HOW DO WE KNOW IN DESIGN? EXPLORING KNOWLEDGE AND INQUIRY IN ARCHITECTURAL DESIGN

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Abstract. This paper examines the intricate relationship that exists between the field of architecture and the role that research can play in it, by describing how this relationship has manifested itself in academic environments over the past two decades. The paper goes over modalities and methods to conduct architectural research, illustrates paradigmatic examples, and identifies a specific place for the formulation of what research can constitute in architecture. In analyzing architectural research connected to doctoral education, but also to the second cycle of higher education, the paper describes the Design Studio as the ideal place where teaching, research and learning can blend in to produce innovative and meaningful forms of knowledge.

1. Introduction

More than 25 years ago, the 1998 Sorbonne Declaration—initially signed only by the ministries of France, Italy, the United Kingdom, and Germany—and the 1999 Bologna Declaration, signed one year later by the ministries of 29 European countries, paved the way for a process of radical reform in the higher education system that aimed to build a homogeneous, coherent, and comparable framework across the entire continent.

Such a process, originally inspired by a then favorable and optimistic sentiment towards Europe's future, as well as by the desire of 'building upon and strengthening its intellectual, cultural, social and scientific and technological dimensions' (European Higher Education Area [EHEA], 1999), currently includes more than 48 countries. The beginning of this transformation was inspired by a few key points: the adoption of comparable academic degrees consisting of three main cycles – undergraduate, graduate, and doctoral; the promotion of student mobility via the establishment of a credit system (ECTS), as well as exchange among teachers and researchers; the introduction of a quality-assurance system based on comparable criteria and methodologies.

The Bologna process, which culminated in the establishment of the EHEA in 2010, also addressed the role of scientific research within this renovated and unified landscape. Over the years, various Ministerial Communiqués on this topic have emphasized different aspects such as the relevance of higher education as the crossroads of research, education and innovation (Bergen Communiqué, 2005), or have referred to research through the lens of climatic crisis and the green transition (Tirana Communiqué, 2024).

The ongoing attempt to create a unified European system for higher education has radically influenced how certain disciplines—architecture, in our case—have redefined the roles of teaching, learning, and research within academic contexts. This shift has occurred through a series of official documents, policies, and initiatives implemented over several years.

This gradual adjustment process has generated compelling opportunities for innovation, alongside clear difficulties and ambiguities. This paper specifically examines some of these ambiguities by focusing on the relationship between the field of architecture and the role that research can play within it.

The Bologna Process, in fact, has formally certified that research in architecture – and in any design-oriented field – is equivalent to that in other scientific disciplines, by questioning not only the ultimate meaning of research but also by forcing to rethink some of its processes and methods. The combination of the challenges posed by the Bologna Declaration, along with the ongoing reorganization of the European labor market over recent decades, has prompted architects, scholars, researchers, and practitioners alike to interrogate themselves on what constitutes

research in architecture, what the boundaries between theory and practice are, and how research is communicated to a wider public.

While the phenomenon of academic specialization—which affects all fields, not only architecture—has certainly introduced scientific rigor and the emergence of previously unexplored epistemological opportunities, on the other hand, it has seriously undermined that generalist, holistic form of knowledge production that architecture has always entailed. This holistic approach is a necessary condition derived from the complexity of operations architecture implies and from its intrinsic multidisciplinary character. Artificial separations arose: between academic researchers practicing architecture and architectural practitioners researching design; but also, between how academic researchers conduct research and how architects conduct research.

Such distinctions produced two antithetical results: the first result equates the word "design" with "practice" – the latter often employed in pejorative terms, as it indicates the professional / practitioner busy with developing projects based on market-driven logics. The second result reduces the role of architectural design in academia to the act of building, as Jeremy Till reminds us in his three myths on research in architecture: building a building is research (Till, 2008).

Within this complex yet disorienting context – deriving both from the specificity of architecture as a discipline as well as by its necessity to address ever-evolving societal needs – it becomes crucial to investigate the meaning of research in architecture, but also the possible forms through which the relationship between architecture and research can manifest itself, and lastly to define goals not only restricted to the academic audience but to a larger and societal public.

This paper explores the intricate relationship between architecture and research. It examines how this relationship has been interpreted and envisioned in academic environments over the past two decades, particularly within the context of the EHEA. A selected literature review reveals the complex positions, approaches, and experiments developed on this topic in recent years. This analysis is structured around two main points:

1) Design has its own ways to formulate questions, investigate issues, produce knowledge. Within these *designerly ways of knowing* (Cross, 1982), architectural research stands out as a specific form of inquiry that keeps design at its core. Its unique character also involves using methods and tools that are unfamiliar to research in other (design) disciplines.

2) Architectural research can be for, through, in, by, design.

The two points above provide orientation for navigating the role that research can play in architectural design. They involve a series of research questions that are addressed in this paper.

a. What does constitute research in architecture and what are its goals?

b. How different are these goals from other non-design disciplines?

c. What research tools do we employ in architectural design?

d. How do we assess the outputs of architectural research?

In addressing these questions, the paper explores modalities and methods for conducting architectural research, presents examples that move beyond academic specialization, and identifies a specific place for the formulation of what research can constitute in architecture. By analyzing where architectural research can primarily occur—within doctoral education but also in the second cycle of higher education—the paper describes the Design Studio as the ideal place where teaching, research, and learning can blend together to produce innovative and meaningful forms of knowledge, consistent with the original spirit of the Sorbonne and Bologna Declarations.

