29. Wicked Problems

Lauren Garskie
Gannon University

Definition and Background

A key component of design thinking is the kinds of problems for which it is particularly suited. The problems design thinking attempts to address are referred to as wicked problems. Wicked problems are "wicked" in both the problems themselves and their solutions. Wicked problems are complex, ambiguous problems involving many stakeholders. They neither have easily identifiable, one-time solutions nor can they be solved simply with more information. Horst Rittel, a mathematician, designer, and teacher, is credited with defining "wicked problems" in the 1960s (Buchanan, 1992; Marback, 2009) and along with Melvin Webber suggested ten distinguishing properties of wicked problems (Rittel & Webber, 1973). Expanding on the understanding of what wicked problems are, Rittel explains they are ill-formulated, the information is confusing, there are many clients and decision makers with conflicting values, and ramifications in the whole system are confusing (as cited in Buchanan, 1992, p. 15). Richard Buchanan further underscores the indeterminacy of wicked problems. In reviewing Buchanan's work, Richard Marback (2009) brings attention to Buchanan's connection of design and rhetoric, arguing for rhetoric as a wicked problem: "Rhetoric is the study of the most wicked of all problems: making responsible use of the persuasive power inherent in all artifacts" (p. 402).

It is not just the problem itself that is wicked, however, as the solution is also part of what constitutes a wicked problem. Marback (2009) argues these problems as wicked "because they are never finally solvable" (p. 399); rather, they require resolution "over and over again" (Rittel & Webber, 1973, p. 160). These problems feature no clear, permanent solution, being what Carrie Leverenz (2014) calls irresolvably complex. Jim Purdy explains they "require recursive attention and consideration of contextual factors" (as cited in Pope-Ruark, 2019, p. 439). This recursivity is a result of "[adjusting] to changing social, cultural, technological, and human needs" (Cooke et al., 2020, p. 328). Instead of calling them "wicked," Stanford's d.school (2019) refers to these problems as "unbounded problems," summarizing them as complex, ambiguous, and messy. While differences exist between calling design problems wicked versus unbounded, the d.school emphasizes that the solutions for unbounded problems are both uncertain and unclear.

A core ability for the d.school (2019) is to navigate the ambiguity and "develop tactics to overcome ambiguity when needed." One such tactic Katherine McKiernan and Andra Steinbergs (2016) identified was "trust among stakeholders and

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collaboration toward a shared goal as important characteristics for taming wicked problems" (p. 104). When working on what they identified as a "wicked environmental problem," Stuart Blythe et al. (2008) noted, "The situation demanded that all parties communicate honestly and effectively with one another" (p. 273). Additionally, the continual refining and adapting rather than focusing on a fixed end-point is part of the "design thinking mindset needed to find *sufficient* solutions" (Cooke et al., 2020, p. 328). For example, "a civic entrepreneur's proposed solution (in the form of a venture) cannot be entirely set in stone because the parameters of the wicked problem are always shifting and being redefined over time" (Gerding & Vealy, 2017, p. 303).

Design Application

Nigel Cross (2011) highlights this relationship between problem and solution as a theme of design thinking and how designers think and work. Cross (2011) explains, "In order to formulate a design problem to be solved, the designer must frame a problematic design situation: set its boundaries, select particular things and relations for attention, and impose on the situation a coherence that guides subsequent moves" (p. 120). Charles Wickman (2014) also stresses the role of the individual "in deciding—or, in some cases, prescribing—how problems should be defined and how, therefore, they ought to be addressed" (p. 27). Designers must carefully set the ***problem definition***, recognizing as a wicked problem though ***iteration*** is inherent as "a linear path from problem to solution does not exist in wicked problems" (Rose, 2016, p. 432). It is up to them to impose some sort of structure to these problems, which explains why the ***testing*** phase of design thinking is especially iterative. At the same time, the designer is having to consider perhaps competing interests. The ambiguity of the problem is "created by multiple, potentially competing interests designers and their clients . . . bring to the design task of creating a specific artifact" (Marback, 2009, p. 399). The designers are constructing the frame in this ambiguous situation, and it may be wrong.

In imposing some sort of structure to these problems, important to remember is, as Cross (2011) notes, how the solution is not always straightforward; instead, emergent properties are perceived in earlier solutions that were not consciously intended. Referring again to the indeterminacy of wicked problems, Buchanan (1992) emphasizes the "problem for designers is to conceive and plan what does not yet exist, and this occurs in the context of the indeterminacy of *wicked problems*, before the final result is known" (p. 19). Overall, the focus on problem-solving and the nature of the problem is key to design thinking.

