Design Pedagogy in an Uncertain World: Sensible, Transdisciplinary, and Post-Human Approaches

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Abstract *In a world marked by uncertainty and complexity, design plays a fundamental role in questioning the present and envisioning a more sustainable and equitable future.*

To train designers able to respond to contemporary challenges, we must question the conventional approach to design pedagogy, rethinking the tools, techniques, and aesthetics we have known and taught so far.

In pursuing new and transformative design pedagogies, we suggest possible perspectives that represent methodological and epistemological challenges to design pedagogy and contribute to understanding design as a field of practice and research that focuses on the world as it could be. The first challenge is to implement a method of reflection-in-action, in a process of mutual nurturing between making, feeling, and thinking. A pedagogy based on a comprehensive vision that connects the experiential, social, and material aspects of design through experimentation and the process of trial/error, training students to be able to navigate the "swampy lowland" of the creative process (Shön, 1983).

The second is to apply a multidisciplinary and transversal approach to design practice, connecting different fields such as politics, architecture, anthropology, art, digital fabrication, and ecology, offering a non-hierarchical framework for action.

The third and most complex challenge is to permeate design pedagogy with posthuman thinking, stimulating the reflection around concepts of situated knowledge, radical care, and the interdependence between human and non-human entities, challenging the dominant and undefeatable position of the human being and its relationships with the environment, suggesting new ways of knowing and making sense of the world.

The paper will discuss these pedagogical challenges through the example of the Master of Design Research, conducted at BAU School of Arts and Design since 2017, providing the context of reference to relate the insights of trying to push the boundaries of design pedagogy and "staying with the trouble" (Haraway, 2016).

Author keywords *design pedagogy; conscious design; transdisciplinary; posthuman thinking; speculative design*

Introduction: Rethinking Design Pedagogy

In a contemporary landscape defined by the intricacies and uncertainties of a rapidly evolving world, the role of design takes on a fundamental significance in questioning the present and envisioning alternative futures, contributing to transformations and processes, and offering new perspectives to look at reality.

In order to foster designers able to respond to the multifaceted challenges of the present era, it is imperative that we reevaluate and challenge the conventional approaches to design pedagogy. This entails a comprehensive rethinking of the tools, techniques, and aesthetics that we have known and taught so far.

The fundamental change resides in the ability of design education to train conscious designers equipped with the tools to discern the evolving societal, technological, and environmental landscape, and the capacity to think critically and affirmatively. That is, understanding complexity but also being able to imagine and open alternatives. Developing the competencies to prefigure new worlds revolves around the capacity of design education to provide students with those tools and offer them space to explore, experiment, make mistakes, and discover.

In our quest for novel and transformative design pedagogies, we advocate for a range of potential perspectives that present both methodological and epistemological challenges to conventional design education and contribute to understanding design as a field of practice and research that focuses on the world as it could be.

In this article, we will discuss three challenges to design education: the implementation and expansion of the method of reflection-in-action, fostering a reciprocal relationship between making, feeling and thinking; the generation of knowledge alliances, transcending disciplines and fields of action and navigating unprecedented forms of collaboration; the integration of posthuman thinking, urging to question traditional epistemologies and explore ideas such as situated knowledge, radical care, and the intricate interconnection between human and non-human entities, making space for new ways of knowing and making sense of the world.

The presented pedagogical challenges are also discussed through the examples of two final master thesis projects from the Master of Design Research, conducted at BAU College of Arts and Design. Those examples show how the pedagogical challenges are embodied in design projects that question conventional ways of looking at reality, envisioning new material relationships with the world.

From Reflection to 'Diffraction' in Action

Taking inspiration from Manning and Massumi, we conceive design as a mode of *thinking in action*, an interconnected process where knowledge is generated *through* the process of making, dismantling the thinking/making dichotomy (Manning &

Massumi, 2014). This form of cognition inhabits the space between thought and action, theory and practice, a threshold where boundaries blend and transitions are not linear. An intermediate space between *Techne* and *Episteme*, that we trace to the ancient Greek concept of *Phronesis*, which represents practical knowledge generated in a concrete and intricate context essential for making decisions. *Phronesis* embodies a type of contextual knowledge acquired through hands-on experience and is fundamentally practice and action-oriented.

This approach to design as a reflective practice has been initiated by Donald Schön who transferred the concept of *reflection in action* from the methodological to the epistemological realm. In his work, The Reflective Practitioner (1983), Schön proposes an alternative epistemology of practice that interprets design as a *"reflective conversation with the situation"*. The author suggests that reflection in practice often begins when a routine action produces an unexpected outcome, that surprise gets our attention and drives us to a process of reflection:

> "We reflect on action, thinking back on what we have done in order to discover how our knowing-in-action may have contributed to an unexpected outcome" (Schön, 1983:26).

This notion of *reflection in action* underscores a symbiotic relationship between making, feeling, and thinking. It advocates for a pedagogical approach that integrates the experiential, social, and material aspects of design through hands-on experimentation and trial-and-error processes, training students to be able to navigate the "swampy lowland" of the creative process (Shön, 1983). Navigating the "swampy lowland" means engaging with messy but crucial issues, driven by experience and intuition. Grand (2012, p.156) endorses and reinforces the importance of remaining messy and controversial to make space for new and unconventional ideas to be generated.

Similarly, Ranuph Glanville defines design as a process of exploration into the unknown: "Design is like wandering in the countryside with some vague idea of going somewhere while not really knowing exactly where you are going, making repeated decisions over which path to follow [.]" (Glanville, 2016, p. 154). An invitation to embrace the process of getting lost because in getting lost we might find something we won't expect.

This process of productive disorientation as a method of inquiry requires designers (and students) to learn how to inhabit uncertainty and ambiguity in the process.

As Marta Camps and Jaron Rowan suggest, the invitation is not to observe from the outside but rather to enter, to position oneself among things, to get one's hands muddy, decentralise oneself to enter into a relational dynamic (2021, p. 66). Design

is, therefore, understood as an open practice, capable of listening and attention, embracing complexity and contradiction.

Embracing such forms of knowledge production and embedding these approaches into our teaching methods pose an interesting challenge for design educators. In this pedagogical context, the role of educators is complex and delicate. As Marta Camps suggests, we can understand design pedagogy as a practice of embracing uncertainty and not-knowing in the process of teaching, accompanying students in their processes of discovery rather than merely transferring knowledge to them (Camps, 2021, p. 99). Pushing the boundaries of design education, Camps proposes a pedagogy of *knowledge in action* as a shift in the curriculum aiming not to strictly adhere to predefined learning objectives, but to be responsive to the possibilities sparked by acts of openness within each individual. Thus, this is an educational approach striving to attune to growth and receptiveness, requiring us to put aside the rigid demands of the disciplinary curriculum, despite the inherent limitations and contradictions (Camps, 2021, p. 105).

Knowledge in action offers educators a space to align thoughts, feelings, and actions, an opportunity to inhabit possibilities and potentials and embrace open educational spaces that aim to discover and unveil knowledge through unplanned actions. With a requirement for a certain pedagogical discomfort, the model proposes practices that deviate from disciplinary parameters and seek a more situated experimentation, where judgment is suspended in favour of new and unexpected adventures (2021, p. 98).

Such a pedagogical model is rooted in experiential learning, openness, and the intertwined relationship between thinking and making. In such an evironment, educators themselves are called to learn how to navigate the uncertainty and ambiguity of the process. Following this intention to push the boundaries of design pedagogy, we suggest expanding the established and recognised model of *reflection in action* towards one of *diffraction in action*, urging an epistemic movement from reflection to diffraction.

Reflection comes from the Latin '*reflectere*' relating to the idea of folding back or folding again, while diffraction comes from the Latin '*diffratio*' relating to something that breaks or separates. While reflection relates to a movement towards the 'same' or the inside, diffraction connects with a sense of openness and relationality, of being affected by external encounters.

Haraway suggests an understanding of diffraction as a metaphor to overcome the traditional reflective form of thinking, considering diffraction as a "more subtle vision" (2004/1992, p. 70)

The author explains how *"Diffraction does not produce 'the same' displaced, as reflection and refraction do. Diffraction is a mapping of interference, not of replication, reflection, or reproduction"* (2004/1992, p. 70). Thinking diffractively means stepping out of the con-

ventional, allowing us to acknowledge the differences and interferences that exist, and implying a critical and responsible engagement with the world.

The metaphor of diffraction as a mode of thinking allows us to expand the process of reflection in action towards concepts of interconnection, interference, and affectedness.

Knowledge alliances

Contemporary design and the multiple practices it includes operates in a complex intersection. It needs to be able to navigate and articulate market interests and social needs. Academic requirements and political agendas. Aesthetic challenges and ethical concerns. In this sense, design crosses many disciplines and fields. Design pedagogy must incorporate this complexity and be able to blend theoretical concerns with political awareness. Technical skills with poetic views. It needs to encourage radical forms of imagination with attention to detail and the importance of the context.

All this happens in an ever-changing society with challenges and complex problems arising. We are living in an unprecedented historical moment. As a species deeply entangled in the world we face a series of problems and challenges completely unprecedented in scope, magnitude and complexity. Mass extinction of species, forced migrations, resource depletion, pollution of rivers and waters, unequal concentration of wealth, loss of biodiversity, political polarization, pervasiveness of microplastics, growth of fascism and extremism, propagation of new forms of mental illness and unrest, extreme climate events, ocean acidification, precariousness of work and life, just to name some of the most notable. Many of these problems seem to be closely linked and related to each other, but even so, we face them separately. We have inherited a set of world views and epistemic categories that seem inadequate to face the current moment.

In that sense, the current situation requires us to establish alliances of knowledge and practices. Transcend the discipline to delve into innovative and unprecedented forms of cooperation. Ways of knowing that go beyond rationality, criticism or aesthetics, that is the three modern epistemic categories. We need to develop ways of doing capable of assuming complexity through inventiveness and creativity. The neoliberal emphasis on the autonomy of the subject, the prominence of the idea of the person as being independent of the environment, and the gradual erosion of forms of political organisation to favour narratives centred on the self and the individual identity of the subjects, have contributed to particularise many of our shared problems. Massive issues can only be dealt with on a micro level. Every problem seems to happen on a personal scale. With this, larger frames of reference, and the ability to understand the systematicity of certain struggles or the structurality of the inequalities that we are facing are lost. In this context, it is essential to reflect on

new ways of understanding and dealing with current troubles and challenges and the role that design can have in opening up these complex entanglements of economic, social, personal and material elements. We need to articulate these problems with broader contexts, where we can see and understand the interconnections and structural causes that underlie them.

Materializing the problems by taking into account the structurality of power relations, the institutional frameworks that reproduce them, and the infrastructure designs and production models on which they are based, are some necessary steps to overcome the limitation of focusing only on particular and individual effects and address the full range and complexity of the problems that unfold in front of us.

Design in this sense can be understood as a medium (Easterling 2021) or part of a wider relational practice. A practice that is not focused on problem-solving but also concentrated on issue-raising. In her book "Staying with the Trouble: Making Kin in the Chthulucene", Donna Haraway urges us not to jump to conclusions hastily. She invites us to sustain the complexity of the problems and categories inherited from modernity so as not to end up ratifying or idealising visions or categories that, instead of undoing, Haraway invites us to mix up, to interweave. For the author,

> "continuing with the problem requires learning to be truly present, not as an axis that disappears between horrible or Edenic pasts and apocalyptic or salvation futures, but as mortal bugs intertwined in myriads of unfinished configurations of places, times, materials, meanings" (Haraway, 2016, p. 20).

To do this, she recommends that we learn to make new relatives, rare relatives that link us to a heterogeneous and complex biological world. Establish links with those non-humans that until now we had silenced. Since *"nothing is connected to everything, everything is connected to something"* (Haraway, 2016:61), the author proposes developing forms of tentacular thinking. Weaving spider webs. Creating networks of meaning capable of articulating what we had divided. To do this, she proposes a science that does not start from human exceptionalism and utilitarian individualism, that is, from the star subjectivity of European modernity, but instead proposes learning to think with excluded others. With the monsters and bugs from which the gift of speech has been removed. For her part, in a similar vein, Isabelle Stengers invites us to articulate an ecology of knowledge (2005) capable of addressing the multiple challenges that occur in different ecologies and, in turn, to look for ambassadors and clowns capable of establishing links and highlighting the absurdities of certain logics and power relations that keep ecologies separate.

Design needs to be able to entangle worlds. Combine ideas with materials. Articulate social, aesthetic and economic concerns.

Integrating Post-human Thinking

Perhaps the most complex challenge for design pedagogy is to embrace and materialise posthuman thinking. This entails a paradigm shift that challenges the conventional understanding of humans as separate from technology and nature and encourages contemplating concepts of situated knowledge, care and the intricate interconnections between human and non-human entities. It involves challenging the prevailing anthropocentrism and rethinking human-non-human relationships, presenting new epistemological pathways to comprehend and engage with the world (Braidotti, 2013). As Rowan and Camps have argued before, we can find different spaces for debate in contemporary design in which the need to confront some of the maladies from modernity and humanism is being addressed, as they write,

> "calls and ideas surrounding the need to decolonize design and redress modernist ideas and aesthetics that have been naturalized in design practices (Prado & Oliveira, p. 2014). On this line of work, we can see the contributions of Arturo Escobar who under the notion of pluriversal design has opened a debate around the need to incorporate non-European perspectives and aesthetics in design (Escobar, p. 2018). [...] These different debates and approaches are also finding their space in the academic context as conversations around the need to think and implement what has been called "Pluriversal Design Education" (Noel, p. 2020), or pedagogical experiments in which decolonial perspectives and non-western epistemologies are taken into account (Mortensen & Tavares 2021)" (Rowan & Camps, 2022, p. 567).

Although the task is not easy or exempt from contradictions, we can see specific practices where these approaches are being materialised. In his recent book, "Designing for Interdependence", Marti Ávila (2022) explores ways in which we can design for more-than-human worlds. Introducing animals and plants and giving them agency, his projects focus on showing how different forms of life are connected in what he describes as webs of interdependence. Interdependence, as a condition of everything that is alive, makes it evident how the concept of care and the practices it entails are fundamental elements. They are not only essential to sustain and maintain relationships, and thus the continuity of the system, but essential also as a way to approach reality. Care becomes a tool to observe, make sense of, and navigate reality, and consequently, to question the status quo and imagine alternative worlds.

A radical idea of care that envisions an integration of human and non-human entities within the realm of care, transcending human-centred perspectives and reimagining care beyond human interaction (Puig de la Bellacasa, 2017). An invitation to reflect on the impact of our actions—including design actions—not only on

the human species but also the others and all the living systems, and to rethink the concept of well-being in relation to ecological limitations for maintenance, repair, and possibilities of prosperity. In a recent paper, Hee-Jeong Choi, Braybrooke and Forlano argue for "*participatory engagements in the form of more-than-human co-creation*" (2023), bringing posthumanist ideas to urban design.

Another interesting field of practice comes in the shape of bio-design and design with living organisms, as advocated by Keune (2021) or found in discussions on how to go beyond human-centred design presented by Giaccardi & Redstrom (2020). In this line, Tim Cowlishaw's research on digital wastes and his proposal to think in more-than-human timescales is certainly interesting, as well as his design probes and epistemic objects with which he carries out his research. By introducing debates surrounding utility and working through different time frames, Cowlishaw helps us to imagine non-human-centred design practices. As he argues,

> "[t]he argument for a move away from the primacy of use and user-centered-ness seen in a variety of work dealing with the question of design for more-than-human worlds is of particular importance to design for digital media, not just for the historic importance granted to such perspectives in digital design, but also because such perspectives do not account for the materiality of digital infrastructure, its entanglements in the world, and its mutually- dependent on-tological relationship with the objects of digital design themselves, a relation-ship which is deeply dependent on ongoing relatings of care and maintenance" (Cowlishaw, 2022, p. 30).

Most of these projects and practices have a speculative element to them, but help us to imagine the way forward in the integration of posthumanism in specific design practices.

Two Students' Projects as Material References

To materialise the presented pedagogical challenges in the context of design education, we draw on the experiences and insights gained as educators in the Master of Design Research program at BAU College of Arts and Design, which stands as a contextual example, illustrating the ongoing efforts to push the boundaries of design pedagogy.

The program, initiated in 2017, embraces a multidisciplinary, integral, and broad understanding of design, intended as a mode of thinking in action, with a social and political role.

Through a series of diverse and multidisciplinary subjects, the master provides students with tools, strategies and methods to do research in design and gener-

ate new knowledge through the practice of design, training them as designers/researchers able to understand the complexity of the world, question the status quo, and envision alternative realities.

This approach to design pedagogy invites students to rethink their own understanding of the world and let new questions emerge from their explorations rather than seeking answers. It is an approach dedicated to developing students' critical and speculative thinking and training designers who do not just respond to existing problems but rather, doubt, interrogate, and question. Designers who are capable of sustaining contradiction and uncertainty, not as elements that block and limit the design process but rather as drivers for alternative ways of looking at reality. Within this approach, posthuman theories are embedded as a possible framework for speculation and exploration.

Materialisation is another key aspect of the pedagogy of the master. Throughout the program, students are invited to materialise their ideas positioning themselves at the edge between theory and practice. The challenge of inhabiting such space in-between is faced in each and every subject, where students are invited to intertwine their theoretical research based on different sources, such as readings, projects, movies, etc., with their practical research based on experimentation, manipulation, and transformation. The two are inseparable and students have to demonstrate their ability to explain the contexts, references, and processes of their design research projects.

In the Final Master's Thesis students are invited to apply the knowledge, methods, and processes learned throughout the different subjects, to their specific topic of interest. In this pedagogical space, they dive deep into their urges and concerns and, borrowing from all disciplines and research methods touched upon in the program, they are able to generate their own design research methods and processes. This individual research project is the space where students explore, experiment, and test, developing their specific approach to design and demonstrating their ability to do research through the practice of design as well as question reality through design.

We present here two final master thesis projects that exemplify the fascinations and preoccupations discussed in this paper. The projects engage with post-human thinking, matter and theory, social and political issues, questioning our position in this world as human beings and speculating on new relations and connections with other living beings. They formulate new and unconventional questions rather than finding fixed solutions to problems.

The first project, called *"Tierra bastarda. Devenir en el umbral"* (Bastard soil. Becoming in the threshold) by student Marina Muñoz, is an exploration of concepts such as limbos, becoming, and transition through material research with raw clay. The research focuses on the process of co-creating with matter, involving time, movement, and transformation.

In this project, clay is intended as a matter of transition, a space for exploration that exceeds fixed categories and classifications. The project is a claim to the importance of limbos as tangible and material spaces, complete and incomplete at the same time, in a condition of constant transition. Referring to Braidotti (1994), the student interprets clay as a nomadic subject: an entity that transforms, reinvents itself, and challenges the boundaries of established conditions and disciplines.

The material exploration has been developed in the territory around Badalona (Barcelona, Spain) where the student collected different types of soil and worked with her hands to accompany matter through the slow process of material transformation from clay into ceramics, letting the natural environment be part of the process.

The process of reflection-in-action, which we presented earlier in the paper, is visible in this material research where the student learns from the dialogue with the material and through the action of manipulating and transforming matter, combining ideas with materials.

Through the practice of pottery making, the experiential research delves into concepts of entanglements and *sympoiesis* (Haraway, 2016), transformation and hybridity.

The material outcomes of the research are a series of clay artefacts that embed all the steps of the process of co-creation, planned and unplanned. Some artefacts generated processes of germination and some others showed traces of the firing process. Those artefacts are containers that challenge the boundaries between mud and ceramics.

This project represents an outstanding result within the context of a pedagogical approach based on integrating experiential, social and material aspects through processes that intertwine making, feeling, and thinking.

The second project, called *"Meterse en un jardin. Plantas de plastico para repensar los cuidados"* (Getting oneself into a mess/garden. Plastic plants to rethink care) by student Blanca Pia Fernandez, aims to prompt a reflection, raise questions, and explore pathways regarding the relationships, connections, and coexistence between humans and plastic, considering it as a ubiquitous material that transcends us through time.

The project starts by questioning the conventional position of plastic in our society as a material of little value, considering it to be of poor quality, disposable, and cheap. This contradicts the intrinsic characteristics of the material itself, such as its longevity, versatility, and the high environmental cost of its exploitation.

Figures 1 + 2: Project: "Tierra bastarda. Devenir en el umbral". 2023. Credits: Marina Muñoz and Rubén Aznar.

By proposing an alternative to the conventional way we understand plastic, the project goes beyond solution-oriented processes of plastic circularity and reuse, and places care at the centre, discovering through matter and repairing from and with it, establishing intimacy bonds to generate a shift in habits, adopting new perspectives to construct a negotiation space that offers the possibility to rethink the way we inhabit the world.

The exploration has been both material and theoretical, always keeping the tension between the two. Working with synthetic and plastic materials to observe their relationship with time, the student questioned the natural-artificial dichotomy and proposed a change in the relationship between humans and plastic to generate a bond of care and intimacy that transcends time, highlighting the characteristics associated with this material: its omnipresence, its banality, and longevity.

As previously explained in this paper, integrating posthuman thinking in design pedagógy means moving away from an anthropocentric vision and rethinking human-non-human relationships, offering new ways to comprehend and engage with the world.

Figure 3: Project: "Meterse en un jardin. Plantas de plastico para repensar los cuidados".
2022. Credits: Blanca Pia Fernandez.

The material outcome of this research is the design of a plastic garden embedding those ideas and representing a space that aims not only to question the status quo but also to establish a new domestic and caring bond between humans and plastic, through alternative and uncommon forms of plastic.

Through speculation and imagination, the project helps us envision the way forward to incorporate posthuman thinking into design practice.

Conclusions

The presented design projects materialise the challenges and possibilities we propose to rethink design education. They present alternative epistemologies and establish new forms of relationships with non-human worlds, offering new lenses to look at reality, challenging the human-centric perspective, and posing questions that open new pathways to be undertaken. They are the outcome of design processes able to navigate uncertainty and ambiguity, able to relate with matter and thought, generate alliances and interferences between fields of knowledge, to intertwine making, feeling, and thinking. They represent an understanding of design as a practice crossed by multiple forces, conscious and attentive, capable of embracing complexity and contradiction.

The pedagogical perspectives presented in this paper and exemplified through those examples invite design educators to a methodological and epistemological shift in design education, towards a design education that is able to embrace uncertainty and contradiction, and to navigate the complex and intricate interconnections among living beings and understand the responsibility and affordance of the design actions and processes.

In trying to push the boundaries of design pedagogy, we as educators have to learn how to stay with the trouble (Haraway, 2016) and accompany students in their processes of discovery.

As we conclude this exploration, we recognise that rethinking design pedagogy is an ongoing journey and the proposed shifts and perspectives are not exhaustive but indicative of the paradigm shifts needed to adapt design education to an ever-changing and uncertain world.

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