2. POINT A: design has its own ways to formulate questions, investigate issues, produce knowledge. Within these *designerly ways of knowing*, architectural research stands out as a specific form of inquiry that keeps design at its core. Its unique character also involves using methods and tools that are unfamiliar to research in other (design) disciplines

Over the past decades—at least since the 1960s, when design research first evolved as a recognized field of study (Kennedy-Clark, 2013) —, many varied attempts have been made to address the general question of what constitutes research in design, and how it can manifest. Despite the variety of positions and contributions, a general consensus gradually emerged: there are ways to produce knowledge that are unique and specific to the territory of design. As Cross (1982) pointed it out sharply, there are *designerly ways of knowing*.

These ways of knowing encompass tools, methodologies, and purposes. Like research in other disciplines, good design research should always be inquisitive, informed, methodical, and communicable (Dorst, 2017). However, design knowledge ultimately resides in the products themselves—specifically, in the forms, materials, and finishes that embody design attributes (Cross, 1999). These products vary in scale, size, and most importantly, in their societal and environmental impact.

Of the many *designerly ways of knowing*, architectural research possesses its own unique character. To describe its main features, it is necessary—as Jeremy Till suggests—to first debunk some foundational myths. Till identifies three such myths: 1) the myth that architecture is just architecture; 2) contrary to first one, the myth that architecture is not architecture; 3) the myth that building a building constitutes research (Till, 2008).

The first two myths described by Till effectively capture architecture's disciplinary condition: its constant oscillation between two antithetical visions or worldviews, which David Gissen has summarized using the terms environment vs. autonomy (Gissen, 2010). According to Gissen, who introduced this polarity to describe the current disciplinary context and its theoretical production, such a duality is paradigmatically represented by the positions of Reyner Banham and Manfredo Tafuri. One side of this duality is, in fact, Banham's belief that architecture is always the product of its techno-natural environment, as described in his essays *The Architecture of the Well-Tempered Environment* (1969) and, also, in *A Home is not a House* (1956). Architecture, for him, must create possibilities by integrating nature and technology. In other words, it needs to interact with real-world factors and engage with the material and ideological modes of production. If Banham's theoretical explorations are somewhat influenced by a sort of post-war capitalist optimism, Italian historian Manfredo Tafuri rejects any possibility of contamination with capitalism. Instead, he proposes an architecture disconnected from any external factor—an architecture that is autonomous in its own internal logic and its processes of form generation. The only way to achieve a humanist architecture is, for Tafuri, *il disincanto*: to build an absolute and finite architecture, disengaged from the constrictions of the environment and liberated from the capitalist forces that drive society. Years later, although manifested through different forms, this tension between environment and autonomy remains central to the specificity of architecture. It characterizes every aspect of the discipline—whether it translates into buildings, words, or drawings.

Once applied to the field of architectural research, the dichotomy between environment and autonomy translates into a paradoxical dilemma: on the one hand, research in architecture needs to draw upon scientific contributions from other fields without being completely absorbed by or associated with them. On the other hand, architecture needs to deal with questions concerning its disciplinary autonomy and inner logic, without discarding societal issues, which are typical subjects of academic research.

The last myth that Till describes—that building a building is a form of research—is probably the one that generates the most misconceptions and stereotypical ideas about what architectural research should be. In rejecting the simplistic distinction between theory and practice that triggers those misconceptions, Till firmly denies that building a building is inherently a form of research. Architectural research can reside in the built form itself, but also in the process that led to the building and in the strategies that informed its design. To limit research solely to the production of a built form would dramatically undermine the complexity of architectural discourse in its combination of theoretical, cultural, political, technological, and environmental aspects. Furthermore, it would reduce architecture to its only objectual condition.

To overcome this myth—moving beyond the idea of research as building and also beyond traditional scientific research—, Till defines architectural research as a form of research where design can be both the objective and the process used to investigate specific issues. From his perspective, three are the main stages constituting architectural research: architectural processes, architectural products, architectural performances (Till, 2008, p. 9). Architectural processes refer to research dealing with processes in the design and construction of buildings, and include issues of modeling, representation, and theory. Architectural products look into projected or completed buildings: therefore, this stage of research include materials' exploration, aesthetic and expressive considerations, construction techniques. Lastly, architectural performances refer to research into buildings once they are completed, and might include occupancy evaluation, environmental performance, cultural appropriation.

The advantage of this model, according to Till, is that it encourages interdisciplinarity, allowing scientists, historians, practitioners, and academics to contribute jointly to various stages of the process. While, along the same lines as Till, Murray Fraser also distinguishes research in processes, outcomes, impact (Fraser, 2013), Till introduces a further distinction between forms of research – in, for, through design – that became a common framework for many subsequent contributions on the topic.

Overall, Till's contributions allow us to draw some important considerations on the nature of architectural research and its possible outputs. The debunking of the third myth paves the way for further elaborations on how to avoid simplifications and rigid separation between research boundaries. While it seems natural to associate any reflection on architecture with the act of building, what truly distinguishes research in architecture is that design is not merely a medium to produce a building—unlike research in other design fields, where the outcome is typically an object or artifact. By questioning the idea that architectural research always revolves around the building as its output or final product, one can implement a multiplicity of methods, modalities, and techniques, each asserting the centrality of design as a medium for producing knowledge.

