Examine interpretations of Schön’s work in recent CAAD research

CHRISTIANE M. HERR
College of Architecture and Urban Planning, Shenzhen University
ydnac@graduate.hku.hk

Abstract. Donald Schön embraces a constructivist approach to learning and research, characterising designing as a reflective conversation between designer and the materials of a design situation. Accordingly, Schön’s views on digital design support are based on his valuing of indeterminacy, surprise and ambiguity as opportunities to develop new understanding and insight. His criticism of technical rationality is directed towards the privileging of formal and codified knowledge over embodied and tacit forms of knowing. While Schön’s work is increasingly acknowledged in recent CAAD research, respective publications typically remain within the technical rationality perspective. Based on several characteristic examples, this paper examines how Schön’s ideas are absorbed into a perspective incongruous to his own, concluding with a discussion of potential new research approaches that sustain Schön’s values.

Keywords. reflective practice, constructivism, design theory, Donald Schön, epistemology

1. A Sketch of the Argument

Within the CAAD research field, Schön’s (1983) description of designing as reflective practice has a lasting impact. Studies on subjects ranging from tools and systems development to design cognition and education have adopted and built upon concepts originally proposed by Schön, such as his characterising of designing as a “reflective conversation with the materials of a design situation” (Schön, 1992) and his model of design processes as successive activities of “framing, moving and reflecting” (Schön, 1985). In the context of
education and research, Schön argues for the recognition of professional forms of knowledge. He criticises the privileging of explicit and theory-based academic forms of knowledge over tacit and intuitive forms of knowing that characterize professionals’ expertise, which enable practitioners to deal with ill-defined challenges that are at once unique, complicated, difficult and messy. Navigating the “swampy lowlands of practice” (1987, p. 3), practitioners engage in open-ended dialogues with specific contexts, which are likely to develop in unplanned and surprising ways. Remaining open to and recognising the potential for new insights inherent in surprises and puzzlement thus forms an essential skill of competent professionals. Schön’s research on practitioners’ ways of working and learning is strongly based on studies involving architectural designers, students and teachers. In addition to architects’ ways of utilising sketches throughout the design process, he also examined how computers could support reflective conversations of architecture students (Schön, 1992), and drew attention to the importance of surprise in order to elicit reflection and thus, learning and development of new ideas.

In the CAAD research field, a growing number of references to Schön’s body of work in recent studies indicates increasing popularity and significance of his ideas. Many studies referring to Schön’s ideas however develop along a positivist and technology-centred line of thought. This perspective tends to view designing and design support in terms of tools, techniques and formalised encodings. It thus inherently conflicts with Schön’s human-centred constructivist approach. In the following, I contrast Schön’s work and its underlying epistemology with interpretations of his work in recent work in the CAAD research field. I specifically refer to work presented at CAADRIA and its related conferences and journals as this is where a discussion of contradictions between the perspective of technical rationality and the constructivist perspective seems most relevant. This discussion in Sections 3 and 4 leads to a reflection on future research directions and approaches based on a reconsideration of Schön’s ideas in Sections 5 and 6.

2. The Epistemology of Reflective Practice

Describing practitioners’ ways of working as “reflection in action”, Schön (1983) introduced a notion that captures essential aspects of practitioners’ experiences and resounded with architectural designers. According to Schön (1992), design processes can be described as designers’ engaging in a “reflective conversation with the materials of a design situation”. Such design conversations are cyclical in nature and typically develop in unpredictable ways. Reflecting on surprising outcomes of proposals developed in response to design tasks,
designers form new insights by constructing and reconstructing the objects and relations with which they deal. This ability to construct “personal design worlds” enables designers to continuously create and to respond to changing design tasks as well as goals. Designers’ ways of responding to design challenges can thus be characterised as intuitive, fluid and open-ended. Schön embraces a constructivist viewpoint, building upon Goodman’s notion of “worldmaking” initially, and later drawing on Piaget’s and von Glasersfeld’s radical constructivist ideas (Kinsella, 2006). Emphasising the role and value of subjective reasoning in designers’ ways of approaching design tasks, he objects to positivist conceptions of designing in rational terms of goal setting, constraints, rules and optimisation. Throughout his writings, Schön articulates a thorough critique of what he calls “technical rationality”, the separation of knowledge from doing that emphasises propositional knowledge over practical competencies. Rejecting disembodied, objective notions of knowledge and scientific approaches as they dominate positivist philosophy based perspectives and research (Kinsella, 2007, p. 111), Schön instead promotes an epistemology that questions the relevance of research-based theory and technique in the context of designing (Schön, 1987, p. 3).

