DESIGN RESEARCH METHODS—APPLIED THEORY AND STUDIO

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ABSTRACT

Today, the curriculum at schools of architecture is generally subdivided into design studio (practice) and the adjacent scientific or scholarly subjects ranging from natural sciences to technology to humanities, often with their own separate faculty, degrees, and institutional structures. This separation is widely experienced as a fragmentation of a discipline that claims to be integrative and wholistic. This essay provides a sketch for an alternative pedagogical format of integrated design research methods and studio at the graduate level, which could help bridge these perceived institutional gaps, but also offer a research agenda of its own kind. Design Research Methods is framed here as an applied theory, since exemplary design approaches themselves are selected, analyzed, comparatively discussed, and serve as a primer in the studio environment, while in turn the studio tests various theoretical concepts, design approaches, tools, and methods, and provides feedback to theory. This applied theory is not meant to replace traditional forms of critical inquiry, reading, and writing but should serve as a complementary addition that empowers students to define their own research and design agenda for their thesis year and beyond.

Keywords: Architecture Theory, Design Studio, Methodology, Pedagogy

1. NOTES ON THE GROWING DISTANCE BETWEEN THEORY AND PRACTICE

Architecture is not a science, but a cultural practice. Yet there are certain scientific approaches to architectural questions and issues that ask for a methodological understanding within the discipline. Traditionally, these have been grouped into two general categories: humanities with research in history, theory, sociology, anthropology, and other such fields on the one side, and natural sciences with physics, mathematics, civil engineering, material sciences, fabrication, and computation on the other side. Design (studio) is conventionally considered to be the arena where the diverse subfields converge, overlap, interchange, and integrate in a creative process—both in education as well as in the professional field.

This essay sketches out a different approach to contemporary architectural pedagogy: design research methods. This course offers a hybrid format that crosses between a scientific method and design, since it aims to catalogue, analyze, and theorize different design approaches in a comparative manner. That is, it tries to gather some generalizable knowledge of the discipline by systematic research into the design process itself. And it is applied theory, since it introduces these design methods back into the studio, puts them to test (for a specific design problem), and asks students as well as instructors to comparatively discuss their "performance" for a specific situation.

Since the establishment of specialized institutes within schools of architecture in the late 1960s and '70s (history, theory, and cultural studies as well as technology, engineering, computation), there have been continuing concerns about the separation of the subfields of architecture from design (studio), creating academic silos, which result from the institutionalization, specialization, and autonomization of these academic formats (such as specific master's and PhD programs). This analysis is not based on empirical studies, but on the observations of the author from ETH Zurich, Harvard GSD, MIT, RISD, TU Berlin, TU Wien, TU Graz, and University of Utah, as well as derived from conversations with colleagues from different institutions in North America and the German-speaking world. Yet what seems significant here is that the more research intensive and the more autonomously these institutes operate—such as the Institute for the History and Theory of Architecture (gta) at the ETH Zurich or the History, Theory and Criticism of Art and Architecture program (HTC) at MIT—the more they are perceived as being distant from design studios and architectural practice.

Today, the difference between knowledge (or "understanding," in the language of NAAB) and application (or NAAB's "ability") is one of the biggest obstacles for design education. Both students as well as society at large ask for a rapprochement between the diverse subfields ("integrated architectural solutions" according to NAAB). This rapprochement between the various subfields and studio wished for by architecture students, designers, and accrediting bodies—and this is a hypothesis—could provide an opportunity for convergence and integration of diverse sets of knowledge into action. Since the author can only comfortably speak for the humanities side, this essay discusses an immersive integration of History Theory Criticism into design studio, and—this is important—vice versa in a format that we call "design research methods." This essay addresses a predominantly pedagogical format in which diverse subjects are integrated into studio, which are in themselves not yet "scientific" or "scholarly," but rather provocations, polemics, and historical avant-garde practices that form part of contemporary architectural discourses. Yet it also offers a research perspective wherein theoretic input, design practices, and critical reflection go back to new theories about pedagogy and design.

