Design discussions in the Community and Place Studio at the University of Georgia's College of Environment and Design (image by author, 2023).

Building collective know-how: Part 1: A case for more procedural knowledge in landscape architecture

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This paper argues that building landscape architecture's procedural knowledge – defined as a collectively shared and critically examined understanding of the diverse ways landscape architects practice – is of critical importance to the profession and discipline, especially if the field desires to become more relevant and valuable to society as a whole. Knowing-how to plan, design and manage landscapes is the core knowledge-base of the field. Landscape architects' abilities to view complex situations holistically, engage in ethical deliberations, envision new possibilities and weigh alternatives from multiple perspectives are together the key to their expertise. Growing this expertise will help designers create designs that respond to the complex problems of today's society. More procedural knowledge is needed within the field so that: (1) landscape architects can learn from each other; (2) beginning landscape designers have clear models upon which to build expert knowledge; and (3) educators do not have to rely solely on their personal experiences when teaching design. Because good design practice responds holistically within particular circumstances, it can be challenging to develop transferable knowledge about design and planning practices, but models are available from practice research that suggest how it could be done.

Introduction

The Landscape Architecture Foundation's New Landscape Declaration states that 'landscape architects are uniquely positioned to bring related professions together into new alliances to address complex social and ecological problems' (Landscape Architecture Foundation, 2018, p xxiii). Perhaps landscape architecture can become a 'great mediator between nature and culture' (Corner, 1990, p 74); but, as many critics such as Hohmann and Langhorst (2005) and Fleming (2019) point out, landscape architecture has not yet fulfilled this vision.

Within academia, calls to strengthen landscape architecture's impact and relevancy argue for: more systematic research strategies and methodologies (Braae and Steiner, 2018; Deming and Swaffield, 2011; van den Brink et al, 2017), a better integration of research evidence into practice (Brown and Corry, 2011), stronger leadership by landscape architects within academia (Nassauer, 2023), and closer examinations into how design can be a research method (Abbott, 2018; Lenzholzer, Duchhart and van den Brink, 2017; Nijhuis and de Vries, 2019). The amount of landscape architecture research has increased significantly over the past decades (Milburn and Brown, 2016). However, evidence suggests that, in general, the outcomes of this research are not well-integrated into professional practice (Chen, 2013; Chen et al, 2017; Milburn and Brown, 2016).

Most of these calls for more research within the field focus on the development of substantive knowledge. This is the knowledge that can be widely shared about 'the nature of the environment and the nature of human and spatial and emotional behavior within it and responses to it' (Lang, 1987, p viii), often called 'knowing-what' or 'knowing-that'. The discipline has recently made great strides in developing its substantive knowledge through initiatives such as evidence-based design and landscape performance. Yet it has given less attention to how to develop and expand our procedural knowledge – that is, the understanding of the ideologies, processes, methods and principles that are involved in developing a design, or 'knowing-how' (Murphy, 2016; Ndubisi, 1997).

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In this paper, I use 'know-how' to indicate what an individual designer knows and applies while designing, which is often tacit, and 'procedural knowledge' to indicate the knowledge about designing that is shared across the profession and discipline. I define design as 'a locus where integration and synthesis of the natural, social, historical, technological, and built dimensions of knowledge occurs to provide practical and desirable landscape change' (Langley, Corry and Brown, 2018, p 19). Defined in this manner, design is an umbrella term that covers the spectrum of landscape architecture practices, including planning, site design and land management.

Building from these definitions, I make the case that landscape architecture's procedural knowledge is of critical importance to the profession and discipline, especially if the profession desires to become more relevant and valuable to society as a whole.

Historically, much of the knowledge about landscape architecture was developed through practice. Murphy (2016) provides an overview of existing procedural theory within the field. Books authored by practitioners and educators have long shared models of design processes (for example, Halprin, 1970; LaGro, 2013; McHarg, 1992; Steiner, 2000). Peer-reviewed articles also develop new concepts that can inform how one practices (for example, Nassauer and Opdam, 2008; Shearer, 2015). However, given that design is a core activity of landscape architecture, the explicit knowledge about how landscape architects design and how they learn to design is surprisingly limited.

Procedural knowledge can be developed from practice, research or some combination of both (Murphy, 2016); and, therefore, building procedural knowledge can also build stronger ties between the two. My current contribution to this endeavour is divided into two. Part 1 (this paper) makes the case as to why procedural knowledge is of critical importance to building and growing the profession. Part 2 (to be published later) proposes strategies and methods for building collective know-how in landscape architecture based on recent scholarship on reflective practice, practice-based research and practical wisdom.

Why landscape architecture needs more procedural knowledge

Over the years, the profession of landscape architecture has struggled with two aspects of its identity. First is the issue of defining its core expertise (Baird and Szczygiel, 2007; Deming, 2015; Fein, 1972; Langley et al, 2018; Weller, 2018). Second, it has struggled to demonstrate its relevance to society's most pressing problems, such as how to achieve the ideals of sustainability and equity (Brown and Corry, 2011; Fleming, 2019; Landscape Architecture Foundation, 2018; Melcher, 2019; Nassauer, 2023).

Building more procedural knowledge within the field can address both these concerns. Procedural knowledge can make significant contributions to the core knowledge-base of the profession. Additionally, it can prepare practitioners for the future of the profession, where knowing-how to apply information will be just as important as (if not more important than) the knowing of the information. And, finally, it can help practitioners respond to the complex political and economic realities that are at play within wicked problems such as climate change and achieving equity.

1. Knowing-how to design is landscape architecture's core knowledge

Landscape architecture has long suffered from an identity crisis (Baird and Szczygiel, 2007; Fein, 1972; Hohmann and Langhorst, 2005; Langley et al, 2018; Swaffield, 2007). According to Langley and colleagues (2018), part of the problem is that the 'unique knowledge, processes, and capacities of landscape architects – central requirements of a recognizable profession – are currently broad and largely undefined' (p 9). After reviewing standard knowledge domains defined within landscape architecture practice and education, they conclude that 'landscape architecture has no knowledge domains that would be considered unique to the profession' (ibid, p 19). They propose, instead, that 'the intersection of these domains and the focus on conceptualizing and guiding appropriate changes to the landscape might be the bases for landscape architects' uniqueness' and '*the ways the knowledge domains are applied* by landscape architects' could be its core knowledge-base (ibid, emphasis added). The irony is that out of all of the knowledge

domains they present, design is perhaps the least researched and least understood. By not strengthening its procedural knowledge, landscape architecture is weakening its own identity. With more procedural knowledge, landscape architects will better understand how design integrates multiple disciplines and perspectives, thereby better positioning landscape architects to be leaders in transdisciplinary research and practice (Ford, 2018; Nassauer, 2023).

2. Knowing-how to apply knowledge is as important as the knowledge itself

Landscape architects analyse, synthesise and apply a wide variety of information, values and evidence related to a place. Knowing-how to integrate knowledge and values within a project is as important as having the knowledge itself.

In their opinion piece, Brown and Corry (2011) argue that 'landscape architecture has the potential to be as important to the health and well-being of the landscape and the populations in it as medicine is to humanity' (p 329). In order 'to re-establish landscape architecture's respect, credibility, and leadership', they propose evidence-based landscape architecture, defined as 'the deliberate and explicit use of scholarly evidence in making decisions about the use and shaping of land' (ibid, p 328). They further argue that designs based on facts, not beliefs, are needed if landscape architecture is to be a responsible profession. In conclusion, Brown and Corry warn that 'ignoring the lessons of other disciplines' might diminish the importance of our already vulnerable profession (ibid, p 329).

Yet professionals in other disciplines, such as medicine, are realising that facts alone do not make for a successful practice. Malterud (2001) reflects that medical practice involves at least two tasks: understanding the medicine and understanding the patient. Understanding patients is more complex than simply applying research evidence, as she explains:

> There is, for example, much interobserver variation, which affects the accuracy and variability of assumed clinical facts, i.e., when reading of mammographic images. Also, laboratory research findings are affected by manipulation and interpretation. Furthermore, diagnosis of a disease is affected by a doctor's personal experiences, and is not always just a matter of objectively observable facts. (p 397)

Many disparities in the diagnosis and treatment of diseases come from a poor understanding of the patient rather than a poor understanding of the medicine (Kerkhoff et al, 2022). Similarly, landscape architects need to know not only the facts about landscapes but also how to integrate them into a proposed design. Although it is irresponsible for landscape architects to make decisions based on their individual beliefs alone, using facts alone can be equally problematic. The application of knowledge within landscape architecture requires an understanding of beliefs (the awareness of and sensitivity to other's beliefs as well as an awareness of one's own) as well as facts; and this understanding becomes especially important when decisions include concerns about diversity and equity.

In today's world where 'Digital-led automation is making data, information, and knowledge – especially explicit knowledge – more abundant, open, and connected' (Nonaka and Takeuchi, 2021, p 2), a landscape architect's ability to know-how to evaluate and apply information has become even more important. With recent developments in artificial intelligence (AI), the generation and development of information is increasing rapidly; however, the translation of information into action remains a human endeavour (ibid). This might involve, for example, being able to evaluate the relevancy and value of information, to make judgements on what might be misleading or fake, and to reflect on the ethical implications of acting on new knowledge.

Even if knowledge generation becomes dominated by computing, action and therefore design will remain human. The integrative and imaginative know-how of designing might be the one thing that computers cannot do for us – or, at least, it might be the one thing

that we do not want computing to do for us. Yu (2018) argues that, within landscape architecture practice, AI will take care of the 'Many calculations, analyses, and tedious drawing and modeling work [that] are already being done by computers', leaving humans to focus on creation and design, including 'emotional expression, artistic appreciation, and brainstorming' (p 1). Yu concludes, 'in the age when AI is gradually replacing, defeating or even destroying humans … we believe that if there is only one human left in the world, he or she must be a designer!' (ibid). Procedural knowledge is the knowledge that (I hope) AI will not replace, but, if this knowledge is not made explicit, how do we preserve it?

3. Knowing-how involves a deliberative process that grapples with the complexity of today's wicked problems

Finally, if landscape architecture wants to 'lead the planning, design, and stewardship of healthy, equitable, safe, and resilient environments' (American Society of Landscape Architects, 2023), the field needs more than substantive knowledge. Both equity and resiliency are wicked problems (as defined by Rittel and Webber, 1973). They are idealised goals that lack a clear definition, whose solutions are entangled with economic and political forces and subject to global systems and cultural beliefs. Wicked problems lend themselves well to designerly ways of thinking; they need approaches 'based on a model of planning as an argumentative process in the course of which an image of the problem and of the solution emerges gradually among the participants, as a product of incessant judgment, subjected to critical argument' (ibid, p 172). Landscape architecture needs to do a better job of explaining and teaching how its deliberative processes grapple with complex, systemic problems.

Sustainability and resilience

In 'Design and the Green New Deal', Fleming (2019) chastises landscape architecture for self-aggrandising claims of the profession as 'climate saviors', whereas in reality, 'Contemporary practice is focused on sites, not systems; and on elite desires, not public interests'. The work of landscape architects 'is limited in scale and subordinate to client mandates' and, historically, 'we have been bystanders to progress, not principal actors' (ibid).

As Fleming (2019) argues, if we truly want to be a part of the forces for change, 'We must rethink how landscape architecture engages with social and political movements'. Fleming advocates for more political activism within the profession. But, additionally, I think we need to share our knowledge about how we work with (and against) political and economic structures in order to realise projects. Many landscape architects have practices that address some of these larger issues, albeit at the scale of people's everyday lives (for example, SCAPE, MASS Design, Kounkuey Design Initiative and Agency Landscape + Planning). More explicit discussions of these processes could develop into models of practice that promote landscape architecture's ability to make small changes in complex situations.

Equity

'Soft skills', such as how to involve community members in design decision-making processes, are a part of the procedural knowledge that landscape architecture needs to develop, especially if we are concerned about questions of social justice and equity. Implementing equity within the profession is not as simple as adopting a code of ethics or working towards better representation within the profession (although these are both worthwhile pursuits).

Justice involves procedural justice ('equal access to the process by which priorities are set and decisions are made'), as well as distributive justice ('equitable distribution of environmental benefits and burdens') and restorative justice (repairing past harm) (Chang, 2020, p 2).

In a study of how landscape architects (LAs) see equity in the profession, Miller, McNamara and Smoot (2022) observe, 'Many respondents pointed to the public

engagement process as a key connection between LA practice and equity' (p 100) and 'Interviewees noted that LAs need to gain a better understanding of community engagement: A lot of LAs don't really understand community engagement that well' (p 102).

Critically examining the challenges and trade-offs that happen in participatory design can help future practitioners grapple with similar tough questions (for example, Juarez and Brown, 2008; Melcher, 2013). Procedural knowledge can also help students develop the soft skills, including 'communication, leadership, empathic listening – that will enable successful engagement and positive design outcomes' (Ford, 2018, p 103). While these skills are typically learned-by-doing, the profession does itself a disservice by not trying to develop this knowledge more broadly.

Why is procedural knowledge difficult to develop?

Procedural knowledge is not easily captured through the objectivist, deductive research strategies that are frequently valued as the most scientific forms of research. Aristotle's three concepts of *episteme*, *techne* and *phronesis* help explain the characteristics of practice that make it hard to capture in the most traditional forms of research.

In the *Nicomachean Ethics*, Aristotle (2011) places *phronesis* (translated as prudence or practical wisdom) alongside *techne* (translated as artistry or craftmanship) and *episteme* (translated as science) as three of the five 'things by which the soul attains the truth' (p 118). (The other two of these intellectual virtues are *nous* (understanding or intellect) and *sophia* (wisdom or a theoretical reason that combines *nous* with *theoria*).) *Phronesis* differs from episteme in that it involves a deliberation that 'admits of being otherwise', while 'science is a conviction concerning universals and the things that exist out of necessity' (ibid, p 122).

Design can be considered a combination of all three of these forms of knowledge (Braae and Steiner, 2018). It integrates a wide variety of substantive or epistemic knowledge into the design; it involves *techne*, a making – of designs, of drawings and of places. And *phronesis* combines these thoughts and actions into a particular design.

While *episteme* and *techne* are critical components of design decision-making, it is *phronesis* that makes practice challenging to capture and share between people and across a discipline. *Phronesis* tends to be tacit, built up through experience rather than direct instruction, and rarely follows an explicit set of rules or exact set of actions. These characteristics have also been found in design practices through 'research into practice' from the past 40 years (Cross, 2006; Lawson, 2005; Schön, 1983).

Phronesis

Phronesis has been interpreted in many different ways (Flyvbjerg, Landman and Schram, 2012; Kinsella and Pitman, 2012). However, the four characteristics of *phronesis* that Aristotle (2011) has described are especially useful in understanding why know-how is hard to transform into generalised knowledge.

The first characteristic is captured in Aristotle's (2011) words 'admits of being otherwise' (p 112). In his view, 'what we know scientifically does not admit of being otherwise' (p 118). For Aristotle, *episteme* aims to develop universal (or generalisable) principles and truths. But addressing the question of *phronesis*, 'a true characteristic that is bound up with action, accompanied by reason, and concerned with things good and bad for a human being' (ibid, p 120), involves deliberation – a choice between alternative actions. Designing is an action that admits of being otherwise; designers acknowledge that any given project does not have just one correct design solution. Choices must be made; these choices are a key part of the design process.

Second, Aristotle explains that because *phronesis* is 'concerned with the human things and with those about which it is possible to deliberate', it is 'not concerned with the universals alone but must also be acquainted with the particulars: it is bound up with action, and action concerns the particulars' (ibid, p 124). Design always addresses a particular place, particular people and a particular situation. Although design can make

use of the rules and principles found through traditional forms of science, its aim is to address the particulars of a place.

Third, *phronesis* requires deliberation. Good deliberation, for Aristotle, 'is a sort of correctness – but not correctness of either science or opinion' (ibid, p 127). According to Aristotle, good deliberation involves investigation, calculation and a reasoned argument. The process of designing can be described as one of continued deliberation – of developing alternatives, consulting others, weighing solutions against each other and then trying again. Failing to reach the true-or-false form of correctness does not mean that design is simply subjective whimsy.

Finally, being skilled at *phronesis*, being skilled in deliberation and action, requires 'an experienced eye' (ibid, p 130) as well as scientific knowledge. Aristotle argues that age and experience help a person develop good judgement. This is another characteristic of designing; it is generally understood to be a knowing-in-action that is gained through experience or learning-by-doing, rather than through reading a book or memorising principles (Cross, 2006; Lawson, 2005; Schön, 1983). It is a characteristic that makes it especially challenging to share and build procedural knowledge across an entire discipline.

Although *phronesis* is often defined as ethics (for example, by Braae and Steiner, 2018), understanding *phronesis* as being open-ended, particular, deliberative and active involves more than a statement of ethical principles. *Phronesis* integrates *episteme* and *techne* into our everyday world. Despite this, *phronesis* is the least understood and least studied of these three concepts within landscape architecture. Discussions about landscape architecture research seem to set aside discussions of *phronesis* in favour of the more clear-cut and well-trodden path of *episteme*, thereby increasing the divide between practice and research.

Research into practice

Although know-how is hard generalise and develop into a more transferable form of knowledge, research involving close observations of how practitioners work has developed a better understanding of this practical knowledge. Schön (1983) studied how a variety of professional practitioners – in psychotherapy, architecture, engineering, town planning and management – work in situations of complexity, uncertainty, instability, uniqueness and value-conflict (p 39). He concludes that these practitioners actively define and refine the problems while also searching for solutions; a process significantly different from technical rationality.

Cross (2006) and Lawson (2005) both study how designers, especially architects, solve problems. They observe that the problem-solving process designers employ is different from that of most scientists – partly because they are working with ill-defined problems and working towards a prescriptive, rather than descriptive, solution. Similar to Schön, they point out that, for designers, the phases of design overlap and flow into each other. Lawson (2005) concludes, 'It seems more likely that design is a process in which problem and solution emerge together. Often the problem may not even be fully understood without some acceptable solution to illustrate it' (p 48). Because the design process is a back-and-forth action and reaction to the situation and readjustments, a replicable method, such as those valued in research involving experiments, is challenging to achieve (Cross, 2006).

Research into reflective practice and design thinking is not new to landscape architects; theories from Schön, Cross and Lawson feature frequently in its discourse (see, for example, Armstrong, 1999; Armstrong and Robbins, 1999; Cramer, 2022; Deming and Swaffield, 2011; Filor, 1994; Melcher, 2013; Murphy, 2016; Prominski, 2005; Shearer, 2015). However, recent publications about research in the field suggest that the discipline is more interested in using design as a research method than in using research to better understand design (Abbott, 2018; Lenzholzer et al, 2017; Nijhuis and de Vries, 2019).

How can landscape architecture's procedural knowledge be improved?

Both practitioners and researchers can make valuable contributions to landscape architecture's procedural knowledge.

Practitioners can articulate, evaluate and share their know-how with others using reflective practice methods (Schön, 1983). Certainly the task of explaining and sharing such reflections on design processes and practices with others requires additional time and skills that many professionals do not have. However, if the field develops clearer methods and criteria for reflective practice (such as those developed by Fook, 2019), practitioners could use them to document and share their expertise with other designers. Additionally, methods for translating tacit knowledge into explicit knowledge could be inspired by Nonaka and Takeuchi's (1995) research.

A further fear among the profession may be that by developing more explicit knowledge about designing, we will take away some of the magic of design (Lang, 1987). Could more procedural knowledge reduce designing to a formulaic procedure that would hamper creative problem-solving? I do not think so. Because design engages with particulars, procedural knowledge about designing is never going to give us a perfect recipe or magic formula for all scenarios. A design process and design decision-making can never be fully decontextualised. At best, we will develop transferable models and rules of thumb rather than prescriptive procedures.

A related concern is that building procedural knowledge might involve sharing of proprietary knowledge that will threaten the competitiveness of individual firms. I see this as highly unlikely. Skilful designing, like *phronesis*, comes from experience. Even if we do develop a stronger understanding of our procedural knowledge, that knowledge will not fully replace the nuanced, tacit skills of an expert (Dreyfus and Dreyfus, 1991; Dreyfus, Athanasiou and Dreyfus, 1986). A better understanding of design processes will not devalue the skills of an expert practitioner, but it will provide more resources and models for beginning designers and those who educate them.

Researchers who focus on research into design can also make significant contributions to procedural knowledge. However, because know-how is embedded within the subjective experience of the designer and situated within a specific design project, developing transferable knowledge about designing is not as straightforward as other forms of research. Research methods of a more qualitative nature, such as ethnography or action research, are challenging for a beginning researcher to undertake with confidence. Additionally, the more straightforward research methods tend to be seen as of higher value within academia. As Milburn and Brown (2016) point out, 'integrative and applied scholarship' tends to be valued less by universities than 'the traditional "scholarship of discovery"' (p 72). Still, as many landscape architecture academics start their careers as designers, researching into practice should be a productive way to transition from practice into research. If resources are available to help explain and clarify how research into practice can be conducted, this pathway into research will become even more attractive.

Suggesting some strategies and methods for reflective practice and practice-based research will be the focus of part 2 of my contribution to this topic. Interest in practice-based research is growing within a wide variety of professional disciplines (Costley and Fulton, 2019; Kinsella and Pitman, 2012; Smith and Dean, 2009) and landscape architecture can draw from their experience. Practice-based research includes both 'research into practice' and 'research through practice'. Many professional doctorate programmes are developing more explicit theory, criteria and methods in order to prepare professionals 'to use data to design and understand the effects of innovation through the ability to gather, organise, judge, aggregate, and analyse situations, literature, and data with a critical lens' (Perry, 2019, p xvi).

Conclusions

Knowing-how to design is a core knowledge-base of landscape architecture. Landscape architects' abilities to view complex situations holistically, engage in ethical deliberations,

envision new possibilities and weigh alternatives from multiple perspectives are central to their design expertise. We need to grow this expertise in order to create designs that respond to the complex problems of today's society. More procedural knowledge within the field is needed so that landscape architects can learn from each other, beginning landscape designers have clear models on which to build expert knowledge and educators can teach design based on knowledge beyond their personal experiences alone. Because good designing responds holistically within particular circumstances, it is challenging to develop transferable knowledge about designing, but there are models from practice research that suggest how it could be done. In part 2, I will review theories and methods from reflective practice, practice-based design and practical knowledge to propose some strategies for increasing procedural knowledge in landscape architecture.

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