Wickman (2014) notes global climate change, educational reform, and widespread unemployment all as examples of wicked problems. Specifically, Wickman provided the environmental catastrophe of the 2010 Gulf of Mexico oil spill as a wicked problem because it was "so complex in [its] causes and effects, [it] cannot necessarily be 'solved' in any simple sense of the term" (p. 24). Wickman

found Rittel and Webber's ten characteristics as a useful way for understanding the complexity of that problem. Applying those characteristics to these global concerns, or even more local community concerns, can be a way of showing "that making change in the world often requires us to move beyond a linear, problem/solution model of engagement" (Wickman, 2014, p. 39).

Pedagogical Integration

Carrie Leverenz (2014) has demonstrated the available connections between pedagogy and wicked problems in terms of design thinking. Instructors may "design wicked assignments" that are "growing out of some external exigency" (Leverenz, 2014, pp. 6-7). The key to enacting meaningful learning via wicked problems is to adhere to the culture that supports design thinking, namely the courage to experiment with unknowns or ambiguity, and willingness to embrace ***failing***. For students, this means taking up more complex design issues, tinkering with new tools or technologies, trying unattempted approaches, and venturing into new terrains—or, as the cliché goes, stepping out of their comfort zone. Instructors may support such efforts by providing scaffolding activities such as problem definition exercises, sprint ideation and design sessions, and ***rapid prototyping*** activities.

Stepping out of the comfort zone can mean taking on the more complex problems society faces. April Greenwood et al. (2019) argue, "Wicked problems are those that transcend any one discipline, institution, or community: for instance, poverty, generational homelessness, obesity, pollution" (p. 401). The technical communication classroom provides an ideal space for engaging with wicked problems (Wickman, 2014). Jason Tham (2021) notes how "many TPC [technical and professional communication] scholar-instructors are already practicing design-centric, problem-based pedagogy" (p. 393). In taking on such problems, Laquana Cooke et al. (2020) further emphasize the need for ***iteration*** as "problem solving in TPC is most effective when approached as an iterative process that meaningfully engages with stakeholders, teammates, and users" (p. 328). One will need "to continually adapt to user needs, unfamiliar tools, and material constraints to tackle the complexity of an ill-defined problem" (Cooke et al., 2020, p. 328). It is design thinking's iterative approach which makes it particularly well suited for wicked problems.

Additionally, Joseph Williams et al. (2013) argue for the importance of distinct and specific "authentic" audiences within the technical communication classroom. "Truly authentic audiences, however, are increasingly mixed, composed of constituents who have disparate interests and needs that must be addressed with multiple sophisticated appeals, arguments, and modalities" (Williams et al., 2013, p. 248). As emphasized, wicked problems involve multiple, often conflicting stakeholders. For example, Stuart Blythe et al. (2008) identified themselves as third-party expert reviewers who "tried to support various stakeholders' efforts to define, understand, and articulate their responses" (p. 273). The U.S. Army Corp

of Engineers, the Technical Outreach Services for Communities, and the local community were all part of their wicked environmental problem. Design thinking's first principle of ***empathy*** and tools such as empathy mapping can provide ways for understanding users. Yingying Tang (2020) explains how "design thinking values users, not as merely passive consumers . . . but as co-creators whose voices, experiences, and needs can shape the design and use of technologies." Such consideration of the user also requires awareness of the lack of clear, permanent solutions for wicked problems. Jeffery Gerding and Kyle Vealey (2017) ask, "How do you persuade or motivate people to be financially and socially invested in a problem that, by definition, cannot be solved?" (p. 293). They examined how +POOL, "a recreational pool, filtration system, and floating laboratory," developed "hybrid solutions that may not necessarily resolve or provide closure to complex social problems but that instead continually adapt and evolve to keep pace with them" (p. 293).

The pedagogical goal for integrating wicked problems with the technical communication classroom is to spark ***innovation*** rather than stifle it. Thus, instructors should mind the gaps between student aspiration, the available means for creative tinkering, and the magnitude of the wicked problem undertaken. These components need to be balanced in order to foster a positive learning experience that leads to productive, innovative, and—even better—implementable outcomes.

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