What Design Research Offers to Psychologists

A Review of

The New ABCs of Research: Achieving Breakthrough Collaborations
by Ben Shneiderman
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Reviewed by

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What can psychologists learn from an inventor who has been at the forefront of the design of computer interfaces and who has written a book on research methods? Quite a lot, as this book demonstrates. And this is a propitious time, when psychology as a science and its application to solving social problems are topics of debate.

First a note about my connections to the author. Before my retirement, we were both professors at the University of Maryland (but in different administrative units). We met 20 years ago when we were assigned to teach during adjacent hours in the same classroom. I became intrigued with the models for visual data presentations he was setting up to show to his computer science students. I began to follow the work underway in the University of Maryland's Human Computer Interaction Laboratory, which Shneiderman founded in 1983.

The book presents an approach originating in the hard sciences and engineering, where Ben Shneiderman has been recognized by election to both the National Academy of Engineering and the National Academy of Inventors. I am reviewing this book to alert psychologists to emerging models of design thinking in research that could be applied to the social sciences and psychology.

The author makes two different three-part distinctions. The first is between Applied, Basic, and Combined Research (the ABC of the title). The second is a distinction between Science, Engineering, and Design (SED). This is his explanation: "Scientists seek to understand the world as it exists, while engineers build system and services . . . based on stated requirements for efficiency. . . . In contrast, designers gather requirements and then seek open-ended possibilities through iterative social processes that include diverse stakeholders, so as to create novel, often unexpected outcomes" (p. 3).

During early phases of design research, users' needs are analyzed, and the problem is defined (assuming possibilities for redefinition later in the process). Then initial solutions are proposed (or prototypes designed). These are collaboratively discussed and subject to

iterative evaluation. Revised solutions are proposed and evaluated together with the overall design concept. Then the product, service, or solution is deployed and evaluated over time. Future enhancements are considered.

In addition to describing what this process is, the author also proposes that design research should tackle actionable problems that deal with civic and global priorities (even giving an example of the UN's Millennium Development Goals). He also considers ways that design research could address problems important to cognitive psychologists (e.g., the nature of expertise) and community psychologists (e.g., sense of community in urban neighborhoods). The early chapters of the book elaborate the distinctions and then deal with how science, engineering, and design contribute to understanding the world, to developing innovative technologies, and to serving human needs.

One chapter titled "Form Teams With Diverse Individuals and Organizations" will be of particular interest to psychology researchers. The author gives a number of substantive reasons for promoting teams in his approach to research. "Working in a team, even of two, requires explicit coordination and puts pressure on each partner to deliver . . . there is a strong incentive to demonstrate excellence to partners . . . junior members learn from research leaders, while senior members are exposed to new technologies." (p 165). He further advises researchers to include a substantial number of team members who have successful collaborative experience (and a positive attitude toward collaboration). He argues that teams should include women and men as well as individuals from different cultural perspectives. (These recommendations are congruent with recommendations of a recent publication from the National Research Council, 2014, on international collaboration in the behavioral and social sciences.) He proposes specific ways in which experienced leaders of design research function, for example, giving structure to brainstorming and using specific collaboration strategies to draw on past strengths while seeking new approaches. This is important not only in efforts to design physical objects or technology systems, but also in designing interventions or approaches to deal with social and civic problems.

The Kinds of Problems Where Design Research Could be Especially Useful

Shneiderman refers to an intriguing book on the philosophy of design, which adds perspective to his overall approach. Nelson and Stolterman (2012) distinguish between what they call the "tame problems" and the "wicked problems" with which designers deal. In solving a tame problem it is possible to control conditions and specify treatments for experimental groups, for example. The researcher may be able to ignore the context in which solutions are being tried or the ideological orientations of those who are recommending particular approaches. In contrast, wicked problems are complex and often ambiguous. No exhaustive list of solutions can be formulated; solutions cannot be tried without considering the context (and also how the problem is defined by various constituencies). I would add that problems become particularly "wicked" when they are presented as constituting a crisis, when interest groups are vying to promote mutually exclusive solutions or when unanticipated aspects of a problem emerge during an intervention (illustrated in a piece of educational design research conducted by Valencia and Parker, 2015).

Shneiderman suggests that a first step is to identify problems that can be explored by design more effectively than they can be explored by using the scientific method alone. In psychology there are many such problems, which I prefer to call "problems in the wild" to contrast them with "tame problems" (which also avoids the connotations of the term "wicked"). To give just two examples, social psychologists trying to understand how nationalistic attitudes influence political choices and developmental or clinical psychologists trying to reduce the incidence of bullying are facing "problems in the wild." It could be argued that community psychologists are nearly always facing "problems in the wild" and could find design research of particular value.

I have been able to find only a few explicit references in the psychological literature to this overall approach: a chapter by Penuel and Frank (2016) in the *Handbook of Educational Psychology* contains a short section on *design-based research* and its roots in engineering. More general coverage of design-based research in education can be found in a handbook edited by Kelly, Lesh and Baek (2008). With all its potential strengths, these authors point to the lack of generalizability of the findings from design research studies. This point deserves serious consideration by psychologists. However, when the problems to be addressed are found within complex settings and contexts, the use of design research principles (either in the research itself or in reviewing existing research) may provide insights that are not otherwise likely to emerge.

A Few Weaknesses and Specific Strengths of the Book

There are minor shortcomings to Shneiderman's book in general and for psychologists in particular. Some of the case studies found throughout the book are better illustrations than others of points made in the text. Some of the proposals are more applicable in the hard sciences than the social sciences (that is, for the design of objects rather than of approaches to social problems or programs). However, the author makes the work more credible by concluding each chapter with a section titled "Skeptics Corner" that enumerates and addresses challenges to his ideas.

There are a number of very positive features in the book. A Design Research Roadmap for the next ten to thirty years is proposed. It could fruitfully be debated and potentially be applied in psychology. Because of the author's expertise in data visualization, the book contains an unusual number of useful graphics (e.g. connecting links across clusters of researchers, mapping scientific publication, and depicting the elements of generalized research ecosystems). The book includes a chapter of candid advice that will be of special interest to early career researchers across fields. Here one finds suggestions about how to get one's publications cited but also how to get one's innovative designs or ideas recognized and implemented in policy, program design, or practice.

Overall this book suggests new ways of looking at many problems that psychologists seek to address. Many are approaches that have become feasible with recent technological advances. In short, this excellent book presents innovative ideas about applied and basic science that are applicable to psychological research (and could ultimately increase its scope and value).

References

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