With his thinking grounded within a constructivist perspective, Schön gives much attention to practitioners’ ability to make sense of and derive new insights and knowing from indeterminate tasks and contexts. Studying designers’ ways of working with sketches, Schön and Wiggins (1992) draw attention to the indeterminacy of design situations and the potential that precisely this indeterminacy holds for developing multiple interpretations and new insights. Sketches perceived as ambiguous allow designers to “see” - to recognise, detect, discover, appreciate - more than what was originally intended when producing the sketch (Schön, 1992, p. 133). In this context, indeterminacy and ambiguity can be considered facilitators of new ways of seeing and thus of surprise and new insights.

3. Digital Support for Reflective Practice?

While acknowledging the special nature of designing and practitioners’ ways of knowing, CAAD research continues to adhere strongly to research approaches that are based on the technical rationality mindframe that Schön consistently challenges throughout his work. This may be due partly to the educational background of many CAAD researchers and a focus on technical development of design tools, but likely stems from the widely held separation of designing, understood as applied designing, and research, which is generally understood in terms of scientific research. The separation strongly influences the way studies
are planned and carried out. As Goel (1995) has shown, computational theories conceive of cognition in precise, rigid and discrete notations, whereas designers typically work with dense, ambiguous and changing notations to support designing. Similarly, Schön (1983) emphasises the designer’s continuous “framing” and “re-framing” of design tasks in a cyclical process of reflection, where perceptions of tasks and design responses develop in parallel. The focus in Schön’s writings thus remains on the designer and his “world-making” rather than on the potential of observations for objective, generalisable knowledge extraction. For this reason, Schön typically recounts detailed observations and protocols of design processes to argue his position, and refrains from creating elaborate theoretical models.

In his later years, Schön became increasingly interested in computer software, in particular in software developed to support design processes. In an interview with John Bennett, Schön (1996) describes designers’ experience of surprise in conversation with a software as essential to support learning and insight. He further explains how the support a particular software gives to designers does not necessarily depend on the initial intentions of the software programmer, but more on the quality of the conversation and the experience of surprise that the software enables. Similar observations in developing digital tools for designers are reported by Herr and Fischer (2007). Reflecting on the potential of computers in the field of architecture and design, Schön (1992) discusses possible approaches to this challenge, in particular in relation to Artificial Intelligence research. He argues that the attempt of design research, in its Artificial Intelligence version, to capture design knowledge by embodying it in procedures expressible in computer programs, is ill-conceived: “Symbolic, procedural representations of tacit design knowledge are bound to be incomplete or inadequate in relation to the actual phenomena of designing” (ibid., p. 131). Schön concludes that software developed to perform similar to the ways in which designers perform could at best be envisioned within “a highly restricted situation, a narrowly defined chunk of a design process, where the design world employed by designers can feasibly be assumed as given and fixed” (ibid., p. 146). Rather than producing knowledge systems phenomenologically equivalent to those of designers, Schön recommends developing design assistants in the form of environments that help designers to discover and reflect upon their own design knowledge (ibid., p. 147).

4. Diverging Pathways

Recent studies in the CAAD research field often refer to the notion of design as reflection in action, or reflective practice (Schön, 1983) as well as a paper by Wiggins and Schön (1992) on the way different kinds of seeing enable
designers to engage in a “reflective conversation with the materials of a design situation” (Cross, 2005). Many recent CAAD research studies that refer to Schön’s works are directed towards developing tools and systems to assist designers during the process of designing. A smaller number of studies focuses on educational aspects of CAAD-related teaching. In the following, I discuss perspectives and assumptions usually held in common by recent studies, drawing on several specific, but also characteristic examples.

Studies concerned with tool development based on Schön’s work typically propose digital tools to support reflective conversations in the form of digital resources such as expert systems or automated design assistants that take over a certain extent of designers’ doing and/or reflecting. Discussing the usefulness of CAAD tools at the early design stages, Gero and Kelly (2008) for example suggest CAAD-based flexible drawings, represented appropriately in different contexts by “situated interpretation agents”. Their work is based on the Cocktail Napkin (see Gross 1996), a sketching support tool which identifies symbolic drawing notations in order to facilitate the development of loose sketches into formal schematic drawings. Both studies see CAAD tools as ways to automatically convert ambiguous rough drawings into well-defined or “appropriate” drawings. Gero and Saunders (2001) further argue that computers can now do what Schön and Wiggins (1992) claimed they cannot, and propose a model for simulating designers’ ways of seeing. This includes software-based perception of unintended consequences of design actions, modeled as “adaptive novelty detection”.

