

Design's secret partner in research: Cybernetic practices for design research pedagogy

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Abstract

How to understand the relation between design and research is a longstanding question in design theory and practice. It is also a question in design pedagogy, especially in taught postgraduate programmes where students are expected to engage with and conduct research in formal ways, often for the first time. In this article, we discuss a curriculum that we have developed for introducing research literacy to taught postgraduate students in architecture and design disciplines. The curriculum draws both explicitly and implicitly on an analogy between designing and researching developed through the lens of cybernetics, a transdisciplinary field that relates to both design and science. When cybernetics has been invoked in the context of design, it has usually been as a form of explanatory theory, contributing to the theoretical foundations of design research and its relations with other disciplines. Our approach instead positions cybernetics as a mode of transdisciplinary engagement within students' own learning where an unfamiliar topic (research) is approached through analogy to a familiar one (design). We begin by contextualizing the curriculum and introducing the rationale for this approach in the context of design research. We then summarize key moments in the curriculum and our observations of its impact in students' work. We conclude by speculating on the extent to which enacted analogies such as the example presented here may be taken up in other practical situations, and the potential value of doing so in reformulating cybernetics in ways that are practiced (rather than abstract) and methodological (not just explanatory).

KEYWORDS

cybernetics, design, pedagogy, research, transdisciplinarity

1 | INTRODUCTION

One way to begin thinking about the relation between research and design is through comparison with academic disciplines such as anthropology, physics or

history. To learn how to be an anthropologist, physicist or historian is to learn how to conduct research in these domains. In design, by contrast, research has often tended to make use of methods imported from other disciplines, separate to the practices that are characteristic

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of design activity itself. For instance, design may be the object of study for research, such as where the outcomes and processes of designing are studied in the humanities and social sciences. Design practices may also make use of knowledge produced by research in other disciplines, such as material science, historical precedents, and the use of social science methods to inform design decisions. Within undergraduate design education, these modes of research are usually associated with distinct parts of the overall curriculum. Typically, some modules will introduce a wider context of historical and theoretical enquiry, with students producing written essays and dissertations independently of their design studio work. Within design studio modules, research is usually associated with initial information gathering and concept development in the early stages of projects, a distinct phase of activity that is then applied in subsequent design work as it progresses. Seeing design and research as separate activities or stages is a viable way to understand their relationship, and much of the design research community continues to frame its approach along these lines. For instance, in the context of 'practice-based' research, practice and research are framed by Linda Candy et al. (2021) as independent and complementary processes. However, this way of relating design and research is not the only one. An example of an alternative framing is from Zoë Sadokierski (2020), who acknowledges that designers almost always, if not always, conduct research as a part of their practice. Sadokierski recognizes a distinction between research activities having a design agenda or a research agenda. Nevertheless, research activities are happening in both instances, including through designing.

While thinking of design and research separately can make sense in some contexts, it can also have undesirable consequences. Other disciplines have much to offer design, but to characterize research as primarily separate to design's own competencies risks hollowing out design's disciplinary by making it dependent on and subject to other fields. Characterizing design and research as separate is also challenging for students in learning what research is, as it presents research as something other to design and so other to design students' existing experiences and competencies. To expect design students to adopt the methods and languages of other disciplines can be alienating, as students do not have backgrounds in these disciplines to build on. Moreover, without understanding the underlying principles, assumptions and limitations of different ways of working, design researchers can become uncritical end users of other disciplines' research outcomes, evidence, and methods. The need to understand the principles underlying methods is especially important given that designers often operate in situations that are 'ill-defined' and 'essentially unique'

(Rittel & Webber, 1973, p. 164). Whereas most academic subjects have established sets of methods that relate to relatively repetitive and predictable research settings, designers must continually redesign their methodological repertoire in response to specific circumstances. Design researchers therefore need to engage with research at a deeper level than that of adopting other disciplines' methods.

