
DESIGN AS RESEARCH: THE ROLE OF ARGUMENT IN DESIGN PROJECTS THAT REPRESENT CONTRIBUTIONS TO ARCHITECTURAL KNOWLEDGE

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INTRODUCTION

A key challenge facing architectural education is to prepare undergraduate students for design project work that also meets the standards associated with research. This challenge to undertake *design as research* is a consequence of the shift to Masters level study in the final years of professionally accredited programs in a number of countries, in accordance with the recommendations of the Bologna Accord, together with university-based expectations that all Masters level qualifications incorporate a significant research component. In some schools of architecture this requirement is met by completing a year-long design thesis, while in others the traditional format of studio-based project work is adapted to meet these new expectations. Salomon's comparative review of the independent design thesis and the collaborative research studio identifies the potentials strengths and weaknesses of these alternative pedagogical settings, but notes that both must be committed to the principles of good research, and in particular "to produce results that are recognized as being original and significant beyond the immediate context."¹

The expectation that such design-based findings will have implications beyond the immediate context of the project highlights the primary goal of all research, namely to contribute to knowledge development. This is often referred to as the *significance* of the research findings which, together with *rigor* of process and *originality*, are the generally recognized hallmarks of research, reiterated for example by Jeremy Till in his RIBA Discussion Paper "What is Architectural Research?"² In the case of *design as research* a contribution to knowledge may also be thought of as "advancing the current state of the art."³

It is this expectation of a knowledge contribution that distinguishes conventional studio projects from those aspiring to be design as research, and the pedagogical implications of this criterion are the focus of this paper. This is not to suggest that the two other defining characteristics of research noted above are any less deserving of attention, or that they are not instrumental in producing design outcomes that are 'significant'. For to conflate design with research means that the research needs to be literally part of the design, and unable to be separated from it. Rigor and originality in design thinking and outcomes will be preconditions for a knowledge contribution.

DESIGN AS KNOWLEDGE CONTRIBUTIONS - SOME CHALLENGES

In the context of design-based disciplines in general, Heylighen, Cavallin and Biachin observe that attention to the relationship between design and the creation of knowledge is a relatively recent phenomenon, and that "increasingly, the act of designing is considered to be or involve some kind of knowledge production."⁴ In the case of architecture this would appear to be confirmed not only in professional literature (for example the RIBA Discussion Paper noted above), but by the academic literature. For example, while the May 2001 issue of JAE included a section on *design as research*, Chi in her introduction indicated that this is "less a special topic than an underscore - a reflection upon how we hope to read design work and teaching."⁵ Six years later the September 2007 issue of JAE was devoted explicitly to the topic of *architectural design as research, scholarship and inquiry*, a title which also suggested that *design as research* might be able to be distinguished from design as scholarship and from the more widely understood and accepted view of design as inquiry. More recently, pedagogical issues associated with aspirations for design that is also research are examined in the October 2011 issue of JAE.

However, little attention has been given to date to the question of how design proposals might also represent knowledge contributions. In her 2001 commentary Chi notes that "... design work's own inclination to material or situational specificity places it in apparent tension with notions of research as a communicable activity that contributes to a body of knowledge".⁶ Such tensions are evident in other fields of research, where the challenge is also to find ways of explaining the wider significance of the specific discoveries of individual researchers. In this regard *design as research* should not be viewed as a special case, and designers as researchers might look to the forms of reasoning deployed by researchers in other disciplines in order to link the specificities of individual research projects with the generalities of transferable knowledge.

Chi also suggests that the notion of *design as research* is far from self-evident, given what she refers to as the modern identification of design with problem-solving and the privileging of the idea of designing as a finite, object-oriented process.⁷ Again, we might profitably look to how other disciplines have addressed similar issues. For example, parallels exist in the field of cognitive psychology, where Kuhn has observed that a modern preoccupation with thinking as

problem-solving is now challenged by other approaches, including a focus on thinking as based on argumentation.⁸ An emphasis on design thinking as argumentation offers an alternative to the limited notion of design as problem-solving and a way of addressing the challenge of *design as research*, at least in regard to obligations towards knowledge contributions.

That design thinking (at least in the context of architecture) might be based on argumentation was first advanced by Horst Rittel,⁹ significantly in the publication of the Design Methods Group, well known for its commitment to a problem-solving perspective on design thinking. More recently the view that all forms of design thinking are discursive practices based on argumentation has been explored by a number of authors, notably Richard Buchanan.¹⁰ However, to date there has been minimal attention given to the design pedagogical implications of this position, both in regard to the routine view of design as inquiry and the special case of *design as research*. One of the few acknowledgements of the importance for architecture students of reasoning skills based on argument can be found in the proposals by Yanik and Hewett.¹¹ That there is a need for learning experiences that develop the informal reasoning skills of architecture students is suggested by these authors' observation that many schools of architecture find their students unable to reason logically through a design problem and to argue competently for its solution.¹² They advocate the importance of what they refer to as 'practical argument' in relation to the need for architecture students to discuss and legitimate their designs in studio and other public forums, and they note that "in practical argument we recognize that we have an answer, but that other answers exist as well; indeed we can argue only when one or more potential answers exist."¹³

To assist in understanding why this is so, and thus to establish the focus of any learning experiences intended to address this deficit, it is instructive to turn to empirical findings from recent studies of informal reasoning processes. On the basis of studies of such thinking processes employed by a wide range of subjects in response to a selection of urban social problems, Kuhn has identified three kinds of evidence offered by subjects in support of their 'causal theory' (or explanation) regarding the phenomenon. She refers to these as *genuine evidence*, *psuedoevidence* and *nonevidence*.¹⁴ In order to elicit evidence from her subjects Kuhn followed a three step process: subjects are asked for their causal theory, then how he or she came to hold this view, then to provide evidence to justify their account. Kuhn reports multi-group studies in which only 9% to 22% of subjects were found to hold to what she refers to as an evaluative epistemology (needed to reach genuine evidence), with college students as a subgroup performing only marginally better than these multi-group averages.

Genuine evidence, although it can take a variety of forms, is characterized by being distinguishable from one's causal theory. The evidence needs to exist independently of the reasoning process itself. In the case of architectural design, evidence will usually be drawn from architecture's established knowledge base, although established knowledge from other disciplines may also be relevant.

Unlike genuine evidence, *psuedoevidence* cannot be distinguished from the causal account. In offering *psuedoevidence* subjects typically elaborate their initial depictions of the causal sequence, focusing on the means by which a cause produces an effect. In the case of design work, *psuedoevidence* typically focuses on the decisionmaking process that led to the design outcome, as if this is sufficient justification for the outcome. In the author's experience, students often offer some prior design decision as justification for the design outcome, and Kuhn notes from her empirical studies that *psuedoevidence* is the most prevalent response type. One way of conceptualizing this might be to suggest that the subject confuses an explanation of "how" (causal account) with an explanation of "why" (evidence).

Nonevidence is the third of Kuhn's types of evidence and takes several forms. The most prevalent form is where the phenomenon (or effect) itself is offered as evidence of its cause. In the case of architectural design, when students are asked for a justification of a design proposal they sometimes explain their design or some aspect of it in more detail. The design, it would seem, is its own evidence. A second form of *nonevidence* is that which is related to the wider topic but which remains unrelated to the specific causal account offered for the phenomenon. Kuhn suggests that this indicates that the subjects do not possess the content knowledge that would enable them to substantiate their causal account.¹⁵ Architecture students sometimes offer evidence that is disconnected in this way from an explanation of the particular aspect of the design being questioned. Finally, *nonevidence* also includes those instances where the subject treats evidence as unnecessary, but simply restates his or her causal account (a strategy that Kuhn describes as "argument by telling"). As a variation of this position Kuhn provides examples of students who emphasize intuition or instinct as an alternative to evidence,¹⁶ a strategy also not uncommon in the justification of design work by some architecture students.

Kuhn's findings highlight the importance of being able to base one's causal account for a phenomenon upon relevant knowledge that can itself be differentiated from that account, and which in the case of research needs to be based on content knowledge relevant to the particular research focus or question. Preparing students to successfully undertake design as research thus requires that students understand these distinctions and are able to identify genuine evidence in support of an argument for architectural work deemed to be 'significant' and thus to make a knowledge contribution.

PREPARING STUDENTS FOR DESIGN AS RESEARCH: CONFRONTING THE NEED FOR GENUINE EVIDENCE

In order that undergraduate architect students might come to understand how to offer genuine evidence in support of claims for design work that makes a knowledge contribution, the author has developed a teaching and learning initiative that focuses not on the student's own design work but rather on existing built works by others considered to be significant in some way. Students are asked to

link the specificities of the chosen built work with the generalities of its contributions to architectural knowledge, in anticipation that similar thinking and reasoning processes will be needed when they undertake their own *design as research* project. This approach has been taken for a number of reasons, outlined below.

At a practical level, the time available for the course was limited to 100 hours of study. Faced with this constraint the author decided to have students select examples of published built work rather than their own design work, and by reference to established architectural literature to locate evidence for the significance and thus the knowledge contributions of the selected work. This allows students to choose a work (or architect) of personal interest, and to selectively focus on areas relevant areas of architectural knowledge.

A second reason for focusing on built works by others is that students will have no access to the design decision-making processes involved, and are thus unlikely to offer *pseudoevidence* as a basis for the significance of the work. While this makes the need for genuine evidence more apparent, it does not prevent the student from offering a causal account of the work that is unsupported by evidence and which thus fails to convincingly establish the wider significance of the work. Each year a number of student assignments demonstrate this shortcoming.

A third factor relates to perceived conflicts between creativity and *design a research*. The triple test of good research - originality, rigor and significance - when applied to design is viewed by some students as a threat to creativity within the design process. Appadurai succinctly identifies this tension between creativity and reliable knowledge when he observes that research seeks to guard the domain of reliable knowledge against “the virtuoso technique, the random flash, the generalist’s epiphany, and other private sources of confidence.”¹⁷ By focusing on work by others rather than a personal design work, students typically discover that the wider significance of the chosen work is not at the cost of design creativity but rather is almost always dependent on it. Their investigations also typically identify a rigor with which issues have been addressed in the chosen work, thus hopefully cementing in place an understanding that significant built work which they admire is not inconsistent with the obligations that attach to *design as research*.

GETTING TO GENUINE EVIDENCE FOR ARCHITECTURAL SIGNIFICANCE: THE DISTINCTION BETWEEN DESCRIPTION, EXPLANATION AND ARGUMENT

One way of assisting students to avoid the pitfalls of both *pseudoevidence* and *nonevidence* in developing justifications for their own work as well as in the analysis of work by others is to emphasize the differences between processes of description, explanation and argument. This approach has been investigated by the author as part of the teaching resources and instruction for the course outlined above. A focus on built works by others forces students to engage with established scholarly architectural knowledge in the search for genuine

evidence of significance, and hopefully to also do so when subsequently defending their own design work. However, students will be able to offer *genuine evidence* for their own work only to the extent that they have employed this in their design decision-making. Yanik and Hewitt offer the view that the questioning needed for rigorous decisionmaking is often absent in architectural design studios, “where design often is considered a personal and private matter between students and architect-teachers who both disseminate their knowledge and act as surrogate client.”¹⁸ Asked for evidence-based justifications, these students will frequently resort to an account of some aspect of their personal decision making process (ie: *pseudoevidence*) or simply reiterate the relevant features of their proposal. A lack of clarity associated with the notion of ‘explanation’ is, in this author’s view, in part responsible for the prevalence of *pseudoevidence* offered by designers and non designers alike when asked to give their ‘explanation’ of the phenomenon in question.

Explanation is required when that which needs to be understood cannot be directly apprehended. (In those cases where it can be, then description is sufficient.) While considerable work has been undertaken on processes of explanation and argumentation in student learning in science education for example, little focus has been given to this issue in the context of design education. Berland and Reiser record that the “literature in both the philosophy of science and psychology suggests that no single definition of explanation can account for the range of information that can satisfy a request for an explanation.”¹⁹ They also observe that while some researchers treat explanation and argumentation as separate categories others treat them as a single practice. Berland and Reiser suggest that while it makes sense to combine these two practices because of their related goals and practices, for the purpose of supporting students in engaging with both explanation and argumentation it makes more sense to distinguish between them, and as complementary practices. They suggest that explanations “... provide a product around which the argumentation can occur” while “argumentation creates a context in which robust explanations... are valued.”²⁰

That the term “explanation” can refer to a wide range of intellectual processes is evidenced by Kerry.²¹ He proposes three different types of explanation: interpretative explanations (answering ‘what’ questions and thus in the nature of definitions), descriptive explanations (answering ‘how’ questions and dealing with processes, procedures and structures),²² and reason-giving explanations (addressing ‘why’ questions and identifying reasons, causes, motivations and justifications.) When design critics ask students to explain their design proposals they are typically asking for this third type of explanation, but perhaps understandably students frequently offer either of the two kinds of explanations. Interpretative explanations will offer what Kuhn has referred to as *nonevidence* while descriptive explanations will tend towards *pseudoevidence*. In view of this kind of confusion, this paper proposes that the term ‘explanation’ is taken to encompass ‘what’ and ‘how’ questions, thereby emphasizing the importance of arguments and argumentation in addressing ‘why’ questions.

To give a full account of any work of architecture will require some combination of description, explanation and argumentation. In order to illustrate this fact and to highlight the differences between each, the author has included in the course of instruction the analysis of selected articles in which the significance of the work in question is being discussed.²³

THE POSTER ASSIGNMENT

The course requires students to each prepare an A1 size poster that, by means of a combination of images and text, communicates their findings. A poster format (rather than an illustrated essay) allows the opportunity for images and text to be closely integrated, and the complexity of interrelationships and influences within architecture to be explored and graphically represented. Students are recommended to select buildings for which there are at least ten scholarly publications, as evidence of the recognized importance of the work and as a starting point for their investigations. They are also encouraged to extend their reading beyond project specific material in order to deepen their account. While the chosen example must be a built work completed since 1900, most students choose work that addresses contemporary issues and challenges.

Experience to date indicates that the more successful posters develop a tight relationship between photographic images (serving primarily to describe the work), drawings and diagrams (being primarily explanatory) and text (developing both explanations and concluding arguments). The need to devote written commentary to description of the work is minimized, and students are able to devote the greater part of the 2000 word imposed limit to explaining chosen attributes of the work and developing arguments that make a strong case for the wider significance of the work. Students are able to explore the potential for written text, with its potential to convey precise meaning, to make possible highly selective and focused interpretations of the chosen graphic material. Each of these qualities of successful posters is seen as relevant in relation to the organization and presentation of their future *design as research* projects. Examples of two successful posters are included at the end of the paper.

While the poster assignment is not the outcome of undertaking *design as research*, it selectively addresses several critical steps in the research process with which students have little familiarity, and which they are likely to experience as challenging in the context of their future *design as research* work. In addition to this deliberate focus on evidence-based accounts of the significance of the work, a number of highly graded posters have exhibited features which the author did not anticipate and which suggest an optimistic conclusion: that the interrogation of an architectural work in terms of thinking processes that are at the heart of successful research is not inconsistent with a focus on the intrinsic creativity and innovation of the work, and may offer a fuller account of such attributes. This further suggests that when approached as research, the fundamental nature of design as an intrinsically creative and holistic enterprise may not be at risk and may indeed be fostered. *Design as*

research may be viewed as an opportunity to intensify one's engagement with these intrinsic and fundamental interests, and as having relevance and promise for students' future architectural practice. Features of the student posters which, in the author's view, support the above noted optimistic conclusion are briefly outlined below.

1. Depth, not breadth: Students typically identify a small number of attributes of their chosen work that they consider warrant explanation. Given that each of the selected works are significant (as evidenced by scholarly publications in which each has been discussed) it would seem that such significance may well be the result of a design approach in which the architect has carefully prioritized issues, given selective attention to the most important of these, and explored their design implications in depth. This of itself is a valuable lesson for students, a number of whom in the author's experience mistakenly measure the value of their design work in terms of breadth rather than depth of engagement.
2. Inter-connectedness: A second feature of many posters is the extent to which interconnectedness amongst the component explanations of significance is evident. Thus, for example, in the poster that examines Steven Holl's Bloch Building (additions to the Nelson-Atkins Museum of Art) the innovative way in which natural light is admitted into the building is discussed in relation to two other aspects of the student's explanations – the relationship between building and site and the experiential dimensions of the museum interior. The way in which each of these has informed and influenced decisions regarding structure and materials provides the fourth of the component explanations. In the poster that examines Frank Lloyd Wright's Larkin Administration Building, the spatial concept for the building is explained in terms of contextual and functional imperatives, while the servicing and environmental control strategy is explained in terms of the demands made by this spatial concept. The expressive potential of these architectural elements devoted to environmental control is selected by the student as a fourth area of design innovation warranting explanation.
3. Tectonics and technical realization: A third feature of many posters is the attention given to tectonic and technical innovations in the architecture. Without being required to do so, most students include as an integral part of their explanations a consideration of the means whereby the project has been realized as a completed building. It would seem that when presented with the task of explaining a completed work of architecture and making a case for its wider significance, addressing these kinds of issues takes on an importance that is often absent in the student's own design project work.

CONCLUSION

This paper has focused on the expectation that *design as research* will seek to develop knowledge contributions on the basis of discoveries and findings arrived at by way of design. Both designs and built works that are deemed to be 'significant' or to 'advance the

state of the art' may be thought of as contributing to the growth of knowledge. Demonstrating that this is so calls for a particular form of explanation in which support for claims of significance is provided by offering what Kuhn and others have described as *genuine evidence*, as distinct from *psuedoevidence* and *nonevidence*.

Informal observations of architecture students presenting their design work suggest that these distinctions are not well understood. The paper has outlined a teaching and learning initiative that confronts students with the need to offer genuine evidence in seeking to explain the significance of a self-selected built work. The value of using such built works rather than the student's own designs is outlined. Based on a review of approximately 500 poster presentations over a four year period the author has been able to clearly distinguish between those students who employ *genuine evidence* and those who do not. It is suggested that developing an understanding of these issues and an ability to employ genuine evidence will enhance a student's own design thinking processes and the capacity to explain and argue for the significance their design outcomes in the context of future *design as research* projects.

ENDNOTES

- 1 David Salomon, "Experimental Cultures: on the "end" of Design Thesis and the rise of the Research Studio," *Journal of Architectural Education* 65, no.1 (2011): 42
- 2 Jeremy Till, "What is Architectural Research? Architectural Research: Three Myths and One Model." Discussion Paper. RIBA, London, 2005; <http://www.architecture.com/Files/RIBAProfessionalServices/ResearchAndDevelopment/WhatisArchitecturalResearch.pdf>, last accessed on May 21, 2012
- 3 Salomon, "Experimental Cultures: on the "end" of Design Thesis and the rise of the Research Studio," 34
- 4 Ann Heylihen, Humberto Cavallin and Matteo Biachin, "Design in Mind," *Design Issues* 25, no. 1 (2009): 94
- 5 Lily Chi, Introduction: Design as Research," *Journal of Architectural Education* 54, no. 4 (2001): 250
- 6 Ibid
- 7 Ibid
- 8 Deanna Kuhn, *The Skills of Argument*. (New York: Cambridge University Press, 1991), 2
- 9 Horst Rittel, "Son of Rittelthink," *DMG Occasional Paper No 1* (1972)
- 10 See for example Richard Buchanan, "Strategies of Design Research: Productive Science and Rhetorical Inquiry." In *Design Research Now*, ed R. Michel, (Basel: Birkhauser, 2007), 55-65. For a fuller discussion of the role of argumentation in design thinking and its relationship with design as research, see John Hunt, Designing and Researching: Reflections on Bridging the Gap," *Anti-po-des* 1, no. 1 (2011): 34-44, <http://www.anti-po-des-designjournal.org.nz/current-issue/abstracts-and-papers/hunt/>
- 11 John Yanik and Beth Hewett, "An Argument for *Argument* in Architectural Education," *Journal of Architectural Education* 54, no. 1 (2000): 60-63.
- 12 Ibid., 62.
- 13 Ibid., 61.
- 14 Kuhn, *The Skills of Argument*, chapter 3
- 15 Ibid., 84.
- 16 Ibid., 82.
- 17 Arjun Appadurai, "Grassroots Globalization and the Research Imagination," in *Globalization*, ed. Arjun Appadurai, (Durham, N. C., Duke University Press, 2001), 12
- 18 Yanik and Hewett, "An Argument for *Argument* in Architectural Education," 62
- 19 Leema Berland and Brian Reiser, "Making Sense of Argumentation and Explanation," *Science Education* 93, no. 1 (2009): 27
- 20 Ibid., 28
- 21 Trevor Kerry, *Explaining and Questioning* (Cheltenham: NelsonThornes, 2002), 12-14
- 22 The term 'descriptive explanation' need to be distinguished from mere 'description'
- 23 See, for example the reviews included in Peter Blundell-Jones, *Modern Architecture through Case Studies*. (Oxford, Architectural Press, 2002)