TOWARDS A STRATEGIC ROLE FOR DOCTORAL RESEARCH IN DESIGN
Silvia Pizzocaro, Politecnico di Milano, Italy

Abstract

Design has a long history in Italy. Milano, in particular, has a long tradition in the practice of design, a profession dating back of the early years of the century, well based on local crafts and industries.

Conversely, national accreditation of the Ph.D. research programmes in design dates back only fifteen years, followed by the awards of degrees (Laurea) in industrial design. It was Milano itself, with the Politecnico, that fostered the creation of Italy’s first Ph.D. programme in industrial design (1990) and the Degree course in industrial Design (1993), exploiting the fruitful dialogue with the long lasting entrepreneurial and management tradition of the small and medium size companies and manufacturers of the local and national industrial system.

Therefore, although consolidated in its vocational character, industrial design is just in its infancy as an academic discipline. Further, it is a rather young field of advanced academic enquiry: design curricula are still in progress, as well as perspectives on the form and nature of academic design research.

Nevertheless, education in design - since its beginnings - has been facing the requirements of the demand of design, at both local and enlarged scales.

This contribution proposes a reflection on some critical issues deriving from the “search vs. research” transition in design. Assuming that the shift to a disciplined learning on “how to make research in design” has started to produce strategical visions for pitfalls on applied research. To guide and develop this vision some elements are discussed, stemming from the design research experiences developed within the Ph.D. programme in industrial design at Politecnico di Milano.

At present this Ph.D. programme partly performs an incubator function, in terms of potential skills to capture key aspects of design research development and to try to manage the complexity of design issues deriving from the technology-society interaction.

An emphasis will be proposed on the idea of the Ph.D. programmes as hubs, whose relevance is not (only) linked on a particular area of study, but on the skills to foster research “strategies”, coherent (but not necessarily dependent) with the tacit or explicit factors expressed by some design demand and societal needs.

A premise

Italy has a long tradition in the practice of design, a profession dating back of the early years of the century, well based on local crafts and industries.

Milano, with its Politecnico, fostered the creation of Italy’s first Degree course in industrial Design in 1993, exploiting the fruitful dialogue with the long lasting entrepreneurial and management tradition of the small and medium size companies and manufacturers of the local and national industrial system.
Since the beginnings the faculty engaged by this degree course has represented a variety of cultures, merging the scientific and academic subjects stemming from design studies either in architecture and engineering. A relevant number of entrepreneurs, experts, designers, practitioners in the areas of management, services and culture, as well as professional associations, often join the local academics.

Academic curricula in industrial design (first and higher level) are expected to provide the theoretical, scientific and professional knowledge required by a designer. An enlarged area of learning is articulated by the curricula so to meet as extensively as possible the educational requirements expressed by goods industry, public administrations, companies specialised in the design of communication, interiors, exhibitions and fashion, as well as sectors covering marketing and distribution.

**The Ph.D. programme in design**

The Politecnico di Milano was also among the first design schools to start a Ph.D. degree programme in industrial design (1990).

Since its origins it is intended as a highly focused and intensive programme for reaching advanced knowledge in design theory, methods, processes and practice. The Ph.D. is expected to culminate with a dissertation extending the corpus of knowledge inherent to theoretical design issues or design practice and process.

The introduction of a research Ph.D. programme in design answered the explicit demand for high profile design researchers, while recognising a tacit demand for professional education at the most advanced academic level. The aim of the doctoral programme has been expressed as the education of senior researchers in design expected to operate either in the academic or in the industrial contexts. The Ph.D. degree in design is for those who wish to teach, conduct or apply fundamental research in design. Since 1990 the domains of research investigated by the doctoral activity in industrial design were mainly centred on innovation-related phenomena and theory. Such attention was due to various factors, partly internal to the dynamics of the discipline of industrial design, partly related to the perception of the growing complexity of the innovative process, thus motivating in-depth analysis and new approaches to emerging domains. A relevant number of local doctoral investigations has emphasised the importance of technological change, orienting the direction of conceptual analysis towards systemic, evolutionary, complex approaches. Whatever the motivations for the analysis of technological change and innovation, this field of enquiry has highlighted the factors and fundamental ingredients of the process of

---

1 The three-year Degree course (*Laurea*) is expected to train graduates who are design technicians, practitioners in all the technical duties and design activities of the design process (from product conception to production and distribution). The further Higher degree (which is a *Laurea Magistrale*) is awarded after two more years of study and it offers rigorous, advanced design training in highly specialised areas. The Higher Degree graduates are expected to supervise and define the strategic aims of design activities. These graduates are expected to be able to co-ordinate complex design activities, oriented towards the creation of extensive and multifaceted product systems. Finally, those who have completed the Higher Course may attend the Ph.D. programme, an academic curriculum for training in scholarly design research. At Politecnico di Milano the design area features Ph.D. programmes in industrial design and multimedia communication, interior architecture, design and methods of product development.
development and transformation of industrial products, services and systems. Moreover, as a starting point a broad view of innovation has been assumed, i.e. a dynamic process related to achieving competitive advantages involving the development or improving of new products, services, technology, processes, institutions, systems, solutions. This view of innovation encompasses not only science and technology, but also the range of economic and social activities competing in the marketplace and relevant to design in areas such as communications, corporate organisations, education, and institutions.