2 | DESIGNING RESEARCH

Focusing on the methods and practices of design activity can lead to an alternative approach. The various tacit and reflective practices involved in designing can be understood as creating knowledge. Designerly processes can therefore be considered as particular modes of doing research. Practice research conferences, such as the Research Through Design (RtD) series, facilitate the critique and dissemination of design practice as scholarly inquiry (Durrant et al., 2015), supporting the growing understanding and acceptance of practice-based research modes and methodologies. This appreciation of design as a particular kind of research developed from attempts to formulate the disciplinary foundations of design in its own terms, countering tendencies for design to become distorted through inappropriate theories and methods being imported from elsewhere. One significant contributor to the setting out of design's disciplinary identity was Bruce Archer (1979), who positioned design as a third disciplinary pole of general education, complementing the 'two cultures' (Snow, 1961) of the sciences and humanities that design has often found itself split between. Archer's framework gives design its own place alongside, and independent from, the sciences and humanities. While the work of Archer and others was mostly concerned with educational and professional settings, it has also contributed to a still expanding discourse on the roles that designerly modes of knowledge production may play in research practice and vice versa.

The position we work from in this paper, and in the curriculum described below, takes its point of departure from a response to Archer's framework proposed by Ranulph Glanville (1981/2014) at the 1980 conference of the Design Research Society. Glanville highlights that giving design its own domain separate to other disciplines risks isolating it, obfuscating commonalities and shared concerns. The isolation of design research that Glanville warns of is not just a question of how one draws the disciplinary map but is also encountered in practical situations. For instance, the character of the insights produced through tacit and reflective modes of design enquiry means that they are difficult to share and

repeat beyond the specific context in which they are developed, limiting the research claims that can be made based on them. Moreover, design may become isolated even within transdisciplinary projects, where designers can find themselves limited to roles of disseminating or applying research outcomes rather than contributing to the creation of these outcomes.

Glanville (1999, 1981/2014) suggests an alternative conceptualization. Rather than asking how design activity can be one form of research, Glanville points to how all research activity (including science) is designed. That is, research is not something that just happens. It is a result of deliberate, purposeful action that can be recognized as a specific form of design activity. Experiments are designed in order to test some factors rather than others, using equipment and methods that are designed for these purposes. One can also think of whole processes of research as producing (designing) artefacts of various kinds, most obviously in cases like biotechnology but also in the production and testing of theory (i.e., theories are new things in the world that are created through research). The desire for research to be objective can obscure the ways in which it is designed. Yet, even scientific objectivity is something that is the result of design. The experimenter tries to avoid affecting the situation they are studying, and to do this takes careful experimental design. For instance, in conducting an interview or survey, leading questions need to be avoided in the way the process is designed as otherwise insights will reflect the experimental situation rather than what the experimenter is trying to understand. For Glanville (1981/2014, p. 111), with honest reflection over how research is undertaken, one may recognize an underlying pattern of design across all disciplines.

Glanville's argument draws on cybernetics, a transdisciplinary field that brings different domains into relation with each other by identifying structural similarities in circular causal processes. Cybernetics had been a regular point of reference in the development of design research since the 1960s, including in the work of Archer (Boyd Davis & Gristwood, 2018). But it was rarely a part of mainstream design discourse, leading to Glanville (1999) referring to cybernetics as 'design's secret partner in research' (p. 90), which we refer to in our title. (For a fuller treatment of ways in which cybernetics and design contribute to each other, see Fischer & Herr, 2019).

While Archer's framework positions design as one mode of doing research amongst others, Glanville's concern with how research is designed shifts the question of design's relationship to research to a different logical type: a different *kind of question* about research rather than a different kind of research amongst others. Thinking of design's relationship with research in this

way, design has both its own place, now as a form of meta-position or meta-question, and a deep connection to all other disciplines, including its own designerly practices. From this perspective, the relations between design and research in a project is one of the things that design researchers are designing. Consider, for instance, Thomas Fischer's (2019, pp. 258–259) articulation of design researchers designing the deployments and combinations of different modes of design research within their projects.

Glanville's argument about the relation between research and design is usually understood in theoretical and explanatory terms. It is considered a contribution to the disciplinary basis of design research, being of particular relevance to projects and topics where there is a desire to find mutual ground between design and other fields or in defending design's disciplinarity against encroachment from the sciences. Understanding research as a kind of design activity is not just a theoretical exercise, however. It also has pedagogical and critical possibilities. If research is (thought of as) a form of design activity, then understandings of and competencies in design can offer insights into (the design of) research. In the curriculum we describe below, we have used this relationship between design and research as a pedagogical structure. Students undertake a process of re-positioning their growing understanding of and ability in design as a way of understanding and doing research. That is, the students approach an unfamiliar topic (research) through analogy to a familiar one (design), working around the issue where research initially appears as something separated from the rest of their studies. A further possibility that follows from observing the design of research is that designers can draw on their own disciplinary discourses to encounter research from a more critical position. If research is a form of design activity, then the sorts of critiques one might make of design can also be applied to the design of research. For instance, criticisms of scientific objectivity as privileging dominant standpoints (Harding, 2015) or obscuring responsibility (von Foerster, 2003, Chapter 14) can be understood as part of a wider context of criticizing design in political and ethical terms. Such criticisms are especially pertinent given the social consequences that follow from biases in data feeding through into the designed world. One can ask what worlds one makes (and should make) in research in much the same way as in design. By learning to understand how research works in terms of its design, designers can draw on their existing experience with design to understand, design, and critique research processes, countering the risk of becoming positioned as uncritical end users of the outcomes and methods of research in other fields.

3 | A CURRICULUM FOR UNDERSTANDING (HOW TO) DESIGN RESEARCH

The example discussed here is a module titled Research Practices, which is taken by students across several postgraduate degree programmes at the University of Brighton, including MArch Architecture, MA Interior Design, MA Sustainable Design, and MA Architectural and Urban Design. These programmes all involve research but approach it with different expectations, with some more academic and others more vocational or professional in focus. Most students take the module in their first semester of study, while for MArch students it opens the final phase of their professional studies, which (in Brighton's programme) is open-ended and research oriented. The module is worth 20 of the 60 credits studied in the semester. Cohorts generally have a mix of different age groups and cultural backgrounds, with individuals bringing varied expertise from previous study and practice. The timescale of our observations covers cohorts of postgraduate students between 2019 and 2022.

The module begins with an everyday task. Working in small groups where not everyone knows each other, students are asked to have dinner together. They may either do this by cooking a meal that they have not cooked before, or by visiting a restaurant that no one in the group has previously been to. Students who are not able to participate for any reason can do a version of the activity by cooking a new recipe for themselves, family, or friends. Because this exercise requires new experiences and insights, it involves various activities that can be discussed in terms of both design and research. Students need to ask various questions of each other, such as dietary requirements, budget, food preferences, available time and travel arrangements. They draw on various information sources such as website reviews, cookbooks and family recipes. This exercise plays a number of roles. First, students spend some time getting to know each other. For most of the students, this activity happens during their first few weeks on their programme and so it is part of settling into this new context. Second, the exercise helps demystify research by situating its otherwise strange terminology in the familiar context of food. For instance, it is possible to follow up the activity with discussions about source material, by thinking about why one uses a particular cookbook; peer review, through reflecting on when one might trust online reviews of restaurants; and method, by reflecting on the role of a recipe in making a meal. Third, the exercise provides a lived example that students can use throughout the module so that theoretical questions about research can be explored

by analogy to this shared experience before bringing them into direct relation with ongoing design work.

Follow-up discussions to the dinner exercise include when to think of research in terms of information gathering versus creating new insights, the relationships between creativity and research, and the differences between insights that are new historically and those new to an individual (cf. Boden, 2007). Most students initially associate research with the necessary preparation for the dinner to happen, gathering information about each other, restaurants, ingredients, and recipes (reflecting the idea of research as a distinct phase of a linear project, familiar from the structure of design studio projects within their programmes). Through discussion, the idea is introduced that new insights are created through the event of the dinner too. Conversation amongst the group creates new connections and shared understanding; one learns about one's source material (cookbooks, review websites and recipes) by using them and experiencing their outcomes; and new experiences of food might lead to trying (or avoiding) other new dishes. This discussion introduces the notion that both design and research are present across multiple layers of the situation—that research has been undertaken to design an event through which further research could be conducted, and so on.

The first set of sessions begin by exploring the many possible relations that artefacts can have to research. One example used in discussion is that of a map. Maps can be an object of study for researchers and a design constraint for designers; they are produced through research and design activities; and can be used for undertaking research or design and for communicating their outcomes. Maps resonate with students' design studio work and everyday life, while the historical production of maps raises political and ethical questions about the standpoints (Harding, 2015) and boundary judgements that are implicit in research projects and the difference these make to the insights that are created through them. For instance, what ideas are embodied in the particular projection used in a world map? What standpoint do you occupy in your own designing and researching? Who is included and excluded from different modes of researching and designing? Subsequent sessions build on this discussion of artefacts to explore disciplines and methods. What standpoints and boundary judgements are implicit in these different approaches? What is already assumed when working from a particular discipline? What can a particular method help researchers do, and what does it obfuscate? Which relations between design and research does a particular method assume?

The final part of the module is oriented around the assessment task. Using a combination of text and visual work, students locate some of the themes introduced

earlier in the module with respect to their own work. The overarching question is to explore how the ways in which one does research (how it is designed) have consequences for the scope and status of the insights that research activity generates. Students choose an example of research from their own experience, which can be ongoing work in their studio modules, an assignment from earlier studies, or experience in professional practice. They first describe *how* this worked as a research process, to the extent that it did. Students then develop a critique of this process, addressing practical limitations but also political and ethical questions, such as exploring the usually privileged stance of the designer and researcher. Students respond to their own critique by suggesting, and sometimes beginning, new ways forward. The assessment is designed to focus on how well students evaluate their example of research rather than the sophistication of the research process itself, making it equally accessible for students at different stages of their journey as researchers.

Outside the module, students engage with a broad range of self-identified projects, ranging in aims and outputs. This work could be pragmatic, concept-driven, or understood through making. Engaging with conversations about the design of research has enabled stepping back (even further) from the object of attention than many students may be used to. At times, the unusual approach of the module has led to confusion for some students. Nevertheless, this stepping back has generated a valuable focus on design processes and practices as relational and situated, complementing the attention given to the content and outcomes of design that is central to other modules. This focus facilitates a reflexive situating of oneself within a highly individual research context. Some find this a comfortable journey, especially those more accustomed to engaging theory in their work. For students whose research involves practice in varying ways, the module allows them to wrestle with their understanding of how practice may be theory and vice versa. The module has afforded space for collective discussion away from the common presupposed separation between people as creative practitioners and people as thinkers and researchers. This lack of disconnect is most noticeable for the students with approaches led by their design practice. By framing research and design in this way, the module also plays a role in breaking down any perceived division between research and everyday life. Students are more able to discuss nuances within projects or observations as there is less disconnect between research being 'over there' while they are 'over here'.

As facilitators of this module, we create a site for our own learning through relationships, planning, and responding to ourselves (including our hunches and

feelings), each other, and the group. An effort is made to avoid hierarchy between staff and students and between lecturers who are unavoidably institutionally hierarchically positioned. One impact of this learning could be increased reflexivity of design and design research pedagogy for staff involved in the module. As some teaching staff are researching at MRes and PhD level, much like all students taking the module, they can become more confidently able to articulate the relations between design and research in their theses, while their open questions about design research provide a more accessible environment for students than established researchers whose ideas about design research are more fully formulated.

4 | CONCLUSION

The module curriculum described here is not the only way of introducing research to designers. In developing it, we recognize that more conventional framings of design and research have their own strengths. The main limitations of the module curriculum come from the meta-position it takes. This stance can sometimes be disorienting for students early in the semester, especially those used to a more instructive style of learning. It also means it is not possible to introduce specific research methods in much detail. These limitations are acknowledged explicitly in module sessions. Those students who struggle initially with the approach have used the middle and later phases of the curriculum to work their questions through, for instance by focusing directly on the challenge of encountering wider framings of design work in postgraduate studies compared to their previous experiences. The lack of detail in presenting specific methods is, we think, unavoidable given the range of student work the module supports, although it is possible for specific techniques required by students to be covered within their other modules.

