" (Horvath & Cameron, 2015). How and why should students become skeptical or critical of specific designs and technologies?

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