**Addressing the nature of scholarly design research**

Within the outlined context, the Ph.D. programme curricula have been addressing a number of core questions: what is the purpose of doctoral design research? What is it useful for? Who is going to make use of it? What is its explicit or tacit or potential target? What was the nature of the marketplace it is directed to (considering the market in its broad acceptance of society as a whole)?

Approaching design research raised (and still keeps on raising) an extraordinary challenge. This challenge comes about due to the unusual nature of design research as a field of inquiry. As Friedman (1999) observes: “Design research is unusual for several reasons. First among them is that design is both an intellectual discipline and an applied discipline. Design research operates on several levels, both theoretical and applied. The questions of design research methods therefore span a number of issues. The second important aspect of design is that it is an integrative discipline, frequently required to operate across disciplines and engage multiple research methods. Finally, the variety of fields involved in design is far larger than we find in most disciplines”. The theoretical foundations of design can be located in the natural sciences, the humanities, and the social sciences. The practical applications of design engage technology and engineering, the arts, and the human professions. Each of these also has dimensions of theory in addition to dimensions of application and practice2. As in Margolin (2000): “Design, as various scholars have suggested, is a contingent practice whose techniques, goals, and objectives are continually changing. What is fixed about design is that it is an art of conception and planning whose end result is a product, whether that product is a material object or an immaterial service or system. Design is also an integrative activity that, in its broadest sense, draws together knowledge from multiple fields and disciplines to achieve particular results. It has both a semantic dimension and a technical or operative one”.

The starting of the Ph.D. programme was a step in the recognition that basic design research might be fruitfully carried on within some emergent sites - doctoral curricula - where research-oriented activities may converge and cluster independently from the applied research carried on within companies or professional laboratories. In this sense, Ph.D. programmes could be addressed as strategic sites where research “takes its time” and where design research may generate deeper qualities. Consequently, times required by doctoral research in design may

---

2 As in Friedman (2002, 931): “The profession of design involves the professional practice of design. The discipline of design involves inquiry into the several domains of design. The field of design embraces the profession, the discipline, and a shifting and often ambiguous range of related cognate fields and areas of inquiry. (...) The foundation of design theory rests on the fact that design is by nature an interdisciplinary, integrative discipline. The nature of design as an integrative discipline places it at the intersection of several large fields. In one dimension, design is a field of thinking and pure research. In another, it is a field of practice and applied research. When applications are used to solve specific problems in a specific setting, it is a field of clinical research”.

3
coherently neglect rhythms imposed by the day-by-day redefinition of the product-system (i.e. the integrated whole of products, services and communication imposed by the marketplace).

A preliminary meaning of design research outcomes was starting to take shape as something similar to shelf innovation, as formulated within the dynamics and approaches of concurrent engineering. Shelf innovation consists of the anticipated development of technological solutions and components so that a heritage of innovation can be created, available at any time for possible use in new products, being the shelf concept that of storing solutions ready for future applications (Wheelwright and Clark 1992 and 1993). According to this model, the activities of component invention and testing are separated from product development: in this way advanced technologies can be incorporated in new products avoiding the risks associated with innovation. As a first claim Ph.D. design research was conceived as similar to shelf innovation, accepting that it can generate "research semi-finished components" that can be shelved for future utilisation. Either in the form of design practice components or portions of theory, research results could thus accumulate while being available for use.

**From reflection to research**

If we assume with Friedman (2000, 19) that research is distinguished from reflection³, the approach to design research first taken by this Ph.D. programme seldom exceeded the borders of reflection – the awareness that research borders had to be set being part of the tacit knowledge the programme was fostering. Initially, the preliminary unifying factors for the doctoral research activity were research themes of a varied nature, not a methodological one. The approach to innovation-related issues proved to be the effective common background of this doctoral programme. The theoretical framework underpinning a relevant number of doctoral dissertations reflected this unity of approach. An outline of some titles of dissertations developed along the first decade of the Ph.D. programme offers a view of such an approach: *Evolutionary Approaches to the Analysis of Products and Technical Systems* (by the author, 1994), *The Household Appliances in The History of Artefacts* (Riccini 1994), *Design and New Models of Perception in The Mass Media Society* (Ceppi 1995), *Innovation and Environment* (Morelli 1995), *Strategic Management of The Environmental Quality of Products: Theory and Praxis* (Mangiarotti 1996), *Environment, Products and Standardisation* (Pratesi 1996).