Design is certainly a medium to produce buildings, but not only that. Similarly, architecture and architectural research can focus on buildings, but not exclusively. They can also be about discourses, methods, and processes. Through the debunking of the three myths, Till reminds us that architecture possesses an intrinsic complexity that can be expressed through various different forms.

The question of what outputs research in architecture can produce is essential, as demonstrated by the wide range of contemporary manifestations through which the discipline currently interrogates itself—from curatorial practices and ephemeral installations to multi-media projects. Apart from buildings, the variety of options available to us and the different forms of generating knowledge—exhibiting, installing, building, writing—illustrate the distinctive character that architecture holds compared to other design-oriented disciplines.

The existence of a body of theories, experiences, and practices that shape architectural research—distinct from general design research—is also acknowledged by Jonathan Hill.

Hill connects research, teaching, and education in his capacity as the founder and former director of the Architectural Design Doctoral Program at the Bartlett School of Architecture, University College London (UCL), which opened in the mid-1990s. Hill provides his own definition of what architectural research is—including how it can be taught and what outputs it can produce—from a perspective that builds upon the discipline's stratified history.

In describing the foundation of the program, Hill writes that first of all the name Architectural Design – rather than Design and Theory – was intentional, in order to convey that message that theory is not only text-based, and that 'drawing and building are key elements of the process of developing theories and practices of architecture' (Hill, 2022, p. 1).

Most importantly, Hill contextualizes the opening of this PhD program in Architectural Design by claiming that architectural research is nothing new in the history of architecture. While the formal recognition of such research is obviously new, the methods and means used to implement it have been around for centuries. So, in this respect, architectural research has always existed and will continue to exist in its specificity – which lies in the combination of media such as writing, drawing, and modeling as methods of inquiry. Drawing, for instance, has always been used by architects to give shape to ideas. Drawings or sketches are representations of cognitive processes and can visualize things in another way than words – with the precision of words, but also open to interpretation (Hauberg, 2011, p. 50).

For Jonathan Hill, the use, interpretation, or even misinterpretation of history is what makes architectural research specifically peculiar. Architects throughout the centuries have used history in different ways. Until the early twentieth century, the architect functioned somewhat as a historian; architectural treatises combined drawings and words to investigate the relationship between past and present. Influential architects – from Alberti to Palladio, from Le Corbusier to Rem Koolhaas – have tended to write, draw, publish and build at the same time. What Jonathan Hill outlines suggests a line of continuity that addresses questions and issues internal to the discipline, yet without discarding the urgencies and needs coming from societal inputs. Furthermore, architectural research can include interdisciplinarity—within, between, and across disciplines—because architecture is not made by architects alone but involves a wide range of actors and agents. Finally, architectural research can imply multiple and interconnected outputs: as Hill mentions, the outcome of a PhD at UCL in Architectural Design is not only a text, and not only a building. It is a design project that can be filmed, sculpted, built or drawn (Hill, 2022).

3. POINT B: architectural research can be for, through, in, by, design

The differentiation introduced by Till among different forms of research in architecture—research in, for, and through design—has, in recent years, constituted a significant step further in helping delineate approaches and methodologies that can have an actual impact in contemporary academia.

Associations such as the EAAE (European Association for Architectural Education), as well as authors like Johan Verbeke, Jørgen Hauberg, and many others, have attempted to describe the diverse landscape of research in architecture. They have achieved this by adding nuanced perspectives and detailed categorizations.

On a general level, Jørgen Hauberg, for example, distinguishes between three categories of research in art and design: research into art and design, research through art and design, and research for art and design (Hauberg, 2011, p. 51). While research into art and design is the most straightforward form of research, including historical, social, technical, material research, research through art and design consists of experiments, iterations, step-by-step reports, and is fundamentally about development and action research. Lastly, research for art and design is a form of product-driven research, as it culminates in an artefact / object.

To these three forms of research, Hauberg adds a fourth one: research by design. Research by design is a type of investigation where design and research merge into a single composite and interconnected process—a form of inquiry heavily informed by design itself.

As a member of one of the EAAE research committees,[1] Hauberg and his colleagues contributed to define research by design as a method characterized by the following pillars: a) research by design generates critical inquiry through design work that may include realized projects, proposals, possible realities and alternatives; b) research by design produces forms of output and discourse proper to disciplinary practice, verbal and non-verbal that make it discussable, accessible and useful to peers and others; c) research by design is validated through peer review by panels of experts who collectively cover the range of disciplinary competencies addressed by the work (EME Charter on Architectural Research, 2012). In Hauberg's view, research by design belongs to the territory of architectural research, as it produces knowledge using the tools and methods typical of the architect: drawings, models, but also text.

