

EVOLVED DESIGN THINKING AND THE IMPACT ON EDUCATION AND PRACTICE

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ABSTRACT

What is Design? The lack of consensus on a common definition for design and whether its body of knowledge constitutes a science or a discipline continue driving investigations of the nature of design. Despite the ambiguity, design is recognized as a process of creative problem solving and as such has become an integral part of modern business practices. The shift from product-focus towards user and experience focus has paved the way for interdisciplinary design research and the adoption of new investigative tools. Researchers agree that the understanding of the complexity of modern society requires holistic thinking, and therefore demands the implication of expert disciplines in the process of building design knowledge. How has the evolved mindset impacted design education? Although, interdisciplinary practices and transdisciplinary thinking have been acknowledged as a fundamental notion of building design knowledge, design programs seem to have made only timid adjustments in their curricula to address this new dimension. Traditional teaching methods and settings reveal themselves as insufficient and address little systemic thinking. Hence, alternative design approaches are being experimented with. The intent of this paper is to describe how the School of Industrial Design at the University of Montreal has reassessed its program to reflect the evolved mindset and what is being done to facilitate interdisciplinary design approaches.

Keywords: Design education, design theory, interdisciplinary practices

1 INTRODUCTION

What is Design? Definitions have evolved and opinions differ, thus revealing a lack of consensus on this subject matter. Although the popularity of design has increased in the last decades, conflicting viewpoints and changing practices contributed to the misperception of the discipline. In the following sections the paper is going to review some of the perspectives that have affected modern design thinking and elaborate on their impact on design education and professional practices. The paper will describe in section four a redesigned teaching framework and learning environment that encourages extending disciplinary boundaries and transdisciplinary thinking. It will also refer to a student project and its design approach to creative problem solving. The paper will conclude by assessing the teaching experience and the project results, and will argue the need for an educational framework able to facilitate interdisciplinary design practices.

2 EVOLVING DESIGN PERSPECTIVES

It is fair to say that perspectives on design have shifted in the search for identity and a theoretical framework. Initially viewed as a trade that defines the shapes of artifacts,

design has evolved into a *problem-solving activity* that intends not only to creatively address various aspects of society but more so to impose meaningful design solutions [12]. Modern theorists such as Jonas, Buchanan, Krippendorff, Glanville, Findeli (only to name a few), debate on the scientific foundation of design, if it should be considered a field, discipline or even a science and what should constitute design knowledge. They affirm that design should not be considered just a term that designates its outcome [8], but rather as a process of creative problem solving which seeks to understand phenomena that surround people and their interaction with the material and immaterial world.

Although some seem to diverge on how to achieve it, they all assert nevertheless, the *actor* and the experience as the fundamental terms of reflection and practice in design. As such, design is inherently linked to other disciplines, not only to arts or sciences, but even more so to humanities. Contemplations on design as a ‘transdiscipline’ [1] or ‘agent of reconciliation’ [10], ‘an expert discipline, for relating and connecting floating fields’ [8] substantiate that design draws knowledge from various fields in the attempt of obtaining a more holistic view of a given problem. Hence, researchers have come to agree that the understanding of the complexity of modern society requires looking at problems from a broader perspective, involving multi-disciplinary viewpoints and transdisciplinary thinking.

Design seeks to address people’s needs in a new and a meaningful way, and is therefore considered projective, interpretive and visionary in nature.[10] With its new focus, design reached for user-centered approaches and analytical tools that, consequently, paved the way for integrative practices and transdisciplinary thinking. In order to understand what is meaningful to someone, observing and analyzing the person’s interaction with the product or environment is not enough. Involving people in the design process became a way of finding out what matters. Hence, participatory research or user experience studies provided better insight into users’ perception and cognitive processes and enabled designers to comprehend how people derive meaning. [14]

Today, modern design practices are looking beyond just designing the material or immaterial world: design is seeking to understand and interpret what drives user perception and experience [12], and this required “expanding the concept of *user*“ itself and looking beyond just the *act* of manipulating artifacts. [11]

3 IMPACT ON DESIGN EDUCATION AND PRACTICES

Modern design thinking has significantly impacted academic institutions worldwide that recognized the necessity of integrating design research, expanding design knowledge, and exploring new avenues. As a result, several design schools have extended their graduate program offer on the masters and PhD level and started promoting multidisciplinary project environments and user centred approaches. Undergraduate design education, on the other hand, has barely evolved. Traditional product-oriented teaching methods do not address sufficiently systemic thinking nor provide interdisciplinary learning environments. [13] As a result, we continue observing parallel approaches in design education and changing design discourses, both contributing to an ambiguity about design and its role in an organization. Although some critics perceive the inconsistencies in design discourse as an identity crisis, others consider it a sign of maturing, (re)discovering, (re)defining itself, suggesting “design continues to expand in its meanings and connections, revealing unexpected dimensions in practice as well as understanding” [2] Indeed, judging from the large number of publications, design discourses have been influencing professional practice in industry significantly in the

past decade. Some leading companies reveal how design successfully drives business decisions. Nevertheless, to the frustration of many, design's role is still being perceived by some as an extension of engineering or as a marketing tool, leading to false expectations and discontent. Academic institutions need therefore to take on the responsibility of better preparing students for their role of proliferating modern design approaches and design thinking, and thus correcting ill-perceived expectations about design.

3.1 Industrial Design Education at the University of Montreal

The University of Montreal has been actively contributing to the debates on the evolved nature of design [5,6] during the past decade. The design program has been critically reassessed and adjustments have been made to reflect modern thinking. These changes resulted (as in many other schools) in the instatement of a Master of Applied Science program: *Design and Complexity*. It is focusing on systemic thinking and problem modeling, while engaging students in transdisciplinary design research.

The undergraduate program, however, benefited only from a minor curricula adjustment and a few additional theoretical courses addressing methodologies, human factors, socio-cultural issues and cognitive psychology. These curricula adjustments revealed regrettably a major problem: a dissonance between theory and practice. Studio class continued being taught in a traditional manner, using conventional teaching methods. Hence, students questioned the necessity of the extended theoretical base, skeptical of its pertinence to design, and industrial partners, on the other hand, complain about the design program that does not cater to their needs.

At the same time, multidisciplinary workshops have been introduced with the intention to foster interaction and exchange between disciplines while engaging students and professors in common projects. Although such integrative practices have been long overdue, some perceive them as non-productive. Cultural clashes, communication problems and disciplinary segregation seem to have a dissuasive impact on such initiatives. These problems revealed that multiplying expertise is not enough, new approaches are needed, capable of facilitating transcending boundaries and extending knowledge base, making true intertwining of disciplines possible. Consequently, interdisciplinary learning environments have been introduced since with the purpose of promoting disciplinary interlacing.[13]

An experimental teaching model exposed students to transdisciplinarity by introducing fundamental notions of other disciplines and how they relate to each other, thus enabling students to better apprehend complexity that surrounds a problem situation. Unfortunately, although proven to be successful, these teaching approaches have remained isolated initiatives, peripheral to the compulsory disciplinary programs. As such, these workshops remain limited to only a few students.

3.2 Extending Learning Environments and Disciplinary Knowledge

Interdisciplinary learning environments need to become an essential part of any design education. They help design students to find their place among other disciplines and to comprehend their cultures, languages, methods and tools. Such settings are, therefore, a critical source for creativity and knowledge building. Project-based learning in an interdisciplinary setting not only teaches students social skills, it enhances self-determination and thus fosters active assimilation theoretical knowledge. In addition, collaboration and communication skills cannot be taught, they need to be experienced.

Recognizing the great potential of such learning environments, the School of Industrial Design at the University of Montreal has been rethinking the fourth-year of the undergraduate design program. The school offers senior students the possibility to integrate interdisciplinary research teams, inter-university research groups or to collaborate with industrial partners. These settings are designed to provide students with a context for their thesis project and to expose them to an interdisciplinary culture. The following section describes such a learning environment and its academic framework.