Contrary to Schön’s emphasis on open-ended, surprise-enabling dialogue, studies oriented towards tool or theoretical model development similar to the examples briefly discussed above typically emphasise the tool or system. This often results in efforts to develop descriptions of designing in well-defined and unambiguous terms. Similarly, dialogues between designers and tools are conceived as taking place in machine terms, in a controlled exchange within predetermined contexts. Schön’s critique of technical rationality (Schön, 1983), his advocacy of alternative forms of knowledge (Kinsella 2007) and his repeated emphasis of the central role of surprise in both educational as well as design processes (Schön, 1996) seem to have little bearing on the widespread desire to define, categorise and capture designers’ ways of thinking and working within a tight operationalised framework. Consequently, appreciation of uncertainty and surprise is rarely found in current CAAD research. The prevailing way of building upon Schön’s ideas seems to be that of supporting designers by assigning aspects of their work to computers in order to optimise or amplify design processes, becoming ever more ambitious regarding the extent of human design capability replaced by digital tools, as in the case of Gero and Kelly (2008) or Gero and Saunders (2001). This interpretation however seems quite
different from Schön’s original observations and suggestions. A design assistant to “enhance the designer’s seeing-drawing-seeing” as suggested by Schön (1992, p. 146) does not necessarily have to take over the designer’s seeing or drawing. Another line of thinking to approach this challenge is to embrace and amplify the perceived ambiguity of drawings and augment the designer’s surprise and insight instead, as suggested by Herr and Karakiewicz (2007). This strategy aligns with recent work in the field of human computer interfaces (HCI), where Gaver et al. (2003) and others have argued for ambiguity to be recognised as a resource for design rather than a shortcoming. Similar to work in the CAAD research field (such as the approach described by Gross 1996), most previous HCI research work has tended to see ambiguity as a deficiency. Interfaces and systems maintain or support ambiguity only as long as needed to resolve it (see for example Mankoff et al. 2000).

Studies focusing on CAAD education typically relate to Schön’s (1983) concept of reflective practice as it appeals to designers as well as to educators. But as Achten and Reymen (2005) argue, reflective practice is difficult to formalise in terms of clear definitions or prescriptive criteria that indicate what constitutes “good naming, framing, moving, and evaluating” that lead to “good design” (p. 289). Other educational studies seem more prepared to acknowledge and build upon the constructivist underpinnings of Schön’s notion of reflection in action. Datta et al. (2001) for example suggest pedagogical schemas to promote “higher-order strategies” in the context of digital media education to enable constructive learning situations.

In many cases however, Schön’s work is merely seen as a general framework to understand design processes. Olmos (2007) for example proposes a new way to enhance the process of reflection-in-action in the design studio, based on digital media and virtual reality technology. He refers to Schön’s notion of “knowing in action” and “reflective practice” and argues that “training is the keystone of the learning process in arts and design” (p. 639). The virtual training tools Olmos develops based on this viewpoint are conceived as directing design processes and emphasise control, effectiveness, training and design goals. Although he refers to Schön’s work as his theoretical foundation, both the aims of the study and the language of reporting, which stresses words such as “experiment”, “evidence” and “proof” remain firmly rooted in the technical rationality paradigm.

5. Design Inquiry in the Spirit of Schön

Although a growing number of studies in the field of CAAD research are based on notions such as “reflective practice” or “knowing in action”, few seem to
understand Schön’s work as a challenge to “technical rationality” or as a questioning of scientific research approaches into and for design (see Frayling, 1993). Based on the previous discussion, it seems that superficial distortions of Schön’s ideas are being incorporated into the repertoire of notions and concepts that are canonically referred to as a basic theoretical framework without further questioning. Schön’s writings on the nature of design processes and on potential digital support for such processes can be understood as a deeper challenge to CAAD research. His work provides a basis to rethink CAAD research in terms of its subjects and aims as well in terms of the research approaches with which these subjects are investigated.

Where CAAD research tends to be focused on creating knowledge by defining generalisable theoretical models, Schön does not understand practice or designing as the application of knowledge to action. For him, reflective practice is enacted, with reflection and action forming one concept that can hardly be separated from one another. Schön considers surprise and puzzlement central in creating opportunities for learning and insight, and illustrates this by describing how designers generate surprise and insight by switching between different kinds of seeing when sketching (Schön and Wiggins, 1992). Schön (1983) distinguished between reflection in action, which he characterised as “thinking on our feet” while engaged in an ongoing process, and reflection on action, reflecting on past experiences and processes. Recent approaches to design research tend to posit CAAD research as reflection on action only, maintaining a separation between (scientific) research and applied design. As Glanville (1999) argues, scientific research can be considered a restricted form of designing. Scientific research processes can thus be seen as processes of reflection in action as well as processes of reflection on action. While Schön’s emphasis on surprise and puzzlement is typically understood and considered mostly in the context of reflection in action, reflection on action also involves, and even requires, opportunities for puzzlement and surprise to enable new understanding and insight. To facilitate such opportunities in CAAD research, more flexible and process-based alternatives to conventional scientific research approaches may be considered. Action research or grounded theory for example are research approaches that integrate reflection in action with reflection on action, as shown in the context of design research by Herr and Karakiewicz (2008). Both research approaches are directed towards generating understanding, but remain grounded within specific observations and experiences.
6. Constructing Understanding

Much of design research, and along with it, CAAD research, seeks to strengthen the discipline by consolidating an approach to research that observes, among others, the hallmarks of purposiveness, methodical process, and generalisable, testable results (Cross, 1999). Despite advocating an independent discipline of design, the requirements for valid design research seem strongly based on conventional scientific research, which enforces the separation of applied designing and design research.

The nominalisation of knowing into knowledge divides understanding from the minds, processes and contexts it was acquired in. Schön typically avoids this tendency by promoting understanding through showing and detailed discussion of examples as an alternative to formalising observations into abstract models and theories. By providing examples, Schön enables readers to construct their own understanding, and possibly, to disagree with him. This openness to other, different kinds of ‘seeing’ is reflected in Gaver et al. (2003), who describe ways in which ambiguity can enrich exchanges between people and digital systems by offering spaces and opportunities for personal ways of seeing and experiencing. Similarly, Suwa (2004) reports on the success of a ‘cognitive training programme’ developed to train students’ awareness and ability to ‘see’ in multiple ways which is based on spontaneous, open-ended interpretation of drawings.

In the design research field, Schön’s choice to refrain from formulating elaborate theoretical models has consequently been interpreted as an insufficiently thorough and rigorous way of working. Dorst (2007) for example criticises Schön for not providing a description of possible a priori structures that design tasks and solutions might have, and for not addressing the questions of how frames are made, and what the properties of a good frame would be. Based on Schön’s constructivist approach, however, it seems unlikely that this type of formalising thinking is what he is aiming for in his research. It may be precisely the absence of rigid predetermined taxonomies and an emphasis on personal understanding on the part of the reader, facilitated through detailed discussion of examples that lends his work enduring appeal, particularly among practitioners. While Schön does not promote an absolute opposition to technical rationality (Kinsella 2007, p. 109), his work can be understood as an ongoing challenge to research approaches that focus on creating generalised and formalised representations of knowledge and design processes and rely primarily on scientific research methods.

Kinsella (2006) concludes her analysis of Schön’s epistemology by recommending that: “one of the relatively unexplored avenues for understanding reflective practice may well lie in deepening our understanding of constructivist
thought” (p. 285). In the context of CAAD research, this leads to several fundamental questions: Can positivist and constructivist epistemologies be integrated?

Schön never suggested discarding science and theoretical knowledge, but pointed to their particular limits and the necessity to give greater attention to embodied, tacit and process-based knowledge. The CAAD research field may benefit from more recent constructivist theory as it offers ways to relate designerly as well as scientific ways of developing understanding, as Glanville (2007) shows. Researchers in the CAAD field may benefit from becoming more aware and explicit of the epistemological assumptions underlying their work, not just to clarify and strengthen conventional positions, but also to support alternative developments integrating, continuing and strengthening a constructivist line of thought and research in the field of CAAD. This may provide a base for a renewed dialogue with Schön’s work that reflects his approach to learning and research.

References