2. METHODO-PHILY?

In what follows, I sketch out an applied design research methodology (or methodophily?) that first would have to document, process, and systematize various approaches of architectural design and neighboring artistic disciplines. Second, it needs a critical assessment of the all too many subjective poetics, which means, a comparative testing of their performance and uncovering of blind spots related to nonarticulated belief systems. In studio, architecture students learn how to form a design argument, develop alternatives and variations, test and select one of them, then provide reasons for their selection and work out one design approach into a project, which reduces complexity and options.

Yet a methodological approach toward design moves in a complementary and oppositional direction, that is, a step-by-step opening up of the design decisions, making them visible. This includes verbal/written statements as well as representational/graphical media, the explication of options and alternatives, as well as the questioning and critique of once-made decisions. One could speak of deconstruction and reconstruction if these terms were not so overused in architecture. Third, through the exploration of the design methods

of others, critical design methods lead back to an application in studio, partly as test and "falsification," to say it in the words of Stanford Anderson borrowing from Karl Popper (Anderson 1965, 86–87), or rather, to a critical use of design methods by the students, who are enabled to change from theory (methods) to application (design) and back to new theory (reflection over practice). The overarching goal of a critical design research methodology is not to stop at the systematization, ordering, comparison, application, and reflection of existing design approaches, but to clarify the sociocultural, economic, and political frameworks for various design approaches, and to envision design approaches for alternative forms of social organizations. Otherwise, architectural research might be in danger of losing its subject: the practice of architecture and its role within society.

3. DESIGN METHODS

Design is difficult to communicate, since much of it happens in silence as "tacit knowledge" (Cross 2006, 9). Hence, design is taught in schools of architecture through "studio," that is, a pedagogical lab environment of learning by doing, where articulation comes in retrospectively—at the weekly desk critiques with the instructor or at the midterm/final reviews in front of a jury. A reflection on the methods of design is normally not part of this process of learning by doing, neither from the students' perspective nor from the instructors'. Rather, just by the choice of the design studio and the professor/instructor the students automatically select a specific methodological and formal design approach: students take the studio of instructor X to immerse themselves in the architectural design of instructor X. And since this design approach is only discussed retrospectively regarding students' projects, a common concern among students is that there must be certain preferred ways of designing, which they feel are withheld from them.

   Similarly, the field of "design research" defines the practice of architectural design as a cognitive faculty different from scientific-logical quantitative thinking as well as linguistic-scholarly qualitative thinking, or abductive thinking—different from deductive and inductive models. And unlike a purely functionalist understanding of "design" as "problem solving," where maximal information leads to a distinct, best solution, design is reframed as a bundle of explorative, emergent, opportunistic, reflexive, nonidentical, and ambiguous solution strategies. These strategies can deal with complex phenomena on multiple interrelated levels and with variables with only partial information by projecting their own patterns of order onto them, which leads to a dialogical process between possible formal interventions and the original problem space (Cross 2006, 32–34; Rittel and Webber 1973). Design, in other words, not only entails the creative finding of formal solutions, but it changes, reframes, and unfolds various aspects of the problem complex in reaction to these projections. Despite the ambiguity of both the problem and the solution, exacerbated by the only partial verbal disposability, it would be mistaken to conclude that there are no methods for architectural design, or, similarly, that the existing ones were beyond expression and systematization. Design employs plans, drawings, diagrams, images, and model building, that is, primary nonverbal, yet highly conventionalized and codified forms of representation.

