Pontifícia Universidade Católica
do Rio de Janeiro

Bárbara Alves Betts

Construindo nossa própria narrativa: revisitando a identidade do Design e a Educação na América Latina

Tese de Doutorado

Tese apresentada como requisito parcial para obtenção do grau de Doutora pelo Programa de Pós-Graduação em Design do Departamento de Artes & Design da PUC-Rio.

Orientadora: Profa. Dra. Rita Maria de Souza Couto
Coorientador: Prof. Dr. Juan Carlos Jeldes Pontio

Rio de Janeiro,
08 de Abril de 2025.

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To all Latin designers, for the pursuit
of our identity construction.

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Abstract

Betts, Bárbara Alves; Couto, Rita Maria de Souza (Advisor); Juan Carlos Jeldes Pontio (Co. Advisor). **Building Our Own Narratives: Revisiting Design Identity and Education in Latin America.** Rio de Janeiro, 2025. 129p. Doctoral Thesis – Department of Arts and Design, Pontifical Catholic University of Rio de Janeiro.

This thesis explores the establishment of Latin American epistemologies of design, grounded in the region's social, cultural, political, and economic experiences. Through an interdisciplinary lens, it seeks pathways for a collaborative construction a design identity that represents Latin America through its own foundation. In this sense, education plays a crucial role in intertwining with design, as it serves as the main space for analysis in constructing epistemologies that encompass its practice in this context. The main objective is to propose a framework for Latin American design epistemologies applicable in interdisciplinary educational settings to promote socially relevant and culturally sensitive practices. The thesis includes case studies from projects at the Pontifical Catholic University of Rio de Janeiro and the Pontifical Catholic University of Valparaíso, illustrating effective teaching dynamics guided by design methodologies.

Keywords

Design; Education; Epistemologies; Latin America; Pluriverse.

Resumo

Betts, Bárbara Alves; Couto, Rita Maria de Souza (Orientadora); Juan Carlos Jeldes Pontio (Coorientador). **Construindo nossa própria narrativa: revisitando a identidade do design e a educação na América Latina.** Rio de Janeiro, 2025. 129p. Tese de Doutorado – Departmento de Artes e Design, Pontifícia Universidade Católica do Rio de Janeiro.

Esta tese explora a possibilidade do estabelecimento de epistemologias latino-americanas do design, pautadas na experiência social, cultural, política e econômica da região. A partir de uma perspectiva interdisciplinar, este estudo visa buscar caminhos para a construção conjunta de uma identidade do design que represente a América Latina por meio de um referencial próprio. Nesse sentido, a educação desempenha um papel essencial no entrelace com o design ao ser o espaço principal de análise para a construção de epistemologias que contemplem sua atuação esse contexto. Este estudo tem como principal objetivo propor estruturas para epistemologias de design latino-americanas que possa ser aplicada em contextos educacionais interdisciplinares para promover práticas de design socialmente relevantes e culturalmente sensíveis.A tese contempla o estudo de caso de dois projetos, um realizado na Pontifícia Universidade Católica do Rio de Janeiro e outro na Pontifícia Universidade Católica de Valparaíso, os quais exemplificam como pode funcionar dinâmicas de ensino guiadas por objetos e metodologias provenientes do design.

Palavras-chave

Design; Educação; Epistemologias; América Latina; Pluriverso.

Resumen

Betts, Bárbara Alves; Couto, Rita Maria de Souza (Tutora); Juan Carlos Jeldes Pontio (Co-Supervisor). **Construyendo nuestras propias narrativas: revisando la identidad del diseño y la educación en América Latina.** Río de Janeiro, 2025. 129p. Tesis Doctoral – Departmento de Artes y Diseño, Pontificia Universidad Catolica de Río de Janeiro.

Esta tesis explora la posibilidad de establecer epistemologías del diseño latinoamericano, basadas en la experiencia social, cultural, política y económica de la región. Desde una perspectiva interdisciplinaria, este estudio pretende buscar formas de construir conjuntamente una identidad de diseño que represente a América Latina a través de su propio referente. En este sentido, la educación juega un papel esencial al entrelazarse con el diseño al ser el principal espacio de análisis para la construcción de epistemologías que tengan en cuenta su accionar en este contexto. El principal objetivo de este estudio es proponer estructuras para epistemologías del diseño latinoamericano que puedan ser aplicadas en contextos educativos interdisciplinarios para promover prácticas de diseño socialmente relevantes y culturalmente sensibles. La tesis contempla el estudio de caso de dos proyectos, uno realizado en la Pontificia Universidad Católica de Río de Janeiro y el otro en la Pontificia Universidad Católica de Valparaíso, que ejemplifican cómo pueden funcionar dinámicas de enseñanza guiadas por objetos y metodologías provenientes del diseño.

Palavras-chave

Diseño en Situaciones de Enseñanza-Aprendizaje; Teoría del Diseño; epistemologías latinoamericanas; Interdisciplinariedad.

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Prologue

Before presenting the content of this thesis, I would like to share a few introductory words. This is an invitation to dialogue, and an attempt to bring the reader closer to a central reflection that has accompanied me throughout this entire process. This study raised numerous personal questions that touch not only on my identity but also on the path I have followed as a researcher in the fields of design and education in recent years. It is from this place of questioning, of discomfort and curiosity, that this work begins.

This thesis is grounded in a critical and in-depth bibliographic analysis. A central aim of the research was the continuous, and at times exhausting, search for Latin American authors who address how our understanding of design is constructed in countries of the Global South, particularly in Latin America. This was not an easy task. The scarcity of this literature, especially in languages other than English, exposed a structural silence that this work attempts to confront.

I am fully aware that the English language may "function as a symbol of belonging to a scientific community that continuously imposes its norms, formats, and ways of narrating the world." In light of this, I continue to ask myself: why do I write, line by line, a thesis that questions this very system in the language that most powerfully sustains it?

The answer, to me, is simple. Beyond wanting to provoke reflection among Latin American teachers, students, and professionals, I seek to raise a clear and assertive voice of resistance: a voice that says we no longer accept having our histories told through eyes that do not live in or carry some part of our territories with them.

I come from a family of many nationalities, cultures, and traditions, where symbolic diversity was always part of our collective understanding of life. My family is made up of Americans, in the broadest sense of the word. And yet, those who were born and raised in the United States have claimed this word exclusively to describe their worldview and position in the world. What does it mean to carry a language and a culture that simultaneously belong and do not belong to me? I have always lived with this tension. That is why, throughout this process, I turned to other ways of thinking, found in design and education, that emerge from countries more similar to Brazil. I looked for what unites us, experiences, urgencies, scars, and understandings of the world. Today, after engaging more deeply with this shared experience, I can say I feel more Latin American than ever before.

Writing this thesis in English means it might reach places that would otherwise remain closed to it had it been written in Portuguese, or even in Spanish. But this is not just a study on design education. It is a political project, a poetic exploration, and a transgression of many of the structures that confine us in Brazil and in other Latin American countries. This, too, is why I chose to write it in English: so that it may disturb. So that it may provoke those who look at us to recognize in our voices

richness, cultural depth, and critical insight, just as so many brilliant thinkers have long expressed.

There is still a great deal of groundwork to be done within Latin American institutions for these conversations to truly unfold. The unconscious reproduction of pedagogical models from the Global North continues to shape our classrooms and curricula. But before we can meaningfully imagine other paths, we must first face the reality of where we are. For this reason, this thesis will also be published in Portuguese and Spanish, in an effort to draw Latin American design and education professionals closer to the critique presented here. Still, at this first stage, it is published in English as a deliberate act: to unsettle the dominant structures of epistemic power and to open space for the recognition of who we are and of the knowledge that emerges from where we stand.

1
Introduction

The field of design in Latin American academia has often been shaped by epistemological perspectives rooted in Eurocentric and Western-centric thought, potentially overlooking the unique social, cultural, and historical contexts of the region. This thesis is the outcome of eight years of research conducted within the Interdisciplinary Design Education Laboratory (LIDE) at the Pontifical Catholic University of Rio de Janeiro. Over these years, my understanding of interdisciplinary relationships between design and education has been shaped by diverse experiences, including various spaces, initiatives, research projects, and events. This work generates deep reflection on the possibilities of (re)configuring these relationships. These experiences within the LIDE lab, and the reflections they spurred, have led me to consider the broader educational context in which design and education intersect.

In the broad educational context of basic to higher education, this research offers insight into the convergence of design and education by considering the social formation of the territory in which it is located, providing a situated understanding of this intersection. This work explores future-oriented concepts, informed by both past and present learning. Design, a discipline historically rooted in expanding access to consumer goods, is understood here as a discipline with rich procedural depth. Education, initially exported to Latin America as a social formation model, is seen as a powerful tool for collective construction, capable of shaping a population's comprehension of the world. This thesis carefully unravels the historically-situated construction of design and education as distinct entities with potential for synergistic collaboration, with concepts grounded in contemporary understandings of the social roles of these two fields to reveal opportunities for innovative pedagogical approaches.

To explore this path of disciplinary and interdisciplinary intersections, it is crucial to examine the underlying theories that inform our general perception of both fields, especially design, the primary focus of this research. As consumerism — a defining characteristic of capitalism — became widespread, the term "design" gained global prominence. Consequently, the meaning of design, particularly within academic settings, became increasingly blurred.

Although design is often perceived merely as "a vision" or "an approach" rather than a comprehensive discipline, its scholarly knowledge as an inherently social field is central to this work and will shape its theoretical and methodological development. Given the complexity of design, which involves multiple stakeholders in the project development process, it is essential to consider its social dimension. This understanding of design as fundamentally social serves as the foundation for this discussion.

Therefore, in addition to discussing design theories and methodologies to explore its interdisciplinary characteristics and potential in teaching-learning situations, this research will raise questions about the construction of these relationships taking into account specific cultural understandings and its influential role in shaping the notion of the Global South.

To further enrich the introduction of this thesis, I consider design – inherently social – within a Latin American context, prompting a reflection on issues of cultural identity. As Professor Dori Tunstall[1], former Dean at OCAD University in Canada, points out among the framework of design anthropology, the theory of transculturation provides a valuable lens for understanding these dynamics:

> The theory of transculturation helps to define three key principles I believe should guide the praxis of design anthropology when it comes to understanding and having positive impact on value systems:
>
> • Value systems and cultures have to be accepted as dynamic, not static. Each generation goes through the process of negotiating the elements that make up its value systems and cultures.
>
> • One needs to recognize the mutual borrowing that happens among value systems and cultures and to seek to mitigate or eliminate the unequal circumstances in which that borrowing takes place.
>
> • One must look simultaneously at what is expressed as that to be gained, lost, and created new in the recombination of value systems and cultures by a group of people. (TUNSTALL, 2019, p.353)

In addition to the social perspective, throughout this work, I consider design to be a multifaceted discipline, capable of interacting with the most diverse situations and fields of study. In this sense, anthropological and post-colonial dimensions will be essential for recognizing the arguments outlined. The main question raised throughout this thesis concerns the search for the establishment of a Latin American epistemology of design, which considers the reality of the Global South in the construction of its own theories, methods and practices.

To emphasize the importance of examining design theory and practice from a perspective grounded in our social, political, economic, and cultural reality, I introduce Arturo Escobar's[2] concept of the Pluriverse, which he defines as the possibility of many worlds where different forms of life and knowledge can exist. In this sense, he suggests that it's necessary to design a shift from the dominant, singular worldview of modernity to a Pluriverse of diverse sociocultural arrangements. In his book *Designs for the Pluriverse*, Escobar poses a series of

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1 TUNSTALL, Elizabeth (Dori). Decolonizing Design Innovation: Design, Anthropology, Critical Anthropology, and Indigenous Knowledge. In: RESNICK, E. Social Design Reader. London: Bloomsbury Publishing, 2019. 496p.

2 ESCOBAR, Arturo. Designs for the Pluriverse: Radical Interdependence, Autonomy, and the Making of Worlds. Durham e Londres: Duke University Press Books, 2018. 312p.

thought-provoking questions that I believe are crucial not only for my work but also for design education in Latin America today:

> Does the concept of the pluriverse, and the field of political ontology that attends to it, have future with futures? Or will these concepts, and ontological design itself, become yet more academic endeavor, interesting but defuturing in relation to enabling worlds, knowledges, and lives otherwise? The answer will depend on the extent to which the notions of the pluriverse and political ontology can sustain their effort to disentangle themselves, perhaps not completely but significantly, from modern episteme. (ESCOBAR, 2018, p. 216)

Escobar's emphasis on avoiding the "academic endeavor" is particularly relevant. This thesis seeks to move beyond theoretical abstraction by grounding the development of a Latin American design epistemology in concrete design and education practices, drawing on the principles of transculturation to ensure that this epistemology is both relevant and responsive to the lived realities of the Global South.

Accordingly, the analysis of interdisciplinary issues arising from the relationship between design and education in this work is grounded in the Brazilian and Chilean context. The rationale for this choice stems from my background as a designer, which was largely developed in Brazil. Additionally, my experience studying in Chile during my doctorate degree through the CAPES-Print program has influenced the research to focus on these two Latin American countries. During my eight months in Chile, I immersed myself in the academic context and observed that Brazil and Chile have experienced similar social, political, and economic situations throughout their histories. Although these similarities may not be immediately apparent today, it can be argued that many hegemonic institutional processes have shaped both countries in comparable ways. One significant example is education, which was directly influenced by the *Escola Nova* movement of the early 1900s. This movement established many of the educational standards that are present in both Brazil and Chile until today.

Whereas the title of this thesis encompasses Latin America as a broad framework for this study, the entire experience contextualized and narrated throughout these pages is based on specific lived experiences in Brazil and Chile. In this sense, I appropriated this term because I understand that, in a broad conception, all Latin countries have undergone very similar processes of appropriation.

Research Layout

Given the reflections presented, the following research problem is presented in this thesis: ***Recognizing the historical impact of intellectual colonization on design knowledge, and with the aim of decolonizing design theory and practice in the region, how can collaborative research among Latin American design academics contribute to the articulation of distinct Latin American epistemologies of design, and what are the potential implications of these epistemologies?***

To address the core issue of this thesis, the following key questions have been formulated:
• What academic benefits arise from establishing Latin American epistemologies for design in research and teaching?

• In what ways can interdisciplinary relationships between design and education, when implemented in real-world educational contexts, reshape curricula and methodologies in school environments?

To this end, the object of this research is to cultivate an understanding on the practice of design that is rooted in Latin American contexts, bringing as a central tenet the recognition of our cultural context, advocating for a design approach that is attuned to its history and social reality. Furthermore, it connects with the critical issue of decolonizing knowledge, challenging the enduring impact of intellectual colonization and seeking to establish alternative, more equitable frameworks on design practice. This exploration also highlights collaborative methodologies, recognizing the significant potential for knowledge construction through reciprocal exchanges between students and educators, thereby nurturing a strong sense of collectivity.

Looking at the research problem posed and the guiding questions presented, the main goal of this research is to develop and propose a framework for Latin American epistemologies of design that can be applied in interdisciplinary educational contexts to promote socially relevant and culturally sensitive design practices. To facilitate reflection and guide the pursuit of the central objective, the following specific objectives have been outlined:

1- To investigate, analyze and present various theories, methodologies, and epistemologies of design, focusing on their historical contexts and contemporary relevance;

2- To establish Latin American epistemologies of design by engaging with interdisciplinary fields such as social sciences, anthropology, and post-colonial studies, emphasizing local knowledge and practices;

3- To examine the potential for interdisciplinary relationships between design and education to transform basic education curricula and methodologies, promoting innovative teaching practices that reflect Latin American contexts;

4- To provide practical examples of how the interdisciplinary relationship between design and education can be applied in real-world educational settings through case studies of two specific design projects;

Therefore, the following points aim to justify the relevance of the research in view of the potential interdisciplinary relationships between design and education guided by the Latin American social and cultural context:

• Confront the epistemological gaps in design theories and research by critically challenging the dominant epistemological views of design in Latin American academia, which may be influenced by Eurocentric or Western-centric perspectives;

• Improve educational settings by integrating interdisciplinary perspectives based on design knowledge, promoting innovative pedagogical approaches, and culturally sensitive methodological angles;

• Contribute to a more diverse knowledge of design that can help handle global challenges from a unique perspective when exploring its potential as a tool for tackling social issues in Latin America;

METHOD OVERVIEW			
1st STAGE	**2nd STAGE**	**3rd STAGE**	**4th STAGE**
Literature Review based on the selection of works relevant to the proposed discussion	Thematic Analysis and Critical Examination of literature	Case Study of two projects in Latin American educational settings, guided by Design in Teaching-Learning Situations	Identification of results and possible developments of the research
PURPOSE			
Generate an overview of the emergence of design as a discipline and area of study, bringing its current context and emerging challenges.	Propose a discussion about the need to look at the field of design through Latin American experience and culture, focusing on the interdisciplinary relationship between design and education.	Demonstrate the possibilities of interaction between design and education in schools through examples of two projects in which I participated.	Point out paths for the continuous improvement and deepening of the discussion proposed by the thesis, connected to the advancement of establishing epistemologies of Latin American design and its relation to practical educational settings.
RESEARCH INSTRUMENTS			
Bibliographical research in books, scientific articles and theses in the areas of Design theory and epistemology, education, post-colonial studies, anthropology and social sciences.	Bibliographical research in books, scientific articles and theses in the areas of Design theory and epistemology, education, post-colonial studies, Latin American studies, anthropology and social sciences.	Participant observation, Project guidance for undergraduate students, Interaction with partners, Partnership Design methods.	Research reports and the findings of this thesis.

Table 1: Research Method Overview. Source: Personal archive of the author.

In this *Introduction* I present the theme, problem, guiding questions, general and specific objectives, object, relevance, research methods and techniques and the structure of the dissertation. Furthermore, I provide a general overview of how the main conceptual notes of the thesis are intertwined in the most diverse dimensions.

The second chapter "*A look at Design and its possible approaches*" aims to provide a general overview of the meaning of the word design, from its etymology to its practical application in social, cultural, economic and political contexts. This raises questions about design epistemologies in order to solidify the field's foundation and create opportunities to explore theories that support a broader understanding of the activities that design guides. To gain a more comprehensive understanding of academic perspectives, I intentionally sought out sources from a variety of countries, located in both the Global North and Global South.

The purpose of the third chapter, "*Paving the Way: Establishing Epistemologies of Latin American Design*," was to focus on the research object in order to define potential approaches for structuring a Latin American epistemological perspective. With the collaboration of authors from sociology, anthropology and post-colonial studies, I set myself the challenge of outlining the understanding of Latin America based on the concept of the Global South, and the intrinsic characteristics of this vision. This chapter also focuses on exploring the field of design by examining the need for a shift in its practice toward sustainability, grounded in the concept of the Pluriverse.

The fourth chapter "*Basis for the interdisciplinary relationship between Design and Education*" outlines the possibilities of intertwining between design and education based on the theoretical, historical and epistemological context exposed previously. It explores how basic education processes unfolded in Latin America, focusing on the Brazilian and Chilean realities as examples. To illustrate this construction of the relationship between design and education in practice, I present the methodological development of design at the educational context of Pontifical Catholic University of Rio de Janeiro and in Valparaíso graduation courses.

Chapter five "*When design method and design thinking go to schools: STEAM&Gender and Inventação*" seeks to bring a more focused view on school environments. In order to demonstrate the potential of methods and concepts based on the field of design, I describe in detail two projects that have their roots in the encounter between the two areas. STEAM&Gender, developed at the *Escuela de Arquitectura y Diseño de Valparaíso* and the *Inventação* toy created as a course completion work at PUC-Rio. It seeks to show how the relationships outlined and substantiated throughout the thesis can be practically applied to Latin American education through Design in Teaching-Learning Situations.

The *Final Considerations* revisit the outlined path, highlighting the key insights and proposed developments for continuing this investigation into the growth of interdisciplinary practices at the intersection of design and education. My objective with the deepening of the study of Design in Teaching-Learning Situations is tied to the end of this journey with the experiences I have had over the last 8 years.

This thesis seeks to challenge the epistemological perspective of design prevalent in academia within the Latin American context. As the research unfolds, the reader will join me in a continuous exploration of questions aimed at enhancing the study and research of design in constant interaction with educational settings.

In light of the reflections and theoretical directions presented throughout this introduction, and before delving into the core chapters of the thesis, I find it important to briefly clarify a set of key terms that underpin the narrative and epistemological stance of this work. These terms, though explored in depth and supported by bibliographic references in later chapters, are central to the way I articulate the relationship between design and education within the context of Latin America. Presenting them here, in a simplified and accessible manner, aims to support the reader in navigating the conceptual framework that guides the discussions and proposals that follow.

Brief dictionary of terms:
Although these terms are supported by bibliographic references and are contextualized in specific chapters of the thesis, I present my simple definitions here, prior to the main body of the text, in order to facilitate understanding from the outset of the thesis's narrative construction:

Epistemology → Notion or idea about what is considered valid and prestigious knowledge.

Pluriverse → Possibility of seeing and interpreting the world through multiple ontological perspectives.

Interdisciplinarity → A way of articulating knowledge from more than one field, seeking their intersections and potential for collective action.

Global South → Understanding of the social, political, cultural, or economic dimensions of countries located in the southern hemisphere of the Earth.

Design in Teaching-Learning Situations → Field of study and research line that explores possible interdisciplinary relationships between design and education, focusing on both teaching and learning aspects.

Post-colonial → Refers to theoretical approaches that consider the social, political, cultural, or economic dimensions of the consequences that colonialism (or even imperialism) has had on certain countries or territories.

In addition to the dictionary of terms, the appendix includes visual diagrams designed to help the reader follow the network of authors referenced and connected throughout the theoretical chapters.

2
A look at Design and its possible approaches

This chapter aims to present and discuss the possible theories, methodologies and epistemologies of design in different perspectives and approaches. From a presentation of the historical context of construction of the design activity in a broad way, relevant aspects of its theory and practice are brought forward looking for a better understanding of the scenario established nowadays. Starting with multiple definitions of what design means, from its etymology to the development of approaches already connected to the social, cultural, economic and political contexts of the different realities existing in the world, the discussions seek to weave a panorama for the epistemological construction of this thesis.

Throughout the chapter, essential questions related to the establishment of design theories are raised, pointing out that people's difficulty in grasping the scope of design activities may be based on the lack of existence of well-grounded theories and approaches to design. In order to bring focus to a specific approach, social design was the methodology and practice chosen for a deeper study on how design can play a central role as a mediator of relationships between social groups through their objects and procedural thoughts.

2.1
How do we define Design?

General Panorama

To begin this subchapter about Social Design, it is necessary to take a step back and present a range of design definitions as a subject and research field taking into consideration perspectives of designers from different parts of the world.

Before jumping to the definitions themselves, it is interesting to think about the etymological meaning of the word design - that in English can be used as a noun or a verb. To support this background, I will bring here the definition of Vilém Flusser[3], a Czech-Brazilian philosopher. Self-taught, during World War II fleeing Nazism, he moved to Brazil, settling in São Paulo, where he worked for about 20 years as a philosophy professor, journalist, lecturer and writer. Flusser points that "the word design occurs in a context of cunning and fraud and the designer is, therefore, a malicious schemer dedicated to devising traps" (FLUSSER, p.180):

> In English, the word design works both as a noun and as a verb (a circumstance that characterizes the spirit of the English language very well). As a noun it means, among other things, "purpose", "plan", "intent", "goal", "evil scheme", "conspiracy", "form", "basic

3 FLUSSER, Vilém. "O Mundo Codificado: por uma filosofia do design e da comunicação." Organização Rafael Cardoso. Tradução de Raquel Abi-Sâmara. São Paulo: Cosac Naify, 2007. 224p.

> structure", and all these and other meanings are related "cunning" and "fraud". In the verb situation - to design - it means, among other things, "to plot something", "to simulate", "to project", "to outline", "to configure", "to proceed in a strategic way". The word is of Latin origin and contains the term signum, which means the same as the German word Zeichen ("sign", "design"). And both signum and Zeichen have a common origin. Etymologically, the word design means something like designate (ent-zeichnen). (FLUSSER, p.179)[4]

In his book *The Codified World*, Flusser examines and reflects on images and artifacts, seeking to expand the foundations of a legitimate philosophy of design and visual communication. The analysis generated in his studies brings together design and communication - academically separated, but in Flusser discourses, they are completely tangled - both considered the result of a process of codification of the experience.

When examining the vocabulary that constitutes the vast field of the emergence of the concept and comprehension of design activity, Flusser establishes a correlation between the terms design, machine, technique, and art, while also highlighting their opposing and diverging aspects during the nineteenth century. This, in turn, contributed to the consolidation of these interrelated terms in a fragmented context, which is now perceived as an intrinsic part of the field:

> The words design, machine, technique, ars and Kunst are strongly interrelated; each of the concepts is unthinkable without the others, and they all derive from the same existential perspective on the world. However, this inner connection has been denied for centuries (at least since the Renaissance). Modern, bourgeois culture made an abrupt separation between the world of the arts and the world of technology and machines, so that culture was divided into two branches that were alien to each other: on the one hand, the scientific branch, quantifiable, "hard", and on the other the aesthetic branch, qualifier, "soft". This disastrous separation began to become unsustainable towards the end of the 19th century. The word design entered this gap as a kind of bridge between these two worlds. And that was possible because that word expresses the internal connection between technique and art. And for that reason, design means approximately that place where art and technique (and, consequently, thoughts, evaluative and scientific) walk together, with equal weights, making a new form of culture possible. (FLUSSER, 2007, p.181)

Flusser argues that the concept of design has become central in everyday discourse as we begin to lose faith in art and technique as sources of value, recognizing instead the underlying design that shapes them. His essay *About the Word Design*, aims to uncover the cunning aspects of the word "design," which are often hidden, by following a specific design that highlights these elements. Ultimately, he states that

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4 For ease of reading, all quotations originally written in languages other than English have been freely translated. The original versions can be found in the annex.

everything depends on design, as different designs can lead to distinct yet equally plausible explanations for the current state of the word. To better understand the activity of design and its development and also the professional who works in this area (the designer) I will use a short historical overview outlined by Rafael Cardoso[5], a Brazilian art historian who has focused on studies of the development of design activity in Brazil and worldwide with its complex relations:

> Design was born with the firm purpose of bringing order to the mess of the industrial world. Between the middle of the 18th century and the end of the 19th century - the period that roughly corresponds to the emergence of the factory system in much of Europe and the United States - there was a dizzying increase in the supply of consumer goods, combined with a concomitant fall of its cost, both caused by changes in production organization and technology, transport and distribution systems. Never before in human history have so many people had the opportunity to buy so many things. It was the infancy of the consumer society. For many observers, at the time, the process would have generated a worrying decline in the quality and beauty of the products. Right or wrong (which is far more likely), this perception served as a spur to action. Artists, architects, reformers and bureaucrats, industrial governments, commercial and professional associations, museums and educational institutions entered the field, with the aim of improving the taste of the population and the configuration of the goods that were offered to them. The activities of designing and manufacturing artifacts, carried out for a long time in relative silence, migrated to the center of political, economic and social debates. (CARDOSO, 2012, p.15)

In his book *Design for a Complex World*, Rafael Cardoso brings back Victor Papanek's reflection about the world we have been designing to and what aspects of design should be looked at more carefully. The author directs his attention towards the progression of the human-machine relationship beyond the scope of designed objects. Throughout his literary work, he focuses on the notions of form, function and meaning and demonstrates how human beings' relationship with things is defined by their instability. Beyond that, he critically examines the perceptions, understandings, and production methods of these complex relationships within the contemporary world we inhabit. He argues that the real-world context described by Papanek no longer exists today. Due to the Information Age, relationships involving manufacturing, distribution, and finance are becoming increasingly intertwined with the immaterial world, in which design is involved.

Cardoso also took care to delve into the praxis of design activity in its early stages, pointing out the notion that shaped the elaboration of the practical field of study and teaching of design in the Global North, the famous principle "form follows function", endorsed by the most famous schools of design in the world: the Bauhaus and the School of Ulm:

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5 CARDOSO, Rafael. Design para um mundo complexo. São Paulo: Cosac Naify, 2012. 264p.

> Between 1850 and 1930, approximately, three generations of new professionals - some already called designers - dedicated their efforts to the immense task of conforming the structure and appearance of artifacts so that they were more attractive and efficient. His goal was nothing less than to reconfigure the world, with comfort and well-being for all. Their motto was fitness of objects for their purpose: fitness for purpose, in English, or Zweckmässigkeit, in German (the first major discussions on the subject were conducted in German and English). At about the end of this period, around the 1930s, the most popular motto among us became popular: "form follows function", a condensed phrase from a distant utterance by the American architect Louis Sullivan. The view that "form" and "function" were at the heart of a designer's concerns persisted for a long time. (CARDOSO, 2012, p.16)

In the midst of what was initially established by design in the world, Cardoso defends the idea that designers need to work collectively to find better solutions to the issues we are currently facing. He states that the world is a system of interconnected networks and that it is very difficult to build anything that escapes the artificial system we live in.

Returning to the idea of complexity, to another period in history and moving further to the construction of the analytical panorama of this thesis, I will look at the contributions of Richard Buchanan[6]. North American Professor at the Department of Design & Innovation, Weatherhead School of Management, and editor of Design Issues: A Journal of Design History Theory Criticism published by MIT Press. In his article *Wicked Problems in Design Thinking*, published in the book *Social Design Reader*, he states that "No single definition of design, or branches of professionalized practice such as industrial or graphic design, adequately covers the diversity of ideas and methods gathered together under the label. (BUCHANAN, p.117)". Buchanan relates the emergence of Design Thinking in the twentieth century with the concern to connect scientific and artistic knowledge in order to address problems and purposes of the present. In this context, he also questions the need to seek for a scientific basis for design - a requirement imposed by the neo-positivist project.

Going further in his reflection, Professor Buchanan brings up Horst Rittel, a mathematician, designer and former teacher at the *Hochschule für Gestaltung (HfG) Ulm*, who formulated the wicked problems approach:

> Rittel sought an alternative to the linear, step-by-step model of the design process being explored by many designers and design theorists. Although there are many variations of the linear model, its proponents hold that the design process is divided into two distinct phases: problem definition and problem solution. Problem definition is an analytic sequence in which the designer determines all of the elements of the problem and specifies all

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6 BUCHANAN, Richard. Wicked Problems in Design Thinking. In: RESNICK, E. Social Design Reader. London: Bloomsbury Publishing, 2019. 496p.

> of the requirements that a successful design solution must have. Problem solution is a synthetic sequence in which the various requirements are combined and balanced against each other, yielding a final plan to be carried into production. (BUCHANAN, 2019, p.125)

According to Rittel, most problems addressed by designers are wicked problems. He criticizes the fact that many designers look at its process with a linear angle, assuming that the design process has a logical understanding. Buchanan navigates through the aspects involved in the linear (or logical) model to perceive the design process, and highlights Rittel's thoughts through the concepts of determinacy and indeterminacy:

> As described in the first published report of Rittel's idea, wicked problems are a "class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflict values, and where the ramifications in the whole system are thoroughly confusing." This is an amusing description of what confronts designers in every new situation. But most important, it points toward a fundamental issue that lies behind practice: the relationship between determinacy and indeterminacy in design thinking. The linear model of design thinking is based on determinate problems which have definite conditions. The designer's task is to identify those conditions precisely and then calculate a solution. In contrast, the wicked-problems approach suggests that there is a fundamental indeterminacy in all the most trivial design problems - problems where, as Rittel suggests, the "wickedness" has already been taken out to yield determinate or analytic problems. (BUCHANAN, 2019, p.126)

To tie this reflection with the general overview of how we can define design, Buchanan asks himself why no designers that have studied wicked problems have attempted to answer the question: "Why are design problems indeterminate and, therefore, wicked?. He concludes his article saying that it might be related to the lack of well-grounded theories of design and the fact that the wicked problems can represent a description of the social reality we are inserted into, as he says "design thinking may be applied to any area of human experience." (p.127)

In order to delve deeper into this scenario and continue discussing design definitions, it is opportune to mention the panorama outlined by Ahmed Ansari[7], an Indian researcher and Professor at New York University, in his article *Global Methods, Local Designs* to raise questions about a theory of design itself.

> Subsequent generations of thinkers on design began to turn to the analysis of specific aspects of creative problem solving as observed in the process of expert practitioners in order to propose better, more flexible models of what designerly activity was. This led to the emergence of the term "design thinking," form Nigel Cross with his designerly ways of knowing based around design codes and object languages (Cross,

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7 ANSARI, Ahmed. Global Methods, Local Designs. In: RESNICK, E. Social Design Reader. London: Bloomsbury Publishing, 2019. 496p.

> 1982), to Donald Schön's observation of design as a reflective practice, constituted as a dialectic between the designer and his materials (Schön, 1983), to Horst Rittel's view of design as a process of argumentation (Rittel, 1988). Cross, tracing the history of the Methods Movement and its practice of design as science down to Schön and arguing for design as an interdisciplinary practice uniquely concerned with the artificial world, concluded that in order to establish design practice as embodying its own epistemologies "we must avoid swamping our design research with different cultures imported either from the sciences or the arts" (Cross, 2001, p.55). (ANSARI, 2019, p.418)

By raising Cross and Schön's views on the practice of design, Ansari questions a very pertinent conclusion in relation to design's own epistemologies, reinforcing Cross's position, that it is necessary to avoid that research methods in design are imported from the arts and science. This is evidently connected to the fact that, being an applied social science, epistemologies and theories of design necessarily come from the intersection of theories and practices of science and art. However, what is being said here is that in order to become a theory from design itself, it is important that the context in which they are being formulated are taken into account, that is, the social context in which we live and practice design.

To better illustrate this relationship, I am looking to Professor Clive Dilnot[8] of Parsons The New School for Design in his article *Design as a Socially Significant Activity*:

> The antithetical models of design's significance that we possess today, all of which contain implicitly or explicitly a view that sees design as merely the activity of commodity shaping, or the view that sees design as the activity which allows us to organize consciously the meeting of material human needs - which 'involve things or usable products' - in forms consonant with and conductive to particular kinds of social relations or ways of life… contains also, naturally, a view of what design is. The two are internal relation to one another: views of design imply notions as to what design is socially and vice versa. Debates as to the 'nature of design' thus have consequences for 'pure' design theory and for design method. In a context where design debate, narrowly conceived, seems to be meeting with little success in evaluating design's social import, the questions raised - is design the means whereby we can shape future socio-technological systems? - become a means to general design understanding. The key to the latter now appears to be in understanding, both structurally and historically, the relations involved in what is misleadingly termed 'design-and-society'. (DILNOT, 2019, p.64)

In this excerpt, Dilnot brings up the activity that gave rise to the field of design - as we know today-, the production of objects and artifacts, which has evolved over

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8 DILNOT, Clive. Design as a Socially Significant Activity. In: RESNICK, E. Social Design Reader. London: Bloomsbury Publishing, 2019. 496p.

time in line with our social development. In the face of a highly connected world, it is essential that design is necessarily understood as an interdisciplinary area of study, with its own methods, theories and visions.

Social Design

> Any serious inquiry into contemporary design must be a journey into the trials and tribulations of capitalism and modernity, from the birth of industrialism to cutting-edge globalization and technological development. This is of course beyond the reach of this short book, yet some general remarks are in order. Design has doubtlessly been a central political technology of modernity. Regardless of where one situates the origin of design - whether with the first use of tools by early humans, the budding technological imagination of the Renaissance, the Industrial Revolution, or nineteenth-century modernism - the fact remains that as an aspect of everyday life design takes off with modernity. Why? Because only with modernity, particularly after the end of the eighteenth century, did societies become thoroughly pervaded by expert knowledges and discourses and transformed by them. (ESCOBAR, 2018, p.32)

This section begins with one of the numerous questions raised by Arturo Escobar in his book *Designs for the Pluriverse: Radical Interdependence, Autonomy, and the Making of Worlds*. Escobar is a Colombian-American anthropologist and Professor Emeritus of Anthropology at the University of North Carolina at Chapel Hill in the United States, who argues and defends throughout his book the need for society to develop taking into consideration the multiple onto-epistemic formations of the Global South.

When building the scenario to present the context in which he dives to explain his viewpoint on that need, Escobar claims that society needs to liberate design from the Eurocentric world of the North's understanding of progress.

> A new design dream was overtaking the world; we are still engulfed by it, even though, for many, as for the Earth itself, the dream has increasingly turned into a nightmare. What the United Nations envisioned was sweeping "elimination design" (Fry 2011) of its own, aimed literally at scrapping the vernacular design and endogenous practices that for centuries had nourished, for better or worse, the lives of millions throughout the centuries. Almost overnight, a diverse range of rich and vibrant traditions were reduced to being with, literally, nothing: nondescript manifestations of an allegedly indubitable fact, "underdevelopment". Yet this dream made perfect sense to millions and was embraced by elites almost worldwide. Such was the power of this design imagination. (ESCOBAR, 2018, pg.6)

To add another layer to this introduction on Social Design, I will set here the perspective on which the entire reflection has been based: the multiple understandings and possible approaches for design methods and research, focusing on its cultural,

political, social and economic relations. As Boaventura de Sousa Santos[9] sets in the introduction of his book *Epistemologies of the South*, "[...] social relations are always cultural (intra-cultural or inter-cultural) and political (they represent unequal distributions of power)" (SANTOS, p.9, 2010). Looking at all the definitions presented and insofar comprehending other aspects of this multiple onto-epistemic context, it is possible to say that design is a socially significant activity.

This intrinsic characteristic of design approach has already been introduced and defined by Victor Papanek[10] in 1971, when he argued that design should undoubtedly be a tool to meet people's needs instead of their wants in his most famous book *Design for the Real World*. He defends the importance for designers to live a specific social context in order to create and develop products that meet those specific needs:

> There are many ways of working for the needs of underdeveloped and emergent countries:
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> 1. [...] The simplest, most often employed, and probably shabbiest is for the designer to sit in his New York, London or Stockholm office and to design things to be made in Tanzania. Souvenirlike objects are then manufactured, using native materials and skills, with the hope that they will sell in developed countries.
>
> 2. A second and only slightly more effective way for the designer to participate would be to spend some time in the underdeveloped country developing design really suited the needs of the people there. This still begs the question of meaningful engagement, since short-term experts can't become involved long enough or deeply enough to fully understand local customs and needs.
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> 3. A somewhat better way is to move the designer to the underdeveloped country and have him train designers there, as well as designing and working out the logistics of design needs for that nation. Still far from ideal, this version tends to tie the country too closely to the particular design ideology - and design idiosyncrasies - the particular designer represents.
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> 4. Ideally (as things stand now), the designer would move to the country and do all the things indicated above. But in addition, he would also train designers to train designers. In other words he would become a "seed project" helping to form a corps of able designers out of the indigenous population of the country. Thus within one generation at most, five years at least, he would be able to create a group of designers firmly committed to their own cultural heritage, their own life-style, and their own needs. (PAPANEK, 1973, p.85)

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9 SANTOS, Boaventura de Sousa; MENESES, Maria Paula [orgs]. Epistemologias do Sul. São Paulo: Cortez, 2010. 637p.

10 PAPANEK, V. Design for the real world. New York: Bantam, 1973. 394p.

In the modern and connected world, Social Design has been an area in expansion. One of its first pillars, presented by Papanek, was related to designing for people in underdeveloped countries. That perspective was part of the emergence of the idea on the essential aspects of what it means to design with social responsibility, taking into consideration the cultural, political and economic background of both the Global North and South.

The design activity can be perceived today in many different ways. The fact that its tools and methods can be used in multiple contexts opens up a path to understand all the possible ways to create interactions between social groups. In his book *Design When Everybody Designs*, Ezio Manzini[11], an Italian academic, author and awarded professor, defines social design:

> In its original meaning, social design is a design activity that deals with problems that are not dealt with or by the market or by the state, and in which the people involved do not normally have a voice (for the simple reason that they do not have the economic or political means to generate a formal demand). From here arises the noble ethical nature of social design. But also its limit: if the people involved in these socially sensitive issues do not express a formal demand, neither can they sustain the costs of design; and therefore design experts must work for free, in a charity mode (in some cases, they can work for a charity organization and be paid for that; however, this occurs within the framework of initiatives that, on the whole, are charitable in nature). By implication, there is a normal design that operates in economic terms, and another that is promoted out of ethical motivations and in a charity mode. Thus social design is intrinsically a complementary activity: a design that, to exist, asks for someone else who can and will generously pay for it. (MANZINI, 2015, p.65)

When a more open and participatory process of designing started to become academically accepted and practiced by professors around the world, its fields of action have spread to outside of the industry. In this way, more society-oriented approaches began to take shape and develop alongside the scope of traditional design. As Dilnot puts it clearly, “design is a complex, multi-dimensional activity achieved through forming at once a mode of knowing the world which is at the same time also a mode of acting in the world.” (p.69).

By better unraveling the complexity of the countless design actions, Dilnot also points out the relationships between practice and theory, technique and communication, social and cultural, political and economic:

> This acting knowing unifies the purpositive-instrumental and communicative-symbolic impulses in praxis (in that it is unique). This models, too, the complex interactive relation of subject and object privileging neither pole. Discursively design unites two discursive

11 MANZINI, Ezio. Design When Everybody Designs: an introduction to design for social innovation (design thinking, design theory). Londres: MIT Press, 2015. 256p.

> worlds (that of technique - science and that of communication - understanding) normally held apart in the alienated world. In relation to, for example, technological systems, design posits a means of overcoming control problems since it posits a means of knowing-practice which incorporates the technical as a moment and which can itself thus internally incorporate social requirements (no other mode of knowledge practice can do this). Politically this has clear significance. Design becomes the means for ordering the social-technical world in a manner compatible with socio-cultural and technical-economic ends; the means for forming, literally, future society in a manner at once desired and yet internally dialectically related to actuality requirements. Socially, design models as a practical transformative. Practically, design becomes the means whereby we can change (transform) society in accordance simultaneously with what is desired and the reality principle. (DILNOT, 2019, p.69)

In Brazil, a country considered by the center of capitalism as underdeveloped and part of the Third World, a social approach of design has been established and developed in some teaching and learning contexts such as universities. Taking the focus away from the creation of a product itself - be it graphics, an object, an interactive installation or a service - Social Design presupposes the formation of bonds between the designer and a specific social group. Unlike the context in which it emerged and was consolidated as a practice, Social Design has an intrinsic characteristic of working with the other and takes into account the daily activities of that other in the social, economic and cultural scenario in which they are.

> Social, all Design is, say some. And truth. But design aimed at social issues is much more than this. It has limits, and when working in this field, it is mandatory to know deeply the people with and for whom the designer is projecting, as well as paying attention to its real needs and desires. In the scope of Social Design, it is necessary to have the ability to exchange feelings and experiences with people, placing yourself, as far as possible, in the same situation they are, doing what they do and the way they do it. In all cases, it is necessary to have a holistic view of the variables that make up the design problem. (COUTO, 2017, p.31)

As has been discussed throughout this chapter, the search for a design identity pervades any previously established approach. Social Design, in turn, can also be understood as a possibility of interaction between different groups, which are constantly looking for an expansion of their realities. Due to intrinsically interdisciplinary characteristics, it is possible to identify the complexity of existing cultural systems, recognizing how from design processes and designer views the potential of a community can be explored and developed. According to Gui Bonsiepe[12], a german design academic graduated by *Hochschule für Gestaltung*, known in Brazil as The Ulm School, brings in his book *Design, Culture e Society*, how identity in design can be understood:

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12 BONSIEPE, Gui. Design, Cultura e Sociedade. São Paulo: Blucher, 2011. 270p.

> To understand the meaning of an identity, it is recommended to make a list of its different manifestations. The identity of the design materializes as follows:
> Design materialization modes
> 1. In the form of a group of formal or chromatic features (stilemi);
> 2. In the structure of the taxonomy of products, that is to say, the types of products characteristic of a culture, for example, a head gourd that was created in the Guarani culture;
> 3. In the use of local materials and corresponding manufacturing methods;
> 4. In the application of a specific design method (empathy for a tradition and use of these attributes rooted in a given region);
> 5. In the specific theme (need) of the context. (BONSIEPE, 2011, p.64)

Taking into account what was pointed out by Bonsiepe in relation to how design can materialize the creation of identities, it is possible to place Social Design as a great promoter of identity practices. From the moment it looks at a social group, it interacts with it, identifies knowledge and skills and applies design construction processes with the aim of enhancing the professional development of this same group. Looking at the competences of the designer itself, Rita Couto[13] also defines its characteristics based on the Social Design lens:

> The designer is a professional who is concerned with understanding the way of life and with the projects it develops with and for human beings. It recognizes diversity, the identity of people, understands its limits and its potentialities. He is a professional who must be able to understand the various paths that can take a solution and to foresee its consequences in a natural environment and in a peculiar cultural system. (COUTO, 2017, p. 31)

With the panorama of the numerous views and interpretations of design established in this discussion, at this point it is important to add another layer of characteristics that make up the complex system in which design is inserted.

It is up to the debate proposed by this academic research to understand the different manners and contexts with which design can relate in an interdisciplinary way with education. However, before delving into these more specific issues, it is necessary to pave the way by seeking to broaden the horizon of understanding of the concept of interdisciplinarity, so that these relationships can be better articulated based on it.

2.2
The interdisciplinary vocation of design

What is interdisciplinarity?

The concept of interdisciplinarity, according to Hilton Japiassu[14] (1976), “has a

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13 COUTO, R. M. de S., PORTUGAL, Cristina. Reflexões sobre Design, Cultura Visual e Educação na pós-modernidade. In: ENCUENTRO LATINOAMERICANO DE DISEÑO EN PALERMO, VI, 2011, Buenos Aires.

14 JAPIASSÚ, Hilton. Interdisciplinaridade e patologia do saber. Rio de Janeiro: Imago, 1976. 220p.

double origin: an intern one - that has as its fundamental characteristics the general relocation of the sciences systems, which follows its progress and settling - and an extern one, characterized by the increasingly extensive mobilization of knowledge converging in view of action." (p.42)

In the classic Greek world, philosophers were also mathematicians, politicians were also actors, and the dynamics of economic, social and academic life was based on the emergence of the polis. This organization of what we can consider the first cities of the Occident, shaped our modern perception of the world. The Greeks demystified the world through reason from a philosophical thinking and instituted the quest for wisdom.

Many years after that, especially from the 19th century on after the Industrial Revolution and the invention of multiple technologies, the world developed in a complex way and knowledge began to be categorized and divided into several areas. Before jumping into the definition of interdisciplinarity, it is necessary to state Japiassu's definition of what is a discipline or even more, disciplinarity:

> [...] What we can understand by discipline and disciplinarity is this progressive scientific exploration specialized in a certain area or homogeneous domain of study. A discipline must, first of all, establish and define its constituent boundaries. These boundaries will determine its material and formal objects, its methods and systems, its concepts and theories. (JAPIASSU, 1976, p.61)

The definition of boundaries between disciplines has as one of its most important consequences the development of many epistemologies and ways of understanding the world over the lens of fragmentation. As Japiassu discusses in his book *Interdisciplinarity and the pathology of knowledge*, "the exaggerated and limitless specialization of scientific disciplines increasingly culminates in a growing fragmentation of the epistemological horizon" (p.61).

Taking this context into account, it is possible to say that interdisciplinarity is the interaction between disciplines which operates both in theory and in practice:

> First of all, it appears as an individual practice: it is fundamentally an attitude of mind, made up of curiosity, openness, a sense of discovery, a desire to enrich oneself with new approaches, a taste for combinations of perspectives and conviction leading to the desire to overcome the beaten path. As an individual practice, interdisciplinarity cannot be learned, it can only be exercised. It is the result of continuous training, of a systematic tuning of mental structures. Second, interdisciplinarity appears as a collective practice. (JAPIASSU, 1976, p.82)

It is possible to see how the fragmentation of knowledge has developed itself in schools and universities based on the methods used by traditional epistemologies. The transmission of content divided into specific subjects that do not interact with each other, highlights the tendency of looking into students in a unilateral and determined perspective: that they are all boxes in blank waiting for knowledge to be deposited.

As reported by Ivani Fazenda[15] (1994), Brazilian educator and scholar, renowned for her pioneering work on interdisciplinarity in education, the limited view of disciplinarity prevents the possibility of a multiple perspectives of a classroom and the interdisciplinary transgression of