Johan Verbeke elaborates further on this approach to architectural research by first looking into artistic research in general and then drawing analogies with architecture. According to Verbeke, the key characteristic of artistic

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[1] Working group under the research committee at EAAE (The European Association of Architect Education), 2012. The working group consisted of: Jørgen Hauberg, Pieter Versteegh, Johan Verbeke, David Vanderburgh, Johan De Walsche.

research is that art practice is not only the subject matter, but is also central to the research process itself (Verbeke, 2013, p. 143). At the same time, the outcome of artistic research varies: it can be installations, artworks, performances, which make it different from the field of humanities, where art may be the object of research but not the outcome. Lastly, according to Verbeke, in artistic research emphasis is placed on iterations, exploration, curiosity-driven activities instead of building hypotheses. If in the arts the main research processes involve the making of art, the same is almost true for architecture. This leads to the conviction that, in architectural research, design is the essential feature—a substantial component that allows for the generation of new knowledge.

Research by design can function as a meaningful and valuable approach if it is based on the following conditions: the key role of design in producing knowledge; the essentiality of peer-reviewing as a way to ensure quality; the connection between research and practice, or studio work (Verbeke, 2013, p. 145). This last aspect is extremely relevant to the argument of this paper, as it contributes to clarify the entire problem of situating architectural research within the context of the Bologna Process and current academic directions. These three conditions allow research in architecture to be original, significant, and rigorous.

Verbeke goes on to describe the dynamics in which design and research unfold. In research by design, the act of designing is the key component of the entire research process. It doesn't illustrate the process at the end of the research, nor does it act as an observational moment in the early stage. In research by design, 'designing, making, studio work, practice are the generators of insight, understanding, and knowledge: they are part of the intellectual work and complementary processes of reflection and knowledge creation' (Verbeke, 2013, p. 150). Research by design is not about research on architecture, but investigates architecture through architecture itself.

In traditional research, including research on architectural history and theory, critical distance is necessary to guarantee rigor and argumentative coherence. In research by design, however, the researcher also acts as the designer, developing knowledge through their design activities.

This condition does not imply that outputs cannot be validated or assessed by peer review. That can happen by making the design clearly communicable and accessible, and by integrating it with other formats such as text or verbal presentations.

Similarly, Rob Roggema views architectural research through the lens of the "research-by-design" formula. He reinterprets previous contributions on the topic to outline an integrated model based on three distinct phases: pre-design, design, and post-design (Roggema, 2017, p. 8).

The pre-design research phase is focused on understanding. It happens before the actual design process begins and aims to build awareness of the issues at hand, the context, and the potential of the research. The design phase is the core of the entire research-by-design pro-

cess. In this phase, the 'designer becomes the researcher in a practice context' (Roggema, 2017, p. 9). This phase involves critical assessment, comparability, and evaluation through drawing and sketching. Design options are tested via iterations, and the results are synthesized at the end of this stage in a critical review. Finally, the post-design phase consists of presenting the research outcome. Communication should show how this outcome impacts a wider community—both academic and social—and how it is fully accessible to a wider audience. In this final stage, research and design separate. Design results are presented in reports, posters, drawings. Research outputs follow the route of academic publishing.

The previous contributions on research by design—each with its own peculiarities and interpretations—represent only a small selection of the variety of positions and proposals developed in recent years. They have been chosen for their paradigmatic character as they are representative of established practices and experiences. Despite their differences, they seem to outline a panorama in which, regardless of whether design and research are different moments within the same process or a single composite practice, it is still relevant to investigate the connection between them in the field of architecture. The nature of this connection invites us to question the character and role of architectural design within academia, as well as its general societal impact.

While research in architectural history and technology typically falls within the boundaries of the humanities, design-based research involves the production of new materials where tools and methods play a significant role. Iterations, experimentations, and intuition are characteristic aspects of architectural research, in which design is the essential feature—serving as both the medium and the goal of the research itself.

Research by design can offer an answer to the general question of how to conduct research in architecture, despite—or thanks to—its growing popularity and potentially oversimplified, fashionable interpretations. At the same time, inherent criticalities and limitations in implementing research by design are evident: for example, the constant risk of the research falling into the trap of architecture's self-referentiality, as well explained by Jeremy Till; or, the objective difficulty to assess the actual impact of a research-by-design project if it does not produce results that are evident, beneficial for society, and long-term. Not to mention the risk of dismissing the conventional criteria of scientific systematic inquiry, which can produce mistrust among broader academic communities and stakeholders—policymakers, for example.

Nevertheless, research by design offers the opportunity to overcome the rigid demarcation between design and research, as well as the separation among disciplinary fields (for example, architecture provides the project while other disciplines provide theories and methods). It achieves this by highlighting the act of designing as the key process for developing understanding and knowledge. Research by design focuses on design work as a special

form of research, considering theory and practice, analysis and imagination as inseparable. Research is intended not only as preparation, description, and explanation, but more importantly, as projection and speculation. Ultimately, research becomes a form of design and design a form of research. In architecture, the goal of a research-by-design approach is therefore to crystallize the intertwined forms of interaction between space and program, image and materials, people and the environment via modes of knowledge production that include experimentation, imagination, iteration, comparison, morphing. These modes imply typological reinterpretations, generative analyses, formal readings, and advanced mapping.

The result of these explorations expands epistemological limits and calls for a holistic approach to the built environment that will hopefully address some of the disciplinary contradictions expressed previously.

By claiming that knowledge can be generated through design projects, research by design demonstrates what Ranulph Glanville calls the centrality of design—both as an object of study and as a means of carrying out that study. This approach 'insists on the impropriety of demands that design perform according to criteria of (scientific) research' (Glanville, 1999, p. 89). In comparing architectural research to research from other fields, Glanville suggests that 'we need to learn to believe in design, to live this, no longer apologizing, but refusing to downplay what we do' (Glanville, 1999, p. 89).

4. The *Locus* of architectural research

Having examined the possible methods for conducting research in architecture, it is now necessary to identify the moments, spaces, and contexts where architectural research can take place. If research is generally viewed as an endeavor to produce extendable and testable social knowledge, its application in architecture may present some relevant specifications, as noted earlier. One relevant aspect to clarify when discussing the implications of architectural research—whether we call it research by design, research in, into, or for design—is first to distinguish between using design as a research methodology in educational contexts and the process of design itself. When design is viewed as a research approach, it tends to occur in academic contexts that typically value the production of knowledge; in professional and market-driven contexts, design can often be merely an operation of problem-solving.

However, it is no wonder that in recent times architectural practitioners have become increasingly interested in conducting research within their offices. This research often focuses on key areas such as sustainability and energy efficiency, materials and construction techniques, advanced forms of architectural representation. They have become interested in establishing an evidence base that can explain the impact of architecture on the built environment and the benefits it provides for its users (Aydemir & Jacoby, 2022, p. 658).

Such a growing interest corresponds to the proliferation of official initiatives such as the vision documents on the future of the architectural profession issued in the UK by the Royal Institute of British Architects (RIBA), which acknowledged research and knowledge sharing as crucial aspects to generate innovation (Royal Institute of British Architects, 2020). This interest also aligns with government policies like the UK construction industry vision for 2025, which underscored the importance of research for commercial innovation to support the transition to a digital economy and the rise of smart constructions (Aydemir & Jacoby, 2022, p. 665).

Despite this alignment between national associations of architects, government policies, and recent trends in architecture firms, the gap between the world of professional practice and the world of academia is becoming wider every day, even concerning research. In their operations, the set-up of their strategies, and their final outcomes, research in practice and academic research might provide different answers to the same fundamental questions:

What is the purpose of architectural research? What is its impact? How do we assess its impact?

While research by design appears to answer questions applicable to both academia and professional practice, the relationship between research in these two contexts would require further elaboration that goes beyond the scope of this paper.

This paper, in fact, only examines the role played by research in academia. The reality of how research is typically conducted in architecture schools, and how future generations of architects are currently introduced to methods and forms of academic investigation, urge us to find adequate room for research in architectural design to unfold. Once more spaces for architectural design research are established, the consequences will progressively influence the general understanding of what research can be. This will also hopefully blur the existing distinction between academic research and research in practice.

As mentioned above, attempts to explore the role of design in architectural research have primarily focused on doctoral education. Within a fast-growing body of design-based PhD programs, different institutions worldwide have initiated programs in which research by design serves as the main vehicle for conducting research. From the University of Edinburgh, which has a PhD program called Architecture by Design, to other non-European universities such as RMIT Melbourne, PhD projects provided an opportunity to test the role of design in addressing socially engaged issues as well as purely disciplinary questions (Figure 1).

Despite these examples, the possibility of conducting PhD research through research for, in, or by design is still not widespread across European institutions. This difficulty in emerging as a reliable model to produce design knowledge that is rigorous, relevant, original, and impactful stems from several factors: from the previously-cited struggle to assess the impact of design proposals, to the established structure of most PhD programs in architec-

Figure 1. Manhattan's Geotaxonomies of the Fantastic, physical model (Tiago Torres-Campos. PhD in Architecture by Design, Edinburgh School of Architecture and Landscape Architecture, 2022)

ture schools, to the disinterest or perceived irrelevance of architectural design among a new generation of researchers. While advocating for a more consistent and intense application of design research in architectural doctoral programs, this paper identifies one specific *locus* where research, teaching, and learning can merge to create new forms of knowledge production and transmission. This place can serve simultaneously as both a "battlefield" and a "testing ground" for the emergence of new ideas, models, and strategies in architectural research. This place is the (Design) Studio.

If the purpose of research is to produce knowledge and critically understand the world around us, then we should explore how research projects can improve education—not just in the third cycle (PhD programs), but especially in the second cycle (Master's programs). We can achieve this by assisting students in experimenting with *designerly ways of knowing*.

In this respect, The Design-Based Research Collective suggest assessing the potential of research in relation to four different areas: (a) exploring possibilities for creating novel learning and teaching environments; (b) developing theories of learning and instruction that are contextually based; (c) advancing and consolidating design knowledge; (d) increasing our capacity for educational innovation (The Design-Based Research Collective, 2003, p. 8).

More generally, this paper claims that the (Design) Studio is the central space where architectural design is taught, but it is also a moment of negotiation among different practices, processes, and forms of knowledge that are essential for comprehending the complexity of certain issues. By integrating these aspects, the Studio becomes a territory of experimentation that moves toward a research-by-design strategy: a process made of iterations, curiosity-driven explorations, intuition, and tacit knowledge informed by non-discursive methods of knowledge transmission and production.

This argument derives first from my own direct observation as an academic in the field of architectural design. I have taught for many years in conventional Design Studios, but also in design workshops, charettes, and design-oriented seminars. Despite their differences, all these learning structures emphasized design as a main vehicle for producing knowledge.

If reflectivity can be considered a mark of rigor in conducting design research (Groat & Wang, 2013), my experience as an educator, researcher, and practitioner allowed me to identify a few crucial reasons why the (Design) Studio can constitute the ideal locus for implementing architectural research

a) The Studio allows for a blending of teaching and research, aimed to produce knowledge or to understand certain phenomena.

This point implies that, in its processuality, the (Design) Studio can act as a link between teaching, learning, and research, in accordance with the Bologna Process policies. Key documents illustrating this include the Sorbonne Joint Declaration (1998), which for the first time called for appropriate emphasis on research and autonomous work; the recent Ministerial Communiqués of the European Higher Education Area, such as the Yerevan Communiqué (2015), which referred to research as a link between teaching, learning and research across all study levels; or the Rome Communiqué (2020), which recognized higher education institutions as actors of research and innovation.

b) The Studio is a multi-step process made of iterations and heterogeneous explorations – the ideal moment to elaborate design hypothesis, build scenarios, assess results.

Point b) relies on the iterative character of Studio explorations. As Rob Roggema writes, the Studio constitutes a platform for research because it is 'a process of inquiry, an intensive journey with a high level of production, but where none of the design propositions are intended as an end-result, nor a conclusion, but rather a continuously evolving instrument to interrogate the issues and opportunities at stake. It is a process in which the acts of analysis and design are turned around, mixed and blurred into a situation where at times it might even be hard to distinguish between both' (Roggema, 2017, p. 10). As one can imagine, this experimental and open process that Roggema describes can perfectly suit the application of a research-by-design methodology in teaching a Design Studio (Figure 2).
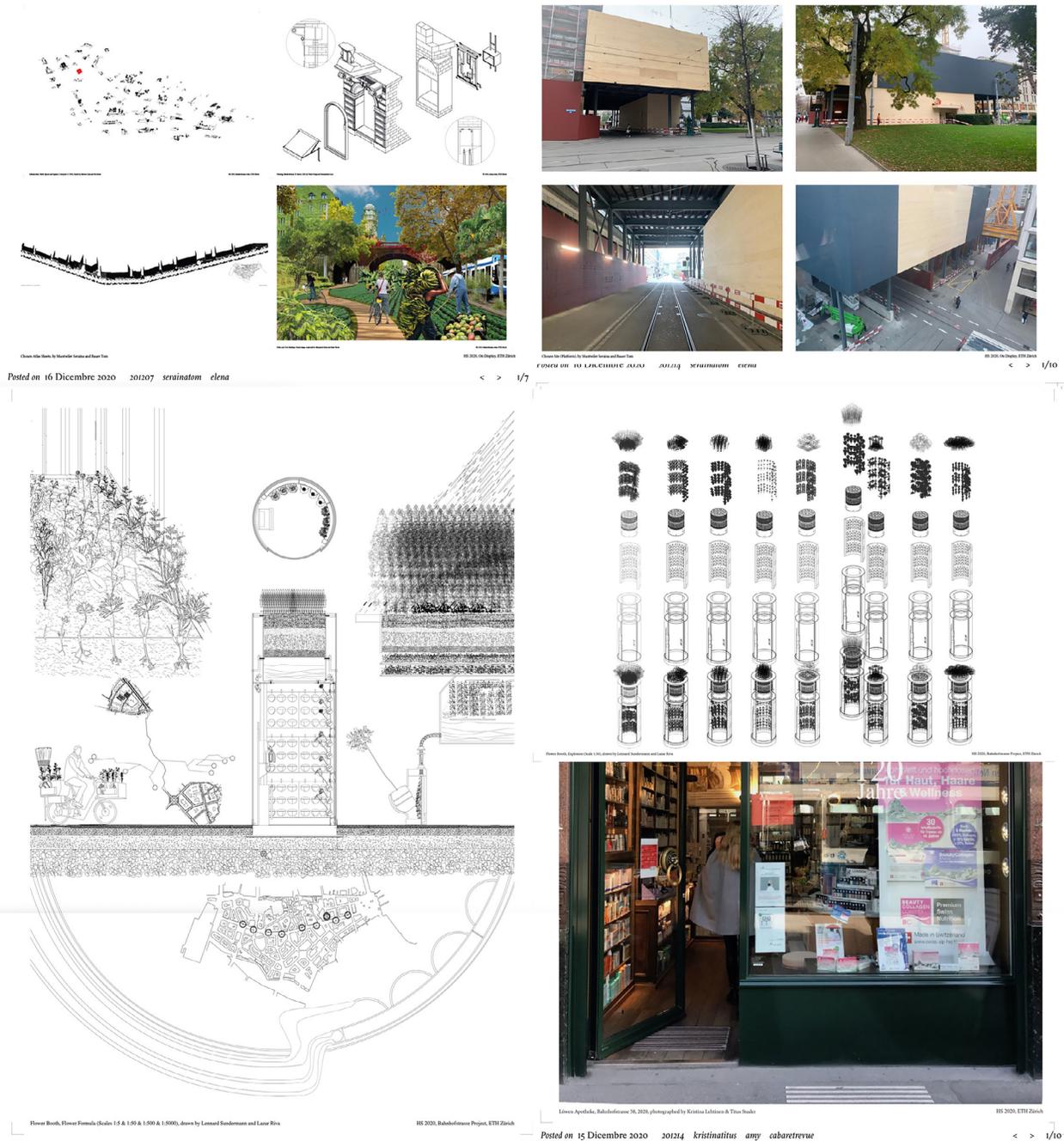
Figure 2. Virtual studio space (Studio Tom Emerson, ETH Zurich, 2020)

c) *The Studio is a real interdisciplinary platform*, *in which technology*, *construction techniques*, *environmental studies*, *ethnography*, *and other disciplines work in the same direction*.

Interdisciplinarity, as previously noted, is one of those issues within the field of architecture that typically raises mixed feelings. Is architecture an autonomous discipline? Is collaboration with other fields indispensable to tackle contemporary issues?

In the dichotomy between autonomy and environment, the (Design) Studio can be the ideal place to set up holistic research processes where different contributions converge.

Against the excessive specialization of skills and knowledge, architectural research advocates for the integration of diverse perspectives around the act of designing. Design, in this respect, acts as the condenser of distinct knowledge forms. Or, in other terms, architectural research crystallizes the combination of building technology, history and theory, and the environment (Figure 3).

d) *The Studio is the ideal territory for experimenting with next techniques and tools, in line with constant advancements in technology, architectural representation, imagery production.*

Point d) makes the Studio an extremely relevant platform for implementing architectural research that tests new tools and media. Even if the outcome of the research process isn't necessarily new or original, the methods and techniques used can definitely be novel in their application and manipulation. This possibility is embedded in the iterative and curiosity-driven process of architectural research which we already described before, and that distinguishes architectural research from other forms of traditional scientific research.

Recent attempts to introduce new tools in architectural research include applying artificial intelligence in design processes. This is evident in the emergence of generative programs such as Midjourney, Nano Banana AI, DALL-E 3, Stable Diffusion, and others. Furthermore, these attempts involve creating unique forms of interaction between analog and digital outputs specifically when it comes to design ideation (Figure 4).

e) *The Studio, similar to research processes in other fields, allows for knowledge systematization and characterization. It can produce taxonomies, inventories, catalogues via design.*

Point e) refers to the possibility that the Studio implies conducting research in a modality similar to what other fields call case study analysis or comparative studies. The

Figure 3. Peeling logistics landscapes, scaffolding the banana industry, diagram (Konstantinos Papadopoulus, Laura Otalora Pinzon, Sophia Scheiwe, Stella Sprenger. Elective course EXTERIORLESS. The Design of the Ordinary, 2025. Faculty of Architecture and the Built Environment, TU Delft. Instructor: Stefano Corbo)

Figure 4. Learning landscapes, architectural visualization (Floriaan Troost. Graduation Studio, 2024. Group of Public Building, Faculty of Architecture and the Built Environment, TU Delft. Instructor: Stefano Corbo)

way the Studio allows for this is always visual and can take the shape of a repository of forms, types, and buildings. Through drawings and models, the Studio permits the grouping, classifying, and comparing of examples, allowing useful design insights to be extracted that can inform the output of the research process (Figure 5). Overall, the Studio makes the design processes visible: the analysis, the making, and the experimentation. By being required to document their creative process, students make their learning evident and potentially accessible, although to a restricted audience (Jones et al., 2025, p. 36).

f) The Studio is a public space in that it acts as a venue for confrontation, political debate, and civic engagement.

The physical and social organization of a Design Studio is intended to help a community of students think, make, and act in *designerly ways of knowing* (Jones et al., 2025, p. 54). More specifically, point f) refers to Albena Yaneva's idea of architecture not as consensual conglomerates, but, conversely, as congregations of controversy (Yaneva, 2012). If architecture, in its process but also in its built outcome, has an impact on wider communities, it is then necessary to investigate this impact. This can be done by mapping controversies, potential problems, and demands. In other words, ethnographic approaches can be incorporated into the research-by-design process to include communities, stakeholders, and human and non-human agents.
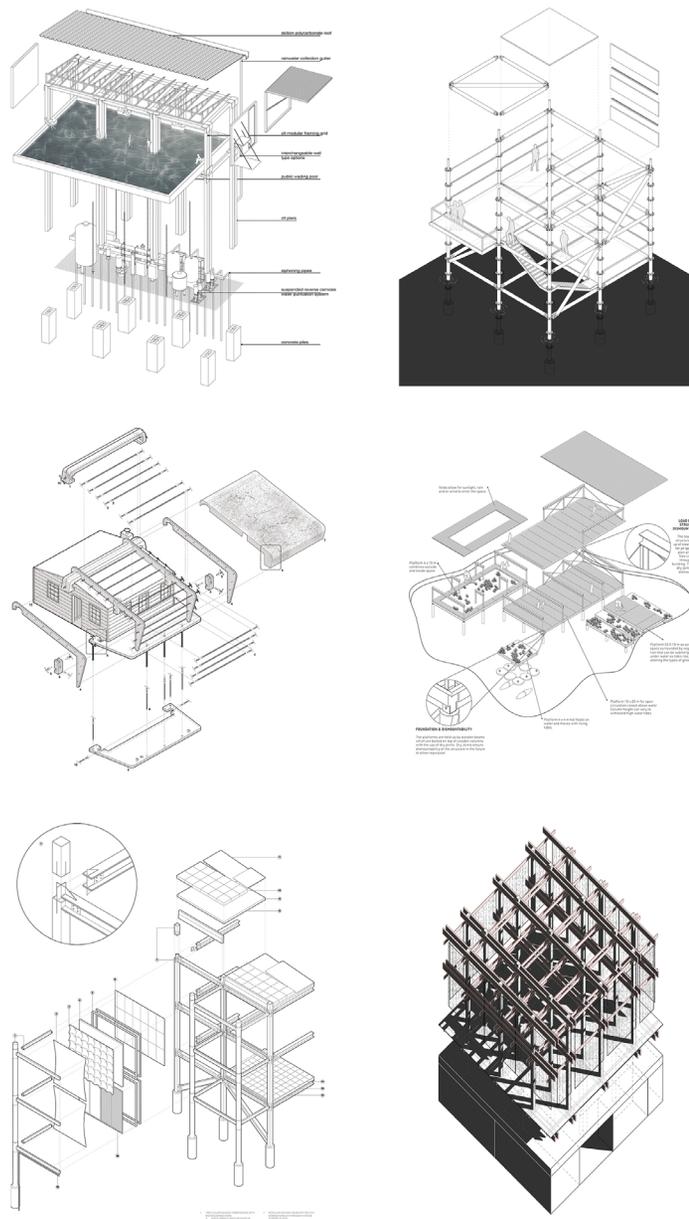
Figure 5. Resilient prototypes, axonometric projections (Camilla Casolari, William Chen, Lucas Jourdain, Lala Leung, Mary Perez, Isabel Roden. MSc. 2 Architectural Design Studio "Resilience-by-Design," 2024. Group of Public Building, Faculty of Architecture and the Built Environment, TU Delft. Instructors: Stefano Corbo, Sien van Dam)

At the same time, given its free and open character, the (Design) Studio is also a place of confrontation, conflict, and civic engagement. One might say that architecture is always a political act, in the sense that it addresses socio-spatial conditions permeated by worldviews on how we live together. The Studio can make this condition even more explicit, producing solutions that critically address the entanglement of people, space, power, and environment via architecture. Research, in that sense, would be a process of understanding the conditions that trigger this entanglement. In facing pressing issues such as the climate crisis or spatial inequalities, a culture founded on architectural research can help revise pre-established paradigms by envisioning future scenarios based on more inclusive, sustainable, and diverse forms of coexistence.

g) The Studio bridges any possible gap between personal and societal research interests.

Building upon point f), point g) refers to the ability of the Studio to deal with the phenomena of polarization currently characterizing the production of research in architecture. Over the past decades, questions related to the internal autonomy of architecture as a discipline—for example, issues of form, language, lexicon, or meaning—seem to have lost relevance. This is in favor of explorations that are either extremely personal (informed merely by personal interests or obsessions) or completely embedded in social and political issues. The latter can sometimes produce an activist and non-rigorous approach to research, as well as some naive assumptions about the role of architecture. The Studio fills this gap by acting as a middle ground. It allows for the investigation of the role of architecture through architecture itself, and it keeps three fundamental questions integrated in the development of a research project: How relevant is a given research topic on a personal level? How relevant is it on the level of the disciplinary discourse? How relevant is it globally, in its societal implications?

Only by integrating these three perspectives can a project of architectural research be rigorous, communicable, and accessible to different audiences.

h) The Studio celebrates design as both a practice and a mode of research.

Eventually, as point h) maintains, the Studio celebrates design as both a mode of research and a practice. Practice is not intended as a mere problem-solving operation, but as a synthesis of agents, methods, disciplines, and phenomena that converge into an architectural proposal.

Though long-term societal impact may be difficult to quantify, the advancement of the discipline—through interrogating itself about its mission and its role in society—can only pass through research that places design at its inner nucleus as its main and essential feature. By doing that, it is likely that purely disciplinary questions can also offer solutions to many of the urgencies that we, as citizens and designers, have to engage with daily.

5. Conclusions

In emphasizing the challenges as well as the opportunities posed by the Bologna Process for the role of architecture in academia, this paper has attempted to specifically describe the relationship between design and research, illustrating its different manifestations – research for, through, in, and by design.

More specifically, the paper delved into research by design as an approach that sees designing, making, and studio work as central generators of insight, understanding, and knowledge, moving beyond mere problem-solving or observation. Research by design demands that theory and practice, analysis and imagination, are treated as inseparable, with the goal of producing knowledge through experimentation, iteration, and speculation. This process expands the epistemological limits of the discipline and calls for a holistic approach to the built environment.

Within these boundaries, the Design Studio is preseented as the ideal place where teaching, research, and learning can effectively merge in order to produce new knowledge and new fields of inquiry. The Design Studio serves as a holistic and interdisciplinary platform that accommodates iterative exploration, the use of new technologies, and a space for political and civic engagement. By integrating diverse perspectives and allowing for the systematization of knowledge through media like drawings, models, images, the Design Studio bridges potential gaps between personal, disciplinary, and societal interests. Ultimately, by fostering a culture where design is celebrated as both a practice and a mode of research, architecture can critically interrogate its mission and role in society, addressing pressing issues ranging from the climatic crisis to spatial inequalities.

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