4. COMPARATIVE APPROACHES TO DESIGN

Hence, a first step toward a critical design research methodology lies in the comparative and nonjudgmental consideration of multiple design approaches, which should not be reduced immediately to "style" nor problem solving competency, but rather read as multiple

possibilities or conjectures. To open these "conjectures" for (pedagogical) discussions, one needs to engage with them one by one, beginning with primary texts—that is, texts written by author-architects themselves—as well as secondary texts—descriptions and interpretations of a specific method by theoreticians and critics—accompanied by a process of reading design examples. From this theoretical entry point into one specific design approach follows practical engagement with various media, such as drawing, collage, diagram, model, terms, information, gestures, and so on, in which students explore, appropriate, deviate from, and adapt its "usability." In this pedagogical set-up, each design approach is seen not only in light of a potential architectural solution for a given problem but also as a conceptual frame for a better understanding of the design problem, in the sense of "generative thinking." By exploring design approaches and research methods one by one, the students project formal structures, organizing principles, and conjectures onto the same problem, and through their comparative (self-)criticism, they learn more about site, context, ecology, program, constructive and material options, and about other aspects such as user groups, social forces, economy, politics, and history by shifting perspectives with every approach. The projecting of a design solution, the redefinition of the problem space, and the development of evaluation criteria work hand in hand (Cross 2006, 77–78). Drawing and other forms of representation—analog and digital—serve both the outside communication with others, for presentations, as well as visualizations of the internal thinking process of the student, as a manifestation or trace, which now allow for an analysis, evaluation, and selection of one of the potential options, triggering further design options and alternatives. In these outputs, various parameters of the design problem, from the different research and design methods to various levels of abstraction are addressed concurrently and hence become accessible for reflexive thinking, speaking, and writing.

These reflections on a critical method of design are far from abstract themselves, since they were developed in preparation of a specific course at the University of Utah School of Architecture and came out of a two-year faculty-led process of redesigning the entire curriculum (Bachelor and Master) between 2016 and 2018. I was charged with developing and coordinating an integrated Design Research Methods course at the entry level of the restructured Master of Architecture program, integrating lecture, seminar, and studio. In the curriculum reimagination, faculty and students decided to move from a traditional final studio model in which the graduate students would select from three different studio options (connected to a specific problem, site, and studio professor) toward a more research-driven free thesis project. To prepare for and guide students through this new process, the faculty decided to offer two new mandatory courses on the graduate level: Research Methods I and II. While the first one is offered for incoming graduate students in order to survey and test design approaches and to develop a research and design agenda, the second one in the third graduate semester prior to the final serves as thesis prep, that is, as a seminar-size format to identify a design question, research background, program, and potential sites, and develop a narrative around the project to be defended before a jury of studio advisors and accompanied in the final semester by a thesis book.

Charged as a team of three instructors with developing the first of these research methods courses integrated with design for fall 2018, we decided early on to expose students to a variety of methodological and research entry points into the design problem in a comparative and reflexive way. To provide a comparative approach, the set-up included a preselected site and a given program, as well as the weekly structure of lecture on Monday morning, discussion of key texts, concepts, and examples of a specific approach in seminar

on Wednesday, individual desk critiques Monday and Wednesday afternoon, as well as a collective design review of all sections on Friday afternoon. Against this rigid structure, differences between the design approaches from week to week were meant to stand out more clearly, so that students could grow a comparative understanding by identifying different problems, gathering information, and developing potential solutions and criteria for evaluation and reflection. "Comparative" here refers first to the different weekly design approaches, themes, and arguments targeted toward the same issue. Second, "comparative" also relates to the students' results, since all students worked on the same program, site, and weekly method, yet when pinned up together every Friday afternoon, they showed a wide variety of interpretations, research interests, and design outcomes. "Comparatively," finally, was applicable in the sense that we as instructors hoped for an in-depth discussion about the adequate forms of representation for different research and design strategies, since each seems to favor different modes of communication. Hence, we formulated the assignments to be as open as possible to a wide variety of media, instead of providing a list of deliverables, and always intended in our reviews and discussions to address the "how" as much as the "what."

The pedagogical aim of the team was to trigger a kind of "perspectival thinking" (Nietzsche 1968, 383) in which every change of viewpoint changes the perception of the problem, and hence the intention that students would begin to grasp that every method brings new information and challenges, and the design problem changes with the applied method. As pointed out by "design research" (Cross 2006), the creative process does not only deliver new formal solutions or organizational patterns but restructures the understanding of the problem itself. By challenging students to change week by week from one design method to the next, "projecting" each of them on the same site and program, the objective of the course has been not only to instigate a diverse set of approaches but also to open up additional dimensions or layers with each approach, bringing new information, tools, and criteria to the table. Each partial response to one method could influence and inform the next stages of the design, even if the students choose to continue to work with one specific and different design approach, and hence allow for a (self-)critical reflection of the steps taken. With this pedagogical set-up of weekly exercises over the first term, the course was to survey different design methods, bring forward a more complex understanding of the design question, and offer general entry points into a design project by practical exploration of the approaches. The comparative discursive aspect was supposed to center on the weekly Friday review, where all results were pinned up (or built up) in parallel. The pedagogical concept here was to turn from provocation (lecture on design research method and examples) to response (seminar discussion and desk critiques) to reflection (group pin-up and discussion). The idea to hold the weekly review in plenum with all students and instructors was to compare and search collectively for emergent patterns and to differentiate between horizontal transformations (variations on the same theme) and vertical transformations (convergence on a similar theme from different directions). Finally, the pedagogical concept of comparative weekly reviews was supposed to animate students to review and comment on their peers' interpretations, approaches, and forms of representation, and to learn from this comparative criticism to develop new research methods and design approaches.

5. TEACHING INTEGRATED DESIGN RESEARCH METHODS

To address the applicability of a comparative design research methods course, and not stay with the theoretical aspects of it, I will briefly describe an example from the first run for the incoming Master's integrated studio in fall 2018 at the University of Utah School of Architecture. In conversation with the faculty who had taught final studio (last semester Master of Architecture in the old curriculum) in the previous years, and from the discussions about the new curriculum, its objectives, and learning outcomes, I was charged to coordinate a team of three instructors. In a first step, we prepared a list of design methods and research entry points into a project. In a second, we consolidated the list to seven design approaches, which would be discussed and tested during the first half of the fall semester. Also, we decided to preselect a site in Salt Lake City and a program—a center for air quality and sustainable tourism in the mountain West (connected to a potential second bid for the Winter Olympic Games)—in which students were encouraged to engage critically and change or expand programmatic elements as they saw fit. The seven design approaches were, in the weekly order of the semester: (1) contextual/place specific,
(2) parametric/experimental, (3) ecological/sustainable, (4) translational (spatial practices from art/music/performance), (5) diagrammatic, (6) programmatic, and
(7) atmospheric/experiential.

     Each week of the first seven started with a lecture on Monday morning that introduced the design and research methods with two or three key theoretical texts representative of this specific approach. The input opened up the contexts of this position, addressed their agenda as well as their reception in the discipline, and illustrated this approach with reference projects, which included executed buildings as well as speculative design proposals, exhibitions, installations, or artistic formats from other disciplines. For consistency and transparency, the students had full access to the entire semester program, all the deliveries, deadlines, materials, and readings from the first day of the semester, with the intention (and explicit advice) to review the materials before the Monday lecture. One aspect of importance was the selection of diverging, conflictual theoretical positions within one week's method to avoid falling into the trap of imitating a precedent, which is known in "design research" as a "fixation problem." This means the tendency of a designer to stick to a known precedent and primarily search for variation and adaptation of the model, or to follow its principle features rather than explore the structure of the problem and potential spatial pattern itself, which artificially reduces or limits the potential outcomes of the design process (Jansson and Smith 1991). For the same reason, the examples shown with each method were from a broad and diverse background, by various offices and authors, so as not to propagate one specific design model, form of representation, or "style," but rather to entertain a controversial discussion about different sources, understandings, architectural positions, tools, and references.

     Directly after the lecture, the group split up into sections with their studio instructor to reflect upon the material presented in group discussion and answer questions, before students started to work in studio on their weekly "approach." On Wednesday morning, the class came together again to discuss the texts, authors, concepts, and references once students had begun to work on their weekly research and design translation of the specific method, while the afternoon was dedicated to studio and desk critiques in the class sections. Friday afternoon the entire group of students and all instructors came together for a weekly review of the research and design concepts developed under one theme or method, including peer review and self-criticism of instructors and students (what worked,

what did not, where there were obstacles or blind spots, what seemed paradigmatic solutions, and so on). Since the students returned to the same site, context, and program week after week, but scrutinized these "givens" in relation to new readings through the various research and design methods, they learned to reapproach, reframe, and reexamine the problem and their previous conjectures, which often led to a change in design principles, in design primitives, in forms of representation, and along with those, the concepts and criteria of their own approach. Also, here our pedagogical intention was to encourage students to explore different and in themselves incompatible directions, patterns, or design solutions to prevent students from falling back into established design habits from past semesters, precedents, or stylistic preferences. One of the findings in the curricular reimagination that was of general concern to the studio faculty: master's students tended to reiterate the same methods or similar design approaches and seemed reluctant to explore alternatives that went beyond variations on the same paradigm.

After the first seven weeks (and, fittingly, fall break), we introduced a "reflection week" during which the group of instructors conducted individual interviews with each student. They were charged with preparing a "portfolio" of their experiences of the first seven weeks, in which they were asked, as a form of design hypothesis, to edit the research findings, approaches, concepts, and potential solution(s) to one scheme or research agenda that they would like to expand and continue in the second half of the term. From this moment on, theory and studio changed rolls; now the "design research methods" seminar served to support the studio, rather than setting the themes, methods, and inputs. In studio, students focused on expanding and adapting (or combining or inventing) a research and design approach into a full project, while for the research methods course they started writing a (self-)analytical paper about their research, design approach, and process. In those second seven weeks, we scheduled one formal mid review and the final presentation, always with the whole group of instructors present to maintain consistency in our conversations (and to celebrate a certain level of critical disagreement). In coordination with the deadlines of the studio, students submitted an abstract, an extended abstract, and a draft of their paper, and after the final review, they submitted the final edited version describing their research, their design method, the application in their project, the process, as well as a positioning in the discourse of architecture with references to texts, precedents, and bibliography.

6. CODA: LESSONS LEARNED . . .

Time for self-criticism: what seemed to have worked well was the design charette style of weekly exercises, as well as the group discussions with students in the first seven weeks on the Friday reviews, which led to engaged and sometimes controversial debates. Some students were able to keep the momentum going in the second half of the semester, and to their own surprise, were diving deep into research questions, formal approaches, and architectural solutions that might have seemed foreign to them prior to this, including failure, (self-)analysis of that failure, and a search for alternatives. Other students, however, fell back into their habitual design approaches in the second half of the semester, once the "pressure" of weekly inputs and reviews was lifted, and this led more often than not to starting from a program diagram and extruding it into a "building." The shortcomings of such a reductive "problem-solving" approach became more obvious in their reflective papers than in their studio projects (where the better ones of this group achieved a competent final project), since these students struggled to articulate how they had gathered information,

identified an approach, and developed a central theme or idea for their project, beyond fulfilling a basic programmatic consideration.

In the second iteration of the course in fall 2019, the team of instructors discussed these findings and decided to change the sequence of the seven methods. Additionally, we reduced the program to a "core," with the challenge for students to advocate additional programmatic elements, and the instructors offered a series of sites to select from. By these two latter measures we hoped to foster an early pro-active understanding of program as a design problem in itself. Also, we challenged students to make a case for a specific site based on their chosen method and interpretation of the theme/program(s) as part of the midterm reflection week before they could transition into elaborating one design approach, which is also the starting point for their research-reflection paper. This should help students identify themes, sites, and programs once they move into Research Methods II (aka Thesis Preparation). But we also agreed on these changes because as a group of design educators, we believe that today students need to progress from problem solvers and service providers to acting in public, in the sense of the political theorist Hannah Arendt (1958), who distinguished the existential materialist labor of self-preservation and reproduction from the technical-artistic work of the producer and craftswoman, and from wished-for politico-social action in public space.

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