4 INTERDISCIPLINARY LEARNING ENVIRONMENTS

Senior students are offered the opportunity to orient their last year of study towards interdisciplinary design research and innovation, as well as to explore a new dimension: interdisciplinarity. In this context, some students have been joining multi-disciplinary project teams to work on industry driven design problems, and others integrated interdisciplinary research laboratories, which expose them to design research-driven projects and innovation. One of these host laboratories was, for example, the chair of Landscape Design at the University of Montreal, which invited a senior industrial design student to join the research group. The student was proposed an overall topic of *Energy Distribution Systems and its Impact on the Urban Landscape*. This project has been aligned with a research program currently in progress. The intent was to evaluate and illustrate a design outcome that has been oriented by research-derived design criteria rather than by a pre-established design brief. The student had to approach the subject from a transdisciplinary perspective (landscape architecture, urban planning, industrial design and engineering), while taking into consideration positions of all actors involved. The pedagogic objectives aimed at understanding a problem situation and the context of design intervention, including problem modeling, concept development and design argumentation. In a traditional context of R&D, this project would be part of the business strategic phase that explores product opportunities and validates ideas. In this case, field and user studies needed to be conducted for the purpose of understanding the problem, helping to extract critical design knowledge in order to generate context appropriate design proposals. As such, it is considered a design driven approach to creative problem solving that is typically used when the subject matter is undetermined, unknown or not clearly defined. [4]

4.1 Academic Framework

Students' senior year is entirely dedicated to their thesis projects providing flexibility and resources to conduct user studies and field research. Professors and researchers guide the students throughout the process and help in defining subject matter, structuring design approach as well as orienting creativity. Students have access to multiple resources, experts and researchers, scientific literature and research publications. Weekly review sessions provide critical feedback and allow reassessing approach and findings.

At strategic moments, experts and industrial partners are being consulted, clarifying or confirming interpretations of research findings. Through interdisciplinary exchange students identify areas that would benefit from design intervention. Students who physically integrate the interdisciplinary research labs are not only exposed to a new learning environment that promotes transcending boundaries, researchers also are accompanying them during fieldwork.

Theoretical courses such as, *design project management, professional practices, ecology and sustainable development* and/or *users, perception and cognition* complement senior students' theoretical knowledge base. Professors who guide the senior students throughout the year encourage them to logically apply the newly acquired theoretical knowledge to the thesis projects.

4.2 Transdisciplinary Design Approach

The design project that studies the *Energy Distribution Systems and its Impact on the Urban Landscape* has been structured in four phases and spread over two semesters. Phase 1 is dedicated to compiling critical data that allows the student to familiarize himself with the subject matter and the context in which the project evolves (economic, sociopolitical, cultural). More specifically, this phase examines key areas such as the urban environment, how it has evolved (historically, socially, economically), the people (actors) living and/or experiencing the environment and the equipment within, the system of energy distribution itself, how it is being implemented and serviced, and how it cohabits with other services. At this stage, the student has also to investigate the technological progress made in this area and to evaluate its pertinence for the project. During the second phase, the student has to synthesize all information, identify problem areas that need design attention and establish design objectives and criteria. The information gathered and observations made, provide a critical basis for problem modeling. It leads to a narrative of a design intent and design criteria, derived from research and transdisciplinary thinking (as suppose to predetermined by engineering or marketing requirements). The third phase deals with projective thinking, including ideation, scenario building and elaboration of preliminary concepts that are susceptible to improve the existing situation. All ideas are then presented to the interdisciplinary expert team, offering a basis for discussion and strategic decision-making. During the last phase, the most pertinent ideas are being refined and developed into a coherent meaningful concept. The formulation of a design argumentation helps justify and explain the proposed concept. During this phase, design students seek engineering expertise in order to refine the product and design intent without neglecting technical aspects such as materials, processes and assembly. Various 3D modeling and rendering tools help to communicate the final design concept, and visualize the product in its context of use. In a typical R&D process the design concept would transition from this point on into a classic product development and engineering phase.

5 CONCLUDING REMARKS

The transdisciplinary design approach offers several advantages. Not only do design students learn to understand the role and expertise of other disciplines involved, including their own, they also learn to appreciate disciplinary cultures, their language, focus, methods and tools. They discover how to navigate among disciplines, how to establish their role and especially, how to defend and justify their position. Project-based learning enables students to actively seek a deeper understanding of the problem and its context because it is reduced to a limited area and related to a specific problem situation. Such an environment encourages also the exploration and experiencing first-hand of the phenomenon surrounding a problem area. Rarely can such an active in-depth information extraction or transfer be achieved through traditional theoretical teaching methods, even if immediate connections to case studies are being made.

Self-determination too has shown to be a critical motivator in assimilating theoretical and practical knowledge. The experiential dimension and immersion in an interdisciplinary environment adds a competitive edge to group dynamics and motivates students to represent their disciplines as well as possible. It has been attempted to make a point that design has drifted closer not only to arts and science, but also to humanities [3], and in this process transdisciplinarity becomes an essential skill, conveyable through pluridisciplinary learning environments.

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