Another aspect of the module curriculum that we see as important is not about design research per se. The practices we have developed in the module can inform some of the ideas that have underpinned its development. The module is premised on a form of cybernetic analogy—that research can be thought of as (if it is) a kind of design activity. Analogies such as this are typical of cybernetics, which uses them to move insights and concepts between radically different domains, leading to the creation of transdisciplinary theory. The analogies developed in cybernetics are constructed in terms of circular causal processes—that is, processes where the observed outcomes of action are taken as input for new action, such as in feedback, conversation, and indeed in designing and researching. As circular causal processes

are widespread across social, ecological, biological, and technological contexts, cybernetics has an extraordinarily broad scope. Wiener (1948/1961) characterized cybernetics as applying across ‘the animal and the machine’, Ross Ashby (1956/1964) saw it as concerned with ‘all possible machines’ (p. 2) and Margaret Mead (1968) understood it as form of language ‘sufficiently abstract to make it possible to cross disciplinary boundaries’ (p. 2).

The abstraction Mead refers to brings limitations as well as connections. First, cybernetics has tended to focus on general principles at the expense of material embodiment and the specifics of a situation. For Ashby (1956/1964), cybernetics is focused on what things do, not what they consist of, leading to the view that ‘materiality is irrelevant’ (p. 1) to cybernetics. Yet, there are many situations that involve feedback processes where embodiment is an important consideration, such as in some of our own interests in bodies and places (Sutherland, 2019; Sweeting, 2020). Second, focusing on general principles positions cybernetics primarily in the mode of explanatory theory, which in turn implies a relation to practice that is both distant and linear (this is the case whether one characterizes such explanations as scientific or philosophical). While cybernetics has much explanatory potential, to see it primarily as a body of theory seeking application elsewhere is inevitably limiting towards its own practical and methodological development. Moreover, linear relationships between theory and practice are in tension with understanding practice in terms of cybernetic circularity and with the reflexive, performative and situated practices with which cybernetics is associated in domains such as action research, the creative arts and design. Third, the ease with which cybernetics moves ideas between contexts risks uncritical deployments of its analogies as if they represent equivalencies between these domains. For instance, while cybernetics’ analogies between biology and technology (Wiener’s animals and machines) bring new insights and connections, eroding the contextual differences between these domains may have undesirable social consequences, such as where treating automated algorithms as if they are intelligent diminishes human agency (Krippendorff, 2021).

Like much of cybernetics, the module focuses on general principles (the design of research) rather than specific details (training in particular methods). It does not do so primarily via explanatory theory, however. While theoretical ideas are introduced through readings and talks, these are only part of the pedagogic approach. The analogy is developed through students enacting it in their learning, with new concepts developed through reflecting on familiar experiences, in turn allowing for the familiar to be reflected on in new ways. This approach situates what would otherwise be abstract theory within contexts

of practice and experience, where embodiment and materials are important considerations. It also shifts the role of cybernetics from a collection of transdisciplinary theory that is learnt about to a mode of learning through transdisciplinary thinking. We offer this as an alternative reading of Glanville’s (1999) framing of cybernetics as ‘secret partner’ (p. 90), where secret is understood as implicit rather than as unknown.

As with cybernetics’ analogy building in other contexts, it is important not to conflate the domains of design and research in the process of connecting them. The point is not that design and research are the same thing (Glanville, 1999, p. 89) but that thinking of them in terms of the other can be a way of integrating them in practice and interrogating their differences. Maintaining distinctions while making analogies can be pedagogically challenging, but it also presents opportunities. Analogies between different situations can lead to new insights and critical questions, helping envision different possible futures. Such an approach could be taken up in design research as well as its pedagogies, and it also offers a pattern that could be followed more generally in cybernetics, making its transdisciplinarity more situated, accessible and critical.

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(2019), a version of which was presented at the same conference.

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