In 2000, the board of the Ph.D. programme faced the issue of partially maintaining the former curricula or radically changing the programme. Anticipating the institutional changes expected from the major revision of the national university system, now oriented towards a 3+2+3 system, and stimulated by the critical and theoretical developments taking place in the international arena about the form and nature of the Ph.D. programmes in design, the Faculty chose to encourage a radical reorientation in the intention and structure of the programme.

The revised Ph.D. programme started to perform an incubator function, in terms of potential skills to capture key aspects of design research development and to manage the complexity of design issues deriving from the technology-society interaction. As a consequence curricula were re-designed, advocating a progressive shift from searching in design to learning how to make research in design.

---
³ Friedman (2000, 19) argues: “What distinguishes research from reflection? Both involve thinking. Both seek to render the unknown explicit. Reflection, however, develops engaged knowledge from individual and group experience. It is a personal act or a community act, and it is an existential act. Research, in contrast, addresses the question itself, as distinct from the personal or communal”. 


The new framework for the programme now expressed a conceptual transition:

(i) from subjective reflection to the objective activity of research;
(ii) from informal training (focusing on the supervisor support) to a formally taught component;
(iii) from identifying areas of research interest to building questions of research interest.

Three major influences prompted the review:
(i) infrastructure changes to the Italian national education system at university level, as mentioned above;
(ii) the inadequacy of the former programme to cope with the requirements of the emergent demands of design research;
(iii) the critical and theoretical developments emerging from the international debate around the form and nature of Ph.D. programmes in design.

The whole doctoral programme was then redesigned into two main areas: industrial design and multimedia communication, without any prerequisite for eligible areas of research. At the same time it was structured into a curriculum framework of basic, main and elective courses, to be selected by students, along with a doctoral dissertation component. Students would also be expected to actively participate in institutional research activity.

Industrial design, in the context of this revised doctoral programme, is intended to be a discipline acting within the industrial culture. Among its main tasks is to deal with the configuration of industrial products as well as with general factors involved in the process of product design in general. In this sense, this school’s specific research interests refer to use, function, social and individual consumption of the products (the functional, symbolical and cultural factors) and to manufacturing (techno-economical, techno-productive and techno-distributive factors). Communication design, on its side, is meant to provide an appropriate learning environment for the resolution of complex problems in the field of multimedia communication.

**Light on the nature of design practice and design research**

A substantial change has occurred: approaching design research has shed light on the nature of design practice and its relationship to design research itself. Different frameworks have started to be proposed, justified and supported in expected “designerly” ways. The approach to design research through the design project has become the emerging context of reference, thus joining the international debate where different terms - project grounded research, project-driven research, research through design, Ph.D. by project, ricerca progettuale, recherche-projet - tend to ground design research in practice, where practice is considered as a terrain and medium of study. The need for further understanding of the underpinning principles of this approach to design research may be considered the renewed expected conceptual trajectory of the Ph.D. programme itself, assuming that research through the design project is progressively leading towards improved definitions of designerly ways of researching. Further, while still building the appropriate paradigm for design research, a distinction started to be debated between works of practice and works of research.

---

4 As in Cross (2000): “The whole point of doing research is to extract reliable knowledge from either the natural or artificial world, and to make that knowledge available to others in re-usable form. This does not mean that works of design practice must be wholly excluded from design research, but it does mean that, to qualify as research, there must be reflection by the practitioner on the work, and the communication of some re-usable results from that reflection”. 

As a simple note we also remind that Christopher Frayling’s category of “research through design”, although somewhat crystallised, contributed to gain recognition for on going and future design research. Among many interpretation of Frayling’s categories we mainly refer to Alain Findeli (2000) when observing that "Research for design" describes what is known as "R&D"; it has no scientific recognition (...), since there is usually no discourse attached to it, no intention of generalisability except technological, and no "accumulative" effect in the theoretical realm (...)."Research about or in design" covers academically recognised, published, and even funded research in the field of design (its objects, products, processes, values, theoretical and historiographical models, etc.), carried out by academics of the design or other disciplines, with the epistemological and methodological tools of the already established and respected academic disciplines, and as such foreign to design (...)."Research by or through design" is research in the field of design carried out with the tools of design, i.e. mainly with its more original and specific feature: the project”.

At the same time, the growing awareness of the intrinsic strength of design thinking within its own context and a growing acceptance of design on its own terms helped to recognise that design has its own distinct intellectual culture.

The scholar-researcher

This doctoral programme task is now represented as the induction of an advanced researcher, whose aim is to develop design research either in academic or industrial contexts: a scholar-researcher devoted to planning research, building a research culture and disseminating research, whose main task is to sustain the operability of research in industrial design, fostering their cultural foundations (inter-and extra-disciplinary). But also, or in alternative, a high-profile researcher capable of identifying problems, selecting objectives and detecting problem-solving strategies within the industrial context: an analyst for tacit or implicit problems, a strategist for desirable interactions in design solutions, a designer in a wider sense, with specific skills in positioning a design problem in the correct dimension and perspective. This researcher’s task is to lead the transition from design hypothesis to design solution in industrial contexts, exploiting limits, constraints and opportunities.

Complexity thinking is now considered a ground for design research.

Faced with new, uncertain, unexpected, dynamic events of society, the relevance of flexible approaches and creative thinking becomes strategic for design (Boutin and Davis 1997, 117), meaning the opportunity to re-define and re-invent according to the specific evolution of each situation. By both accepting and clarifying some elements of complexity theory and its role in revolutionising thinking in scientific and management milieu, the notion of complexity can open promising horizons for designers and educators in design. As a recurrent starting, it has been recognised (Boutin and Davis 1997, 115) that the problem is not that of understanding complexity, but to define and create flexible methodologies allowing practical application for design of new emerging theories, to transform the discovery of complexity into a method to handle complexity. Further, keys concepts central to handling complexity may gain clarity when going with a cultural maturity that entails the designer responsibility (1997, 116) and are revealed

5 In this sense, according to Cross (2000), “a taxonomy of the field of design research would therefore fall into three main categories, based on people, process and products: design epistemology - study of designerly ways of knowing, design praxiology - study of the practices and processes of design, design phenomenology - study of the form and configuration of artefacts”.
as familiar to designers: the complex thought integrating uncertainty while planning organisation, linking, contextualising, globalising, recognising both singular and general dimension. Using holistic visions then turns into a broader (entwined) sense of reality, meaning rapid ability to adapt to changes, to be part of change itself, to take uncertainty as a chance (not only a risk or a limit), to rely on processes (rather than structures), to develop skills of organisation, disorganisation and re-organisation, inventing dynamic concepts (as well as their links).

It has been argued (Friedman 1999) that acting within complexity involve either substantive challenges to design (increasingly ambiguous boundaries between artefact, structure, and process; increasingly large-scale social, economic, and industrial frames; an increasingly complex environment of needs, requirements, and constraints; information content that often exceeds the value of physical substance) and contextual challenges (a complex environment in which many projects or products cross the boundaries of several organisations, stakeholder, producer, and user groups; projects or products that must meet the expectations of many organisations, stakeholders, producers, and users; demands at every level of production, distribution, reception, and control). These challenges require a qualitatively different approach to the practice of design research: analytic and synthetic planning skills that can’t be attained through practice alone, advanced knowledge that is not a higher level of professional practice but a qualitatively different form of professional research practice.

**Conclusion**

Continuing the activities of the original programme, we could say that, as before, an extensive approach still allows this Ph.D. programme to be open to that range of activities and entities (communication, organisational strategies, dynamics of the market, education and public institutions) that are part of the activities connected to industrial design as physical or immaterial artefacts themselves. If a change has occurred, this comes from an improved understanding of the intended learning outcomes and results expected from doctoral study. As previously stated, the programme has moved from the overall intention of researching in design to that of learning how to make research in design.

Sato has observed (2000, 137) that the basic questions raised as guiding forces of design research are directed to two areas of research interest: scientific engagement of understanding the acts of design, and understanding the subjects of design. The first leads to the general theories and methodologies of design that intend to offer models of the general nature of design. The second leads to the development of knowledge about subjects in the domains of design concern.

The curriculum I have been describing for the Ph.D. programme in industrial design is somehow in the middle:

(i) it’s addressing the ‘matter of research’ but it is a matter of research itself, addressing the core questions of the nature of design research,
(ii) it’s producing research results as well as research reflection,
(iii) it’s producing research objects as well as research strategies,
(iv) it’s articulating research outcomes as well as research cultures.

These are provisional claims so I will not emphasise this point. Further, being the Ph.D. continuously revised, results of the curriculum change can not be evaluated with rigour. Rather, I am simply proposing that as expression of potential skills to manage the complexity of design.
issues, Ph.D. programmes in design might advocate the functions of research sites where the complexity of research actions is made explicit; research poles serving to capture key aspects of basic research development; research centres where identifiable communities produce and ratify forms of design knowledge; as well as research sites whose relevance does not depend on the particular areas of study, but on the development of research strategies, coherent (but not necessarily dependent) with the tacit or explicit factors expressed by the design demand and societal needs.

References:


