RESEARCH IN ENVIRONMENTAL DESIGN:
DEFINITIONS AND LIMITS

Ann Forsyth

Katherine Crewe

Tenure committees and thesis preparation seminars around the world are raising questions about the character of research in the environmental design fields. What forms can such research take? How can it be judged? How is it related to the body of work known as scholarship? This paper examines these questions. Research engages with broadly important questions, systematically collecting and analyzing evidence, building on relevant earlier work, recognizing alternative explanations, and documenting and evaluating findings; it is subject to peer review and made public, all this with an overall goal of contributing to the knowledge base of a field. Scholarship does many of the same things as research, but there are some differences given that indicate research is a subset of scholarship. Specifically, scholarship does not necessarily involve the systematic collection and analysis of evidence with an aim to contribute to the knowledge base of a field, as in a scholarly approach to teaching, scholarly critiques of design concepts, and a scholarly approach to design investigation. Both scholarship and research are highly valuable activities. Clarification of their differences will allow design faculty to make more coherent arguments about the character of their academic work.

INTRODUCTION

Tenure committees and thesis preparation seminars around the world are raising questions about the character of research in the environmental design fields of architecture, landscape architecture, and urban design. What forms can such research take? How can it be judged? How is it related to the body of work known as scholarship? This paper examines these questions.

In academia there is a wide range of scholarship — *work that demonstrates great expertise in a discipline, with clear goals and methods, documentation and internal critique, and broad significance, as judged by peers*. Conventional research is only one type of such scholarly activities. However, research carries great status today. This has meant that too often, in order to access the status and recognition awarded to research, environmental design faculty have claimed a wide variety of professional and creative design activities as research when they actually belong within a broader category of scholarship or even standard professional practice. This does little to persuade faculty in other disciplines of the value of environmental design faculty work and avoids the important task of creating mechanisms for assessing the quality of scholarly activity as a whole.

The term *research* has also become a popular catch-all beyond the environmental design fields. Around universities the term often covers the balance of work that academics do when they are not teaching or involved in administration. The term is sometimes even formalized in such documents as university criteria for tenure and promotion where, for administrative purposes, "research" includes a variety of academic endeavors that deserve reward. While we use the term *research* broadly ourselves, we disagree with these popular or administrative definitions of research since they muddy discussions, and — in environmental design fields — such definitions value neither research nor creative and professional design work for their own very different characteristics and strengths.

In this paper, we propose a definition of what constitutes research in the environmental design fields, distinguishing this from the other significant work designers do that is not research. This includes scholarship (which can include teaching, critical discussions of built work, and varied applications of design, as well as research) and also creative professional design. To make this argument, in Part 1 we create a working description of research for the environmental design fields. This working description covers such issues as *engaging with broadly important questions, systematically collecting and analyzing evidence, building on relevant earlier work, recognizing alternative explanations, documenting and evaluating findings, subjecting work to peer review, making it public, and doing all this with an overall goal of contributing to the knowledge base of a field*. Some research is funded but much is not.

For clarity we note that scholarship does many of the same things as research, which is why the two are often confused, but there are also differences given that indicate research is a subset of the wider area of scholarship. Specifically, scholarship does not necessarily involve the systematic *collection and analysis of evidence and a very public release of findings, with an aim to contribute to the knowledge base of a field* (see Table 1). Rather, it can demonstrate the individual knowledge of the scholar without new data or systematic analysis, as in a scholarly approach to teaching, scholarly critiques of design concepts, and a scholarly approach to design investigation. It may also be performed in a less public forum. For example, a scholarly approach to teaching may teach well-known concepts to students to whom the concepts are new. It can do this by providing evidence and being systematic but without a new contribution to the field. These other forms of scholarship are vitally important in all parts of the university, and it can be life-changing to students who witness or are involved in scholarly activities such as scholarly teaching. Our point is rather that research is different, if related, to these other forms of scholarship.

The paper proposes that research in environmental design can be classified into five major forms:

(1) *standard empirical studies* that collect and analyze data, responding to a basic or applied research question;

TABLE 1. Research and scholarship compared.

Dimension	Research (numbering corresponds to definition of research later in paper)	Scholarship (numbering corresponds to definition of scholarship later in paper)
Goals and background	1. Answers a question that has some general interest, which involves knowing a field well enough to understand gaps in knowledge or key questions.	1. Requires a high level of discipline-related expertise. 2. Has clear goals.
Methods	2. Provides evidence that has been systematically collected and analyzed and that is capable of answering the core question.	3. Has clear methods.
Relation to earlier work	3. Builds on earlier work.	
Argument	4. Makes an argument that at least implicitly counters reasonable objections.	
Documentation and evaluation	5. Documents and evaluates its methods and findings, so that both can be replicated by others.	4. Involves documentation and dissemination that includes a reflective critique.
Peer review	6. Is subject to peer review.	6. Is reviewed by a panel of peers.
Public/dissemination	7. Is made public.	
Contribution	8. Contributes to knowledge in a field.	5. Is significant beyond the immediate context due to innovation of a capacity of replication or elaboration.

(2) *logical argumentation* that uses logical, analytical, or other forms of theoretical reasoning to explore the implications of an issue;

(3) *critical analysis* of the built and designed environment, which offers new interpretations based in an historical, theoretical, or aesthetic context and draws on evidence that has been systematically collected and analyzed. This approach combines empirical and theoretical approaches in a way that is distinctive;

(4) works of *synthesis* that summarize, analyze, and classify research findings or positions in ways that clarify findings and identify promising directions or key issues. This paper is, in part, an example of a work of synthesis although, in general, works of synthesis bring together empirical findings; and

(5) *creative work* that systematically generates new approaches and principles and is a very small and unusual subset of the larger body of creative design.

This typology of research approaches takes into account the diversity of research practices in environmental design while also outlining specific criteria for judging excellence in each area. This is particularly tricky with approaches other than standard empirical studies, as work in these modes can shade off into a range of related activities common in the environmental design world, such as discussions about contemporary design in professional magazines. For example, our analysis would lead us to question ostensibly empirical work that is primarily descriptive or fails to answer important questions or to link to prior work. We would also reject works of synthesis that offer a collage of items or ideas without systematic analysis. At the same time, we acknowledge the diversity of research activities in environmental design. In Part 1, we examine samples of all forms of research published in a set of major environmental design research journals.

In Part 2, we discuss in more detail how research relates to other important activities within the environmental design fields, including scholarship, personal creativity, and professional practice. We outline the scope of scholarship in environmental design fields, particularly teaching as scholarship,

and the scholarship of application. We differentiate between research and creative design and between research and standard professional practice.

In conclusion, environmental design research of all forms can fit with the broader culture of universities. However, many environmental designers may do well to develop a more scholarly approach to practice and achieve recognition on those grounds, rather than claiming that their practice constitutes research when it clearly does not meet standard definitions of research.

Compared with other treatments of this work, such as Groat and Wang's (2002) important *Architectural Research Methods*, Snyder's (1984a) significant edited collection *Architectural Research*, or more specialized manuals such as Sanoff's (1991) exemplary *Visual Research Methods in Design*, this article focuses more firmly on the boundaries between research and other activities, particularly scholarship, design, and professional practice. In addition, it has a somewhat broader definition of research than the Groat and Wang book and Snyder collection. Discussions about research in environmental design have also tended to be undertaken by architects, which has meant they have not reflected the broader palette of environmental design research. For instance, landscape architects have made remarkably few contributions to discussions about environmental design research, which has meant that their work in landscape analysis and environmental assessment has been largely ignored. Then again, those on the design side of planning, such as urban designers, have generally integrated their discussion about research with debates from related fields such as history and geography, focusing more on research-in-general than research-in-design.

Overall, debates about research in environmental design have been clouded by incompatible understandings about the criteria for research excellence, too often leading proponents of one approach to dismiss other approaches as a whole. We believe this leads to a kind of relativism that avoids hard discussions about how environmental design research might be improved.

PART 1: JUDGING RESEARCH

Research, at its most general, involves carefully and diligently collecting information to answer a larger question. While there is no standard definition of research, there is a general consensus that research involves "structured forms of inquiry devoted to recurring questions, the results of which can and should be communicated to others" (Hack, 1984:128) or "systematic inquiry directed toward the creation of knowledge" (Snyder, 1984b:2). Many feel it should discover new facts, revise theories, or create applications of new theories. Such definitions point to an ongoing readiness to be challenged.

As Booth, *et al.* (1995) outlined in their introductory textbook, *The Craft of Research*:
[In] the world of research you are expected to make claims that are new and important enough to interest your readers, and then you are expected to explain those claims as if your readers were asking you, quite reasonably, why you believe them. Because you anticipate those questions, you support claims with good reasons and grounds, with evidence.

You should also know, however, that readers you respect will question your evidence, perhaps even your logic, and so you must explain your argument as well, breaking it into subordinate claims, themselves supported with further evidence. You may even feel that you must explain why you think your particular evidence logically supports your particular claim. Further, you have to anticipate that readers will think of objections and alternatives, and so you have to answer them as they are likely to arise.
(p. 86)

Good research should change our thinking. It asks us to accept a new idea, or in the strongest case, to rearrange our system of beliefs in fundamental ways.
(*ibid.*:111)

While different fields and schools of thought have different research approaches, researchers are concerned about reliability (can the research be replicated elsewhere or by other researchers) and validity (is the research measuring what it set out to, are measures truthful) (Kirk and Miller, 1986). Researchers are also familiar with both the substance of the research topic (previous findings, theories for explaining those findings) and the methods used in that earlier work. They communicate their research to others, including those who are also experts in the area (peers), who may then critique or evaluate that work.

The defining features of research, then, are that it involves a transparency of reasoning that supplies evidence that has been systematically collected, is accurately and widely reported, and can answer an important question that the research set out to answer. This may involve more theoretical research that involves logical argument about an issue — for example in mathematics or political theory — but the argument must present evidence capable of being debated. Research must always be important to some wider audience, and this generally involves relating it to a field of study to which it obviously contributes.

In summary, research encompasses the following:

(1) answers a question that has some general interest, which involves knowing a field well enough to understand gaps in knowledge or key questions;
(2) provides evidence that has been systematically collected and analyzed and that is capable of answering the core question;
(3) builds on earlier work;
(4) makes an argument that at least implicitly counters reasonable objections;
(5) documents and evaluates its methods and findings, so that both can be replicated by others;
(6) is subject to peer review;
(7) is made public (rather than remaining the property of one firm, for example); and
(8) contributes to knowledge in a field.

Different approaches to research emphasize different parts of this culture of inquiry. For example, in a standard empirical study, the methods used will be highlighted in the body of the paper, and data collection checklists and surveys will often be reproduced in tables or appendices. In contrast, a logical argumentation will demonstrate theoretical reasoning through argument, and any empirical base is likely to be referred to at most in a footnote. In this case, there is often an assumption that the audience understands the methods.

Overall, research is inherently innovative in that it wants to add to knowledge. However, it is a very public form of innovation in that the process, as well as the product, are subject to significant scrutiny.

Forms of Research in Environmental Design

In the context of these issues and debates, we developed a typology of forms of research in environmental design by looking at 10 years of publication in a range of refereed journals. These were selected as examples of the range of research publications although they each contain a different balance of scholarship and research papers[1]:

- *Journal of Architectural Education*, the journal of the Association of Collegiate Schools of Architecture, representing architecture academics;
- *Landscape Journal*, the journal of the Council of Educators in Landscape Architecture, representing landscape architecture academics;
- *Journal of Architectural and Planning Research*, published in cooperation with eight major professional and research organizations in architecture, planning, and related fields[2];
- *Journal of Urban Design*, the major academic urban design journal;
- *Landscape Research* and *Landscape and Urban Planning*, representatives of formal approaches to landscape research including both more scientific studies and criticism; and
- *Building and Environment*, representing building technology research.

The analysis started with systematic reading of articles and classifying of content, but as we developed the typology, we began to read mostly to find exceptions to the emerging classification. We read papers and informally observed academic life until it was clear that there were few outliers, that is, cases that did not meet our classification. By analyzing these journals, and from our own experience working in the area of environmental design research, we developed the classification of forms of research described earlier, and we deal with each in order here.

Standard Empirical Studies

A standard empirical study collects or compiles data and analyzes it in new ways. This involves both pure research motivated by the "need to know" and applied research focused on a specific site or topic (Locke, *et al.*, 1998:6). Data are systematically collected and analyzed using some form of qualitative or quantitative methods (or both). The bulk of design-related research we found in journals was empirical, typically involving social analysis, historical research, and studies on technological and ecological questions. Six of Groat and Wang's (2002) seven research categories are empirical, including interpretive-historical, qualitative, correlational (which covers much quantitative research), experimental, simulation and modeling, and case studies.

Empirical research in environmental design typically examines an issue that has been proposed in more speculative or theoretical work elsewhere. For example, many post-occupancy studies that we analyzed drew on insights about gender from the late 1970s and early 1980s, others drew on environmental perception work of the late 1980s, and still others drew on studies of urban geographers or theorists of New Urbanism.

Empirical work may be described as cumulative, contributing piece by piece to important larger questions. As such, some of this work may seem trivial to those outside the debates:
Increments of knowledge are won through a step-by-step process which within great leaps are a considerable rarity. Small bits of insight have to be woven together into the structure of larger webs of understanding. Taken as a single event, which is how any one [research] report must necessarily appear to an outsider, what is attempted in most studies must seem at least unambitious, if not trivial. That perception hardly works to encourage a wide readership by people searching for magic bullets to cure problems.
(Locke, *et al.*, 1998:5)

This cumulative research process may vary from field to field. In the social sciences, studies are generally ideographic, creating "a series of informative yet independent pictures" (Locke, *et al.*, 1998:15) or views. However, in the biological physical sciences, work is nomothetic, creating "a series of closely related pictures that are informative only to the degree that they fit together to form a whole" (*ibid.*).

The strength of the empirical studies we found lay in their disciplinary rigor and relevance to ongoing debates. For example, Day's interview-based study of women's experiences in Orange County shopping malls (1999) tested prevailing criticisms of the privatization of U.S. public space, concluding that privatized spaces have meaning only in the context of visitors' identity. Day calls for a more nuanced view of the private/public debate and of privatization in general. Forsyth, *et al.* (2001) conducted a comparative photographic survey between Puerto Rican streets and plazas and counterparts in Holyoke, Massachusetts, providing fresh insight into broader discussion about urban form and social context. Imrie (2003) contributed to writing about disabled spaces by using interviews to assess key institutions and groups directly affecting the convenience of disabled people, from regulatory frameworks to landlords, property developers, healthcare givers, and conventionally accepted architectural building standards.

Questioning the persistent dominance of the "picturesque" style in current outdoor design, Isaacs (2000) used cognitive mapping and guided walking tours to investigate pedestrian responses to a range of streets in Dresden and discovered a complex range of factors contributing to the pedestrian

experience. Heath, *et al.* (2000) tested working concepts of perceived building complexity by survey-ing public perceptions of building skylines in varying situations. Choi (1999) challenged an accepted view that Korea's housing transition from traditional courtyard-focused homes to modern apartments had radically undermined cultural norms. Noting an apparently smooth and successful transition from old to new, Choi analyzed housing plans using Hillier and Hanson's (1984) space syntax model and found that the new layout provided an indoor substitute for the traditional courtyard, thus sup-porting traditional behavior patterns.

Dovey and Dickson (2002), in an article that shades into the critical analysis category below, used a version of space syntax to critique the buildings of Rem Koolhaas. Brazel and Crewe (2002) exam-ined New Urbanist arguments for more concentrated urban development from a climate perspective by comparing temperatures in new infill commercial developments in Tempe, Arizona, with open spaces of conventional shopping malls. They found that increased building densities produced greater summer cooling overall, in spite of some nighttime warming due to the heat island effect. There are many other examples, including most of the articles in journals such as *Landscape and Urban Plan-ning* and *Building and Environment.*[3]

In all of these empirical studies, writers took care to identify and test elements that were key to their questions. For her study of privatized space, Day selected a super-bookstore, an outdoor entertain-ment center, a coffee house, and a swap meet for study, and interviewed women from various ethnic backgrounds and locations who regularly used privatized spaces. For his study of disabled access, Imrie selected places disabled people use regularly, such as stores, apartment buildings, and public toilets, and interviewed groups directly affecting these places. Forsyth, *et al.* (2001) studied public spaces that were a key part of a Puerto Rican cultural enclave.

In terms of criteria for excellent research, empirical work is the most generally accepted form of research. It is easiest to evaluate using the eight dimensions of research outlined above. The one point of confusion occurs with empirical work that is not made public but rather remains proprietary infor-mation. By our definition, it would remain merely an investigation until made public.

Logical Argumentation

In research involving logical argumentation, researchers use logical, analytical, or other forms of theoretical reasoning to explore the character or implications of an issue in new ways. This is the design equivalent of philosophy, mathematics, or political theory. We initially called this category "theoretical exploration" but decided to follow Groat and Wang (2002), who call this process "logical argumentation." Groat and Wang, in an exemplary treatment of this approach, also emphasize its dependence on rule-based propositions, citing the space syntax theory as an example (although most work in space syntax involves empirical tests or applications of the theory).

Logical argumentation is probably the area of research that causes the most controversy. For a start, while some environmental designers use terminology from philosophy that indicates a familiarity with some concepts from the field, these designers have usually not been systematically trained in philosophical reasoning and so are using terms to illustrate ideas rather than create a logical argu-ment. Second, in the world of environmental design, there is some confusion over the use of the word "theory," since the term has often applied loosely to useful environmental design concepts, such as "less is more" or "form follows function," rather than to logical argumentation or explanation.

Not surprisingly perhaps, we found few examples of purely logical argumentation in design journals. However, we found a number of works on postmodernism drawing on discourse by geographers such as Dear and Cosgrove or the cultural commentator Frederic Jameson. Works on theories of aesthetics and on the theoretical underpinnings of architecture fit into this category. For example, Coyne and Snodgrass (1993) argued that modernist individualism among environmental designers could be at-tributed to philosophical underpinnings based in the work of Descartes and argued for an alternative vision. Similarly, Mike Linzey (2001) drew on Peirce's (1992) categories of intuition to locate archi-

tectural intuition in relation to scientific intuition (whose goal is to discover laws and refutable patterns). Peirce was a philosopher of science who studied categories of perception and conceptual thought. Both works are based on earlier writing on the design process among pioneering thinkers such as Christopher Alexander, often evolving systematic design methodologies to reduce error, handle copious design information, or depart from familiar and conventional norms (Cross, 1984).

The success of theoretical writings (more than any other category) depends on the tightness of the logic, its systematic link to earlier research and theory, and the capacity to relate philosophical issues to environmental design ideas. Since environmental designers often refer to theoretical writings as a basis for design ideas, this more ad hoc appropriation of theoretical work among designers may be confused with the more rigorous work of logical argumentation.

Critical Analysis

In a work of critical analysis, a researcher looks at a built form in a new way but also relies on placing new findings in a wider research context. This is a combination of an empirical study and a logical argumentation but is distinctive enough to warrant its own category. More than any other category, this research scrutinizes built work for itself, though in the context of some specific theoretical or historical research literature to which it aims to contribute. Much work in the history of architecture or landscape architecture takes this form.

Neckar (2000) presented Castle Howard in Yorkshire, England, as an example of a designed landscape that also expresses a metaphorical organization of life and death, thus transcending its historical categorization as a picturesque landscape garden. In a comparable study, Dehaene (2002) analyzed Wright's Broadacre City in terms of Wright's democratic rural ideology, which frees the individual from the city's repressions.

Works of critical analysis typically drew on source material in a qualitative way, using rich and illustrative data. Neckar presented a copious array of historic plans for the Howard estate since 1699 and quoted from critics during its early years, such as Horace Walpole, and from the letters of previous owners, gardeners, and visitors over the centuries. He also studied views of the landscape from key points. Dehaene analyzed Wright's designs, sketches, writings, and his physical model of the design proposal.

Critical analysis as research is different from the commentary designers regularly engage in as they aim to present built works to the public. It is also different from the more ad hoc commentary and personal response that one regularly reads in such periodicals as *Harvard Design Magazine*. While such commentary and presentation are useful and can even be done in a scholarly way, it is different from the critical analysis approach to *research*, since critical analysis much more systematically engages with prior knowledge, extensive empirical data, and relevant theory. While many articles in the *Journal of Architectural Education* clearly fit into the larger realm of scholarship (see below), and some are clearly commentary and personal response, critical analysis research is well represented in that journal's more empirical pieces. Overall, critical analysis is different from commentary and response in that it explicitly contributes to the knowledge base of the field in such areas as social theory, history, or aesthetics.

Synthesis

Works of synthesis in environmental design research are so called because they summarize, analyze, and classify various research findings in a new way to develop a new conceptualization. This involves pulling together a major argument from a range of existing work, where the new synthesis is more than the sum of its parts. While logical argumentation can also develop a new conceptualization, it does this through a form of reasoning, rather than sifting and classifying earlier research. It is a matter of emphasis.

We found works of synthesis provided a broad sweep of subject matter, typically historical. For instance, Grant (2001) questioned the growing preference for grid layouts among urban neo-traditional designers, often on grounds of its supposed egalitarianism, by providing a review of key grid layouts throughout eastern and western urban history. Drawing on plans and commentary, Grant showed the grid emerging in societies that are centralizing or globalizing in their power structures. The symbolism of the grid as a rational built form, imposed on the landscape, further reinforced this authoritarianism. Grant arrived at a new conclusion; she suggested urban designers have a responsibility to research built forms before advocating them as solutions to contemporary problems. In a comparable study, Akkerman (2000) traced what he sees as an idealistically formalized theme in the layout of planned cities since antiquity, reflecting an image of cosmic harmony and perfection, which belied the disequilibrium inherent in contemporary city form. Akkerman recommended designs for contemporary cities that recognize the realities of violence and discord.

Sources for works of synthesis are often dispersed, making an orderly assembly essential. Both Grant and Akkerman drew on diverse historical plans, records, and writings but adhered to a chronological sequence and offered a strong conclusion as the outcome. Research that synthesizes is essentially different from works that collage together bits and pieces of information to illustrate a preformed argument. Much seminal writing by environmental designers has followed this collage form, as environmental designers illustrate their creative views; however, such writings are not research arguments. Researchers differ by synthesizing their argument *from* existing work, providing a thorough review rather than selectively quoting. This article is in part a work of synthesis, as well as a work of scholarship (see next section). While having an empirical component — the analysis of published research work — it makes its main contribution in summarizing, analyzing, and classifying approaches to research.

Creative Work as Research

Creative design can be just that — work that is creative and is judged on those terms. Creative work is regularly rewarded with professional awards and selection for juried exhibits. It is also highly valuable in a research university since it can enhance teaching and professional practice, while also performing university outreach. In universities, schools of dance, creative writing, drama, and music composition and performance do creative work that is valued in similar ways. However, creative work should not be confused with research.

For creative work to be classified as research, it needs to conform to the standards, practices, and sensibilities of research. Most creative environmental design work does not do this. For a start, it does not necessarily systematically build upon a previous body of work but instead aspires to a unique combination of ideas from disparate sources. Moreover, while formal research seeks to explain and justify all procedures involved, the process of creative work is typically mysterious. It may contribute a new form or new ideas, but creative work generally does not aim to contribute to knowledge in a field; rather, it aims to provide new creative responses to unique situations. These may contribute to the body of work for an individual, firm, or school but not in the sense of research answering gaps in knowledge.

However, design studies and scenarios, if done in a systematic way that reflects a universe of options, may qualify as research. In each case, judgments about the character of research require documentation and evaluation by peers. Creative work is infrequently subjected to the standards of documentation and evaluation required for regular research.

Overall, creative work as design research potentially falls into two categories. In the first category, one identifies whether the design of prototypes is based on a thorough review of previous work or on actual empirical tests, for example, a prototype window system, storm water infiltration system, or domestic violence shelter concept. This is by far the most common. This design of a public prototype, based on thorough reviews of previous work, distinguishes creative research from the proliferation of practice-based product design in industrial research. In the context of industrial and product design,

members of the Design Research Society, for instance, have expressed concerns about the exclusive relationship between product-based industrial design research and business entrepreneurship, particularly as it leads to single, but marketable and legally protectable, inventions (Love, 2004).

Second, multiple design options can be generated to show the range of potential environments, and then these can be evaluated or critiqued. For example, one can easily imagine a two or three-dimensional matrix where designs systematically vary along two or three characteristics, producing a clear range of options. These could then be evaluated in terms important to the researcher — formal, social, ecological, and so on. However, this is too rarely done. There are certainly works that bring together a range of options, but generally these are empirical studies, critical analyses, or works of synthesis and are in fact inventories rather than creative designs.

Much of the work we found in this category was somewhat off the creative path, often relating more to social factors and environmental issues than high-style creativity. Others systematically generated design options to solve a technical or theoretical problem. Gage, *et al.* (2001) contributed to knowledge of sustainable architecture with their innovative top-down ventilation and cooling system. Their study explained problems inherent in passive ventilating and cooling of low- and medium-rise buildings, particularly in urban settings; described previous laboratory modeling of ventilation flows; and outlined their experiment to test the salt-bath technique, plus two wind-driven devices, for cooling intake ducts while also improving environmental quality. The fact that this is a rare form of environmental design research does not lessen its conceptual importance.

PART 2: SCHOLARSHIP, DESIGN, AND PROFESSIONAL PRACTICE

If research is only part of the work of design faculty, what else are they doing? In this section, we outline key related activities with which research is often confused.

Scholarship

Scholarship is a broad category of work that demonstrates great learning. While there is no standard definition, there is a basic consensus that scholarship involves "the production and transmission of culturally valued, specialized knowledge" (Humphreys, 1997:1). More complex definitions include work that encompasses the following:

(1) requires a high level of discipline-related expertise,
(2) has clear goals,
(3) has clear methods,
(4) involves documentation and dissemination that includes a reflective critique,
(5) is significant beyond the immediate context due to innovation or a capacity of replication or elaboration, and
(6) is reviewed by a panel of peers (Diamond, 2002). (See Table 1.)

A related view of scholarship is the one used by Joroff and Morse (1984:23) as "systematic, detailed description of a phenomenon not necessarily oriented toward testing propositions about it or building theory." This includes many, although certainly not all, activities conducted in universities.

The character of scholarship was debated hotly in the late 1980s and 1990s. The culture wars of the 1980s brought into question the character of academic work in the humanities. In the humanities, scholarship is often more common than research; for example, close readings of works of literature or interpretations of works of visual art are often published as books and articles. In tenure and promotion reviews, academics in the humanities found themselves pressured to show how their intellectual work contributed to knowledge, compared with colleagues in the sciences. In addition, humanities scholars were attacked from outside the academy as producing irrelevant publications, forcing them to clarify and defend what they were doing.

Early in the 1990s, the Carnegie Foundation, under the leadership of Ernest Boyer, examined the character of scholarship and created a classification of forms of scholarly activities across disciplines (Boyer, 1990; Diamond, 2002; Rice, 2002). The Carnegie Foundation defined four forms of scholarship: *discovery* (or research), *teaching and learning, integration*, and *application* (now, typically, engagement) (Boyer, 1990; Rice, 2002). The 1990 report that popularized the typology, *Scholarship Reconsidered* (Boyer, 1990), is widely considered to have had a key role in reframing discussions about scholarly work in U.S. universities and colleges. It has sparked extensive debate, particularly about how to document and evaluate scholarly activities that are not traditional empirical research.

This debate has continued to develop. Most attention has focused on the scholarship of teaching, with attention paid to increasing the scholarly character of teaching and to evaluating it. This means considering teaching as more than the delivery of instruction and instead as something that, in addition to demonstrating expertise, has clear goals and methods and is documented, disseminated, critiqued, designed for replication or elaboration, and subject to peer review. Obviously one can "just" teach a class without undertaking this more scholarly approach.

The scholarship of application, recast as the scholarship of engagement, has gained more attention in recent years (Rice, 2002). This is a particularly relevant form of scholarly work for the environmental design fields as it includes community-based or locally reviewed "research" (i.e., investigations not necessarily reviewed by disciplinary peers as a contribution to gaps in general knowledge as standard research is), service learning, and collaborative practice or the collaborative solving of local problems, often through community-based partnerships (*ibid.*). This includes not only the stereotypical outreach to low-income neighborhoods but also a wide range of environmental design practice, if done in a way that fulfills the six aspects of scholarship noted above.

Of course, environmental design practice that is not conducted in a scholarly way can have high artistic or technical merit, win awards, and enable faculty to be promoted. However, for those working at universities, others easily recognize a scholarly approach.

In practice, two of the key issues in broadening the definition of scholarship have been *documentation* and *evaluation* (Checkoway, 1998; Diamond, 2002). The model that has been adopted for documentation and evaluation is based on the model that has gradually evolved in the sciences and humanities in evaluating *research* and involves (disciplinary) peer review and assessment of the contribution to the knowledge base in the field (see six criteria and Table 1). Assessment can be through mechanisms such as a blind-reviewed journal article, an award where the selection is blind, or through any other mechanism where the researcher is anonymous and, in general, so is the reviewer. This review process allows a focus on the quality of the work rather than on the reputation of the author.

For example, the teaching portfolio is a well-known strategy for such evaluation of the scholarship of teaching, as are teaching awards or writing articles on teaching for peer-reviewed journals. For the scholarship of engagement, faculty can enter projects in professional or service awards, write about their work in peer-reviewed journals, and arrange for formal critiques of their projects by both community members and disciplinary experts. It should be noted that such disciplinary peer review can use a different review standard for a locally relevant project (scholarship of engagement) as opposed to the research standard of contributing to the knowledge base of a field, which may not necessarily have local relevance.

Design and Professional Practice

At first glance, it can seem that the activities of doing research and doing design are similar. After all, both aim to contribute something new to the world. Research has some similarities with original creative artistic work, and for administrative reasons, universities sometimes define them similarly.[4] However, the two are rather distinctive activities.

While the term *design* is used freely in environmental design schools, it is rarely clearly defined. However, we argue that it is used in the environmental design fields to denote at least two distinctive types of activities. In its narrow sense, it refers to the artistic process of creating new forms and the artistic quality of those forms. This is typically the definition of design judged in design awards, particularly in architecture. In the broader sense, design may encompass a wider range of activities to do with creating the designed environment — technical, social, environmental — and not just the artistic aspects. In both definitions, design is essentially creative, although, as more elements are considered, some of the creativity is in meshing together often disparate elements and may be more akin to "problem solving" (c.f., Crewe and Forsyth, 2003). For Groat and Wang (2002:101), design is "a generative production of figural schemas that lead to built forms."

In contrast, research uses systematic methods to answer important questions and add to knowledge in a way that can be replicated by others. This is very far from the world of design, where designers aim for a distinctive and unique product, solving a site-specific problem for a particular client, often a product that cannot be replicated easily. In general, creative work need not be systematic at all and can be purely a personal expression that responds to unique circumstances, unrelated to new facts or theories. However, design work may rest on a basis of research, and this is more obvious in some of the ecological design and large-scale landscape analyses performed by landscape architects (Crewe and Forsyth, 2003). Similarly, although some environmental design criticism may be classed as research, much of it would fall into the category of scholarship because it demonstrates learning through a personal response to a work of design, rather than systematic research into its character. And of course, still more environmental design criticism is a personal response that may have only some scholarly features.

Professional practice may involve research or scholarship but is often the application of existing knowledge and established practice, demonstrating personal experiences and expertise. Earlier research has in fact shown a strong preference, among practitioners, for knowledge that fits an immediate need (Seidel, 1981). While professional practice may express the overall cultivation or talent of the designer and their ability to apply new and old technologies to problem solving, artistically creative and technically proficient professional work does not necessarily constitute either systematic research or scholarship. Research-like activity may of course be a part of practice. However, because this investigative work is typically specific to a project, answering a question such as "how can we reuse vacant lots in the center city area," and since new ideas are not collected in a systematic way and are not publicly shared, they would be classed as "investigation" rather than research (Hack, 1984).

Overall, professional practice may be done in a scholarly way but rarely involves research in the full sense outlined in the first section.

PART 3: RESEARCH IN UNIVERSITIES

The environmental design fields are not uniquely burdened with having creative and professional work valued in the university. As indicated earlier, programs in drama, musical performance and composition, creative writing, and studio art all deal with having creative work and performance evaluated. On the other hand, fields as diverse as business, law, education, engineering, and medicine deal with work that is practice oriented.

Given the diversity of work done by faculty and expected from fields and professions, universities are accustomed to acknowledging a range of contributions, although "research universities," unsurprisingly, value research. Table 2 represents a synthesis of the authors' experience with tenure and promotion decisions at eight different institutions and is presented as a starting point for discussion. Different universities rank these items slightly differently, but this table represents a middle ground. As can be seen in the table, at the top are contributions that have been reviewed at a national or international level, in ways that consider the work as much as possible and not just the person doing the work. These include double-blind refereed journal articles, authored books, national awards

TABLE 2. Forms of scholarly output valued in research institutions.

Most valued:
- Double-blind refereed journal articles in scholarly journals with either high citation rates or low acceptance rates.
- Authored books published by major academic or technical presses or receiving excellent reviews.
- National awards for built work or implemented/significant plans.
- Important patents.

Of some value but not enough to get tenure in most cases:
- Award of a highly competitive grant from a major national source such as the National Science Foundation. However, such grants are not meant to be ends but means to refereed articles.
- Edited books (here the work is not a sustained argument, but it can shape a discussion).
- Chapters in books (particularly if cited or reprinted — they are of lower value than refereed articles because the selection is often related to social networks rather than the intrinsic quality of the work).
- Regional awards for professional work.
- Awards for articles, books, etc.
- Several articles in major professional magazines on one's work.

Depends on the field/situation (in general, architects give higher value, landscape architects medium, and planners lower):
- Articles in journals that are not very selective, that select via an editorial board only, or in proceedings of conference papers — while these are often reviewed, the review is much more minimal than a "top" journal and so these are discounted.
- Articles in professional magazines like *Planning* or *Landscape Architecture Magazine* — architects like this; planners see this as service/education.
- Papers/talks in conferences — a "keynote" speech shows interest in one's work; for most conferences, however, such talks are either part of the educational mission (below) or are meant to help revise drafts of papers that will become articles (above).
- Books from more minor or specialized presses.
- Editorial essays in journals, journal/magazine editorships, and op/eds. in newspapers.
- Editing journals and magazines.
- Lots of money from less competitive sources if it leads to some kind of scholarly output.
- Written work evaluating one's professional/practice work.

Service/education: Good things to do to *educate* and be a good citizen in the field, but which are not valued as research. Some can be given more credit if documented and evaluated, e.g., given awards, reprinted, turned into an article (which puts them in earlier categories). Alternately, they can be used to focus attention on issues you care about and make a market for work in that area to help your research.
- Book reviews (some comparative reviews in fields such as history have more value).
- Professional/consulting/funded reports.
- Educational programs and teaching.
- Self-published work.
- Service to the profession or the university (committees, reviewing articles and grants, running programs) — often done to give something back to the field.

for competitive work, and important patents — whether books, articles, awards, or patents are most valued varies according to the field.

The criteria for excellence in research are, of course, somewhat at odds with the artistic side of environmental design. In the big "D" design area, there are certainly judgments about quality, but there is also a market for the personal fame and idiosyncrasy of the designer and the creation of a large portfolio of work (Stevens, 1998). Social connections are valued in getting work for designers, and many see them as a key in department- and college-level decisions about promotion and tenure (Seidel, 1981:240). In environmental design departments, particularly those in architecture, research outputs are typically created by those in the department from allied fields such as environment-behavior and structures (Stevens, 1998:172). However, the award system provides a means of obtaining credit for design excellence and a way of evaluating architectural output that is recognizable as peer review.

As one of the reviewers of this paper pointed out, this makes Table 2 seem overly rational for those in some environmental design departments, reflecting the larger university but not their departmental experiences. This is particularly apparent in universities where the tenure process is decentralized. However, as universities are becoming more centralized and scrutinized for performance, research and scholarly output will be increasingly expected from environmental design fields, and classifica-

tions of research, such as the one in this paper, will allow more informed discussion about academic productivity.

Overall, this paper takes a position between the research hard liners who think that real research only takes the form of the standard empirical study and those who claim that each environmental design project is also a research project given its innovation. Design activity is certainly as valuable as research but has different methods, premises, and aims (Groat and Wang, 2002:107-108). Opening up debates to discuss scholarship, as well as research and design, provides a means for design faculty to argue for the importance of their work and a way of increasing its quality and significance through a process of goal clarification, documentation, critique, and peer review.

NOTES

1. We decided not to look at refereed conference proceedings, of which there are many.

2. As the *JAPR* website and journal cover announce, *JAPR* is published in cooperation with The American Institute of Architects (AIA), the Architectural Research Centers Consortium (ARCC), the Environmental Design Research Association (EDRA), the Division of Environmental Psychology of the International Association of Applied Psychology (IAAP), the International Association for People-Environment Studies (IAPS), People and Physical Environment Research (PAPER), the Royal Institute of British Architects (RIBA), and Society for Environmental Graphic Design (SEGD) (http://www.lockescience.com).

3. Empirical studies that evaluated a design policy or a program again drew on established theories. Chapman and Larkham (1999) explored a recent government initiative in the 1990s to improve the quality of urban design throughout the U.K. As they examined sample projects in light of their original goals, they questioned underlying assumptions about urban design quality. In a comparable study, Symes and Pauwels (1999) tested the public's acceptance of a government-initiated sustainable neighborhood program in Manchester, England, known as the Hulme Regeneration Project, drawing on Kuhn's theory of the dissemination of new ideas. Research tactics involved a scrutiny of written source materials, such as policy statements, reports, and plans. They also interviewed members of the project team. Both studies probed broader concepts of urban quality of life as it affected British town planning: Chapman and Larkham were concerned with Kostof and Jacobs and people-friendly spaces, Symes and Pauwels with sustainable neighborhood design relating to such issues as fossil fuel use and recycling.

4. The University of Wollongong (1993) has such a definition that includes artistic works but does distinguish it from wider scholarship:

> *Research is defined to include systematic and rigorous investigation directed to the discovery of hitherto unknown facts; the construction of explanatory theory; and, the construction of original works of significant artistic merit; scholarship is defined as an activity directed to the construction of an analysis or interpretation of existing human products of human, scientific, literary and artistic activity aimed at increasing the accuracy and depth of human understanding. Both should result in tangible output. This may include editorship or editorial board memberships, refereeing, and contributions to conferences. Contributions to text books [sic] and scholarly articles on various aspects of teaching and learning are also relevant.*

REFERENCES

Akkerman A (2000) Harmonies of urban design and discords of city-form: Urban aesthetics in the rise of western civilization. *Journal of Urban Design* 5(3):267-290.

Booth W, Colomb G, Williams J (1995) *The craft of research*. Chicago: University of Chicago Press.

Boyer E (1990) *Scholarship reconsidered: Priorities of the professoriate*. Menlo Park, CA: Carnegie Foundation for the Advancement of Teaching.

Brazel A, Crewe K (2002) Preliminary test of a surface heat island model (SHIM) and implications for a desert urban environment. *Journal of the Arizona-Nevada Academy of Science* 34(2):98-105.

Chapman DW, Larkham PJ (1999) Urban design, urban quality, and the quality of life: Reviewing the Department of the Environment's urban design campaign. *Journal of Urban Design* 4(2):211-228.

Checkoway B (1998) Professionally related public service as applied scholarship. *Journal of Planning Education and Research* 17(4):358-360.

Choi J (1999) The traditional characteristics reflected in the plan of modern apartment houses in Korea. *Journal of Architectural and Planning Research* 16(1):65-77.

Coyne R, Snodgrass A (1993) Cooperation and individualism in design. *Environment and Planning B: Planning and Design* 20(2):163-174.

Crewe K, Forsyth A (2003) LandSCAPES: A typology of approaches to landscape architecture. *Landscape Journal* 22(1):37-53.

Cross N (Ed.) (1984) *Developments in design methodology.* Chichester, NY: Wiley.

Day K (1999) Introducing gender to the critique of privatized public space. *Journal of Urban Design* 4(2):155-178.

Dehaene M (2002) Broadacre City: The city in the eye of the beholder. *Journal of Architectural and Planning Research* 19(2):91-109.

Diamond R (2002) Defining scholarship for the twenty-first century. In K Zahorski (Ed.), *Scholarship in the postmodern era.* San Francisco: Jossey Bass, pp. 73-79.

Dovey K, Dickson S (2002) Architecture and freedom? Programmatic innovation in the work of Koolhaas/OMA. *Journal of Architectural Education* 56(1):5-13.

Forsyth A, Lu H, McGirr P (2001) Plazas, streets, and markets: Puerto Ricans and urban spaces in northern climates. *Landscape Journal* 20(1):62-76.

Gage S, Hunt GR, Linden PF (2001) Top-down ventilation and cooling. *Journal of Architectural and Planning Research* 18(4):286-301.

Grant J (2001) The dark side of the grid: Power and urban design. *Planning Perspectives* 16:219-241.

Groat L, Wang D (2002) *Architectural research methods.* New York: John Wiley.

Hack G (1984) Research for urban design. In J Snyder (Ed.), *Architectural research.* New York: Van Nostrand Reinhold, pp. 125-145.

Heath T, Smith S, Lim B (2000) The complexity of tall building facades. *Journal of Architectural and Planning Research* 17(3):206-220.

Hillier B, Hanson J (1984) *The social logic of space.* Cambridge: Cambridge University Press.

Humphreys SC (1997) Introduction: Let's hear it for the magpies. In SC Humphreys (Ed.), *Cultures of scholarship.* Ann Arbor: University of Michigan Press, pp. 1-20.

Imrie R (2003) Architects' conceptions of the human body. *Environment and Planning D: Society and Space* 21(1):47-65.

Isaacs R (2000) The urban picturesque: An aesthetic experience of urban pedestrian places. *Journal of Urban Design* 5(2):145-180.

Joroff M, Morse S (1984) A proposed framework for the emerging field of architectural research. In J Snyder (Ed.), *Architectural research.* New York: Van Nostrand Reinhold, pp. 15-28.

Kirk J, Miller M (1986) *Reliability and validity in qualitative research.* Newbury Park: Sage.

Linzey M (2001) On the secondness of architectural intuition. *Journal of Architectural Education* 55(1):43-50.

Locke L, Silverman S, Spirduso W (1998) *Reading and understanding research.* Thousand Oaks: Sage.

Love T (2004) Australia (West) Design Research Society, Quarterly Council Report 6(2). http://www.dmu.ac.uk/ln/4dd/DRS%20QCR-6-v2.doc. Site accessed July 2004.

Neckar LM (2000) Castle Howard: An original landscape architecture. *Landscape Journal* 19(1-2):20-45.

Peirce CS (1992) *Reasoning and the logic of things: The Cambridge conferences lectures of 1898.* Edited by KL Ketner. Cambridge, MA: Harvard University Press.

Rice RE (2002) Beyond scholarship reconsidered: Toward an enlarged vision of the scholarly work of faculty members. In K Zahorski (Ed.), *Scholarship in the postmodern era.* San Francisco: Jossey Bass.

Sanoff H (1991) *Visual research methods in design.* New York: Van Nostrand Reinhold.

Seidel AD (1981) Underutilized research: Researchers' and decision makers' conceptions of information quality. *Knowledge: Creation, Diffusion, Utilization* 3(2):233-248.

Snyder J (Ed.) (1984a) *Architectural research.* New York: Van Nostrand Reinhold.

Snyder J (1984b) Introduction. In J Snyder (Ed.), *Architectural research.* New York: Van Nostrand Reinhold, pp. 1-14.

Stevens G (1998) *The favored circle.* Cambridge: MIT Press.

Symes M, Pauwels S (1999) The diffusion of innovations in urban design: The case of sustainability in the Hulme development guide. *Journal of Urban Design* 4(1):97-118.

University of Woollongong (1993) Definition of research. http://www.uow.edu.au/admin/personnel/conditions/research_defn.html. Site accessed July 2004.

Additional information may be obtained by contacting Dr. Forsyth directly at Metropolitan Design Center, 1 Rapson Hall, UMN, 89 Church Street SE, Minneapolis, MN 55455-0109, USA.

AUTOBIOGRAPHICAL SKETCHES

Ann Forsyth is Professor of Urban Design and Director of the Metropolitan Design Center at the University of Minnesota. Her work focuses on the social aspects of physical planning and urban development. She holds a Ph.D. in City and Regional Planning from Cornell, a Masters degree in Urban Planning from UCLA, and a Bachelor of Science in Architecture from the University of Sydney.

Katherine Crewe is Associate Professor of Landscape Architecture and Planning at Arizona State University. Her work focuses on citizen participation and design in small towns and rural areas. She holds a Ph.D. from the University of Massachusetts at Amherst, a Masters degree in Landscape Architecture from Berkeley, and a Bachelors from Rhodes University.