

Epistemological Positions Informing Theories of Design Research: Implications for the Design Discipline and Design Practice

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Abstract

Design research is not simply concerned with speculations regarding the relationship of theory and practice. Design research also brings out significant questions regarding the nature of research and the position of the doctorate in university education. This paper presents analyses of examples of objectivist, constructionist, and subjectivist theories of design research. The assumptions that underpin their perspectives are outlined, their powers of generalisation considered. The implications for the position of the design discipline in relation to the greater academic community, and the characterisations of design practice that they contain, are drawn out. The paper concludes by considering the pedagogical implications of the role of disciplines in the knowledge building cycle between research and professional practice.

Keywords

Pedagogy; Philosophy;

The issue of designing in design research is significant because it poses questions about the nature of research in general. This aspect of design research is centred on the question of the relationship between what we do and what we know. There are many different ways in which this question is raised in the design research literature, and many useful answers have been given. However, the significance of these answers is difficult to establish because their terms of reference are often unclear. A large number of different terms have been used to refer to designing in research and these terms are often used synonymously as methodologies, approaches, perspectives, and philosophies as if they are all comparable (Niedderer & Roworth-Stokes, 2007, p. 7). A framework that organises the epistemological aspects of design research is needed to make meaningful distinctions between the different positions.

A Knowledge Framework

Michael Crotty (1998, pp. 2-9) frames the research process by epistemology, theoretical perspective, methodology, and methods. Epistemology is the theory of knowledge that defines what kind of knowledge is possible and legitimate. Theoretical perspective is the philosophical stance that grounds the methodological logic and criteria. Methodology is the strategy that links the choice of particular methods to the desired outcomes. Methods are the techniques used to gather and analyse data related to the research question or hypothesis. The four parts of the framework are arranged hierarchically so that all the different methods are contained within three epistemologies: objectivism, constructionism and subjectivism.

Each epistemology contains assumptions about nature of the world and these assumptions are in turn embedded in the particular methods. For example, research conducted using the method of participant observation is one of many embedded within the methodology of ethnography, which has been adapted by symbolic interactionism, which is one theoretical perspectives within constructionist epistemology. It follows that the assumptions about how we know what we know that are embodied within constructionist epistemology are also embodied within the findings collected through the method of participant observation.

Crotty's knowledge framework suggests clearly defined distinctions between the three epistemologies, but it is important to recognise that within each category there are strong and weak versions. For instance, phenomenological research is categorized as constructivist; however, it is a broad term that can encompass approaches that range from thoroughly objectivist to

thoroughly subjectivist. Consequently, it is important to note that each epistemology represents a spectrum of approaches rather than a homogenous class. With this qualification in mind, it is useful to identify the assumptions that underpin each epistemology.

Objectivism maintains that a meaningful reality exists independently of the mind, that entities carry intrinsic meaning within them as objects, and that we can discover this objective truth if we go about it in right way. Constructionism maintains that meaning is constructed through our minds interacting with the world, which implies that people in different cultures or eras construct meaning in different ways even in relation to the same phenomenon. Subjectivism maintains that meaning is imposed by people's minds without the contribution of the world, there is no truth or meaning independent of the mind. Crotty's framework usefully connects the theory of research to the practice of research, places the opposition of quantitative and qualitative procedures at the level of methods, reveals the assumptions that underpin particular research models, and identifies the limits of their generalizations.

Epistemological Positions in Design Research

In our recent literature review (Feast & Melles, 2010), we analysed a series of articles concerning design research using Crotty's framework as a reference point. The articles included in the review were selected from a bibliography of approximately 300 journal articles, conference papers, book chapters, and state of the art reviews. The bibliography was developed from database searches, existing design research bibliographies sourced from the World Wide Web, and from research and teaching experience. The articles listed in the initial bibliography were then verified and their ability to be accessed checked. The remaining 150 articles were then ranked by relevance according to key words, and then by the number of times each article had been cited in www.google.scholar.com. Twenty-eight articles were reviewed with the aim to explore the complexity of the issue, rather than seek statistical generalization. We identified articles presenting broadly objectivist (Bayazit, 2004; Durling, 2002; Durling & Friedman, 2002; Friedman, 2003; Langrish, 2000; Melles, 2009; Mullins & Kiley, 2002; Owen, 1998), constructionist (Archer, 1995; Biggs & Buchler, 2008; Biggs & Büchler, 2007; Cross, 2001; Dorst, 2008; Frascara, 2007; Hockey, 2003; Hockey & Allen-Collinson, 2000; Margolin & Margolin, 2002; Pedgley, 2007) and subjectivist (Candlin, 2000; Cazeaux, 2008; Dilnot, 1998; Frayling, 1993; Gray & Pirie, 1995; Newbury, 1996; Prentice, 2000; Rust, 2002) models of design research.

The objectivist position is illustrated by Ken Friedman's outline of the conditions for theory construction in design (Friedman, 2003). Friedman maintains that theory construction involves systematically building knowledge through converting tacit knowledge into explicit knowledge. The constructionist position is illustrated by Nigel Cross's model of designerly ways of knowing (Cross, 1999, 2001). According to Cross, this model of design research is concerned with developing design knowledge through intellectual reflection upon making and using artefacts. The subjectivist position is illustrated by Christopher Frayling's model of research for art and design (Frayling, 1993). Frayling claims that a cognitive tradition of direct making which constitutes research can be identified and that research following this autobiographical approach is concerned with personal development. Each model contains epistemological assumptions (Crotty, 1998, pp. 7-9). Objectivist research distinguishes facts from people's everyday meanings. Constructionist research places all meanings, scientific and non-scientific, on an equal basis; all are constructions and none is truly objective or generalizable. Subjectivist research concerns personal expression and its claims cannot form significant generalizations. In addition to affecting the status of research claims, epistemological positions locate the research in relationship to the greater academic community.

The epistemological positions locate design in either Isolationist or Situated relationships with other disciplines (Biggs & Buchler, 2008, p. 6). The Isolationist position claims that design research is somehow special and should be granted special criteria and regulations. In contrast, the Situated position maintains that because design is positioned in a comparative competitive environment, it must place itself in relation with its peers by finding commonalities with the academic community as a whole. By arguing that direct making is research, Frayling (1993, p. 5) separates design research from established paradigms of research, therefore, research following his model of research for art and design takes the Isolationist position. Cross's emphasis on individual reflective

practice would appear to place his model of design research within the isolationist position; however, Cross (2001, p. 55) explicitly acknowledges that the design discipline must embed itself within the intellectual tradition of the university and demonstrate standards and criteria match those of the other disciplines. This model takes the Situated position. Friedman's (2003, p. 520) model of theory construction based on explicit statements as the basis of research in all disciplines aligns his perspective with the Situated position. The relationship between research and the academic community also implies particular pedagogical forms within doctoral education. Doctoral research undertaken in a subjectivist mode emphasises research as a personal journey that gains knowledge for an individual, while objectivist oriented research places emphasis on training in transferable research skills.

The three models of design research also imply characterisations of design practice. Friedman's designer is a professional knowledge worker who addresses problems in many different knowledge domains. For Cross, the designer is a reflective practitioner who attempts to understand the meaning of her own work. Frayling's model envisages the designer as a lone creative genius. The models characterise designing as problem solving, reflective practice, or direct making. Problem solving and reflective practice focus on designing as a process, whereas direct making concerns the crafting of objects.

Design practice and design research

The object-centered approach grows out of the guild tradition, which transfers a rich stock of tacit knowledge embodied in the skills and techniques passed down from the master to the apprentice through many years of ritual and imitation. This tradition produces a form of habituated know-how that allows the individual craftsman to respond intuitively to specific situations. This form of tacit knowledge remains an aspect of professional practice today, however, modern education can not afford the decades of training that are required for traditional guild style craft education (Friedman, 1997, para. 66). Today, design education is changing from the object-centered master-apprentice model of the guild tradition to the theory driven problem solving approach characteristic of a university discipline.

Recent ethnographic research into modern design practice has revealed that designers do not work as lone creative geniuses, more often designers work collaboratively in interdisciplinary teams (Arias, Eden, Fischer, Gorman, & Scharff, 2000; Bucciarelli, 1994; Chiu, 2002; Guinan, 1986; Lauche, 2005; Minneman, 1991; Olson, Olson, Carter, & Storrosten, 1992; Sonnenwald, 1993, 1996, 2007; Walz, 1988). This change in design practice implies that the object-centered approach to design that underpins Frayling's subjectivist model of design research, no longer represents the reality of professional design practice. Design research concerning design "practice" undertaken within Frayling's subjectivist approach would then be subject to a series of misunderstandings (Krippendorff, 1995; Poggenpohl, 2009, pp. 15-16):

- Designers are lone craftsmen that create an autobiographical design. This myth denies the history of design as well as undermining teamwork and collaboration. In addition, challenges that fall outside the craft education paradigm are neglected.
- Designers are not analytical and aim at holistic responses. This implies that designers cannot break problems into sub-problems, so tend not to ask interesting questions and are unable to criticise existing research.
- Designers do not write. This has the consequence that seminal ideas and prototypes are not recognised, literature on design remains disconnected and that the domain of design knowledge becomes colonised by other disciplines.
- Designers endlessly search for the "new". Without a robust foundation of disciplinary knowledge, ideas are endlessly repeated, the process of knowledge building is not understood, and the accumulation of knowledge is impeded. In addition, science is misunderstood as expounding truth and certainty rather than as an evolutionary process.
- Designers should be competitive both inside the design profession and outside it. This misunderstanding resists community building and isolates design from other disciplines.

- Designers focus on the practice of doing design. This focus on doing design means that designers tend not to analyse why or how they do what they do.

Object-centered design work has been concerned the aesthetic aspects of products and so has tended to work towards the end of the development process after many of the key decisions had been made. Design as a process is more complex and requires knowledge and greater depth of expertise than a solo designer can ever individually possess. This forces designers to move beyond surface concerns with aesthetics to investigating what people actually do, what they value, and how they understand things (Poggenpohl, 2009, p. 19). This human-centered approach requires that designers work with sociologists, anthropologists, psychologists, engineers, and other stakeholders to understand the interaction between people and their environments. This also requires that designers participate in decision-making at the beginning of the development process, where the parameters of design problems are still undefined, and collaborate with different stakeholders. This change towards collaborative work implies that the skills and knowledge that designers need in order to collaborate effectively with stakeholders are different than those that characterize the object-centered craft tradition. The necessity of collaboration requires designers to possess the analytical, logical, and rhetorical skills that form the basis of a profession supported by a discipline.

Disciplines support professions by providing analytical tools to question assumptions and by developing generalized explanations, principles, and theories that can be put to use by people in other times and places. Disciplines work by building knowledge within the domains of their inquiry by scaffolding new knowledge on previous knowledge through criticism, application, and reflection. This process requires a cycle between tacit and explicit knowledge (Friedman, 2003, p. 520; Wenger, 1999). Because tacit knowledge is embodied in craft practices and habitual behavioral patterns, it must be converted into articulate statements in order to allow the construction of theories that can be shared, contrasted, tested, and reflected upon. Generating empirical evidence and developing generalizable answers allows designers to address timely problems rather than repeat past mistakes (Poggenpohl, 2009, p. 14). Building a rich stock disciplinary knowledge is essential to design because it forms the foundation from which collaboration can proceed.

Michael Middleton (1967, p. 103) identifies a number of different forms of collaboration in professional design practice including: forms of association between individual people; forms of association between independent firms within a single profession or independent firms in different professions; single practices in which different skills and disciplines are associated; single firms that practice a large measure of devolution, either geographically among their various offices or in the creation of semi-autonomous teams within one office; and offices organized democratically rather than hierarchically, in which decisions are reached through discussion by the group rather than passed down through a chain of command. These different forms of collaboration can be differentiated in terms of their relationship to disciplinary knowledge as multidisciplinary, transdisciplinary, or interdisciplinary.

Multidisciplinary work involves different disciplines approaching a problem in parallel or sequentially without challenging their disciplinary boundaries; transdisciplinary work seeks to unify disciplinary differences in a holistic way; interdisciplinarity works by integrating different disciplinary insights and confronting their differences with the aim to produce a new understanding that takes those differences into account (Choi & Pak, 2006, p. 359; Repko, 2008, p. 20). True interdisciplinarity is very difficult to achieve and many self-styled interdisciplinary enterprises actually work at the multidisciplinary level. Multidisciplinary collaboration occurs, for instance, when a group of people from different disciplines cooperate by working together on the same problem toward a common goal, but continue to do so using theories, tools, and methods from their own discipline while occasionally using outputs from each other's work. While they work together, they remain essentially within the boundaries of their own disciplines, both in terms of their working practices and with respect to the outcomes of the work (Rogers, Scaife, & Rizzo, 2005, p. 266). Design practice that seeks to solve complex problems and develop new knowledge is necessarily interdisciplinary.

Interdisciplinarity is not anti-disciplinarity even though it recognizes the limits of a single discipline's power to solve complex problems. Because interdisciplinary work integrates different perspectives it is characterized by negotiation and argumentation, and so a strong foundation of disciplinary knowledge is needed in order to support effective communication, sharing, contrast, and

evaluation of insights. Without a strong disciplinary grounding, designers working in interdisciplinary collaborative situations are disadvantaged because their ability to contribute lacks rhetorical strength (Poggenpohl, 2009, p. 13).

Conclusion

The increasing need to produce research in design is also influenced by economic necessity. Many university departments in Australia, New Zealand, and the UK, for instance, receive funding based in part on the levels of their students. Undergraduates count little, Masters students more, and Doctoral students most of all. Budgets are also affected by the amount of research each department produces, defined by the number of conference papers, journal articles, books and other outputs that each faculty member publishes. Accordingly, the demand to publish and supervise research has seen the concept of practice-based research quickly become embraced within many design departments. However, there is considerable variation, disagreement and misunderstanding across universities internationally regarding the nature of practice-based research and in particular how it relates to doctoral education in design. Consequently the rigor of practice-based doctorates has become the subject of significant debate and an important topic of major international conferences and publications.

The subjectivist position that all practice is research and that written text is unnecessary is often based on the idea that all designing is a form of creative investigation, therefore, a designed object can make an original contribution to knowledge in its own right. This corresponds to the understanding of the practice-based doctorate as a personal journey that gains knowledge for an individual. Arguably, a limited understanding of the nature of research coupled with a tradition of object-centered design practice has seen an attempt to elevate the designed artifact to the status of research and to accentuate the practice-based nature of design as the distinguishing characteristic of the discipline. The problem with the rush to legitimize practice-based research as the defining trait of the design discipline is that it may appeal to students and academic staff who have limited exposure to academic scholarship and an impoverished view of research methodology. This desire for disciplinarity through the emphasis on object-centered design in fact introduces a vicious cycle that undermines the legitimization of design through producing poor research and under-theorizing design.

Focusing on personal expression short-circuits the knowledge building cycle between research and professional practice. Unless research develops knowledge that can be tested, applied, and reflected on by other people in other times, it creates a gulf between research and practice, and reduces design to concerns with surface aesthetics. Subjectivist design research is based on the mistaken idea that design practice is opposed to the application of systematic methods and the erroneous belief that systemic inquiry is at odds with creativity. These factors contribute to limiting design practice to unique cases and the simple repetition of past knowledge. In order to move beyond ad hoc approaches to collaborative problem solving, research and theory is needed that develop broad explanatory principles that can meet complex, large-scale needs in comprehensive, sustainable, cost-effective, predictable and measurable ways.

Further research

Research concerning interdisciplinary collaboration in design practice has been a concern of the tradition of second-generation design methods, in particular regarding Horst Rittel's argumentative model of approaching wicked design problems (Rittel, 1984; Rittel & Webber, 1973). Rittel (1984, pp. 323-324) mapped out three paths for further research in developing the argumentative model of the design process: 1) Refinement of the argumentative model of the design process and the study of logic of the reasoning of the designer in terms of the rules for asking questions, generating information and making decisions; 2) Practical procedures for implementing the argumentative model, such as how to foster the process of group argumentation, how to select the group, and problems of the decision rules; 3) The technical manner of supporting the instrumental version of the model through administrative and computer based aids. Research into the second and third paths mapped out by Rittel has been particularly strong. Co-design and participatory design have developed significant research and techniques for implementing the argumentative model, with emphasis on incorporating users input into the design process (Sanders & Stappers, 2008).

Research in human-computer interaction has contributed to developing the technical means of support for the instrumental version of the argumentative model through software for the systematic management of information and computer supported cooperative work (Arias, et al., 2000). Arguably, empirical research within the first path concerning the study of the ways in which designers ask questions, generate information and make decisions has been less focused and comparatively underexplored. While there has been research on similar aspects in the fields of cognitive science, knowledge management and organizational studies for instance, there has been less research with a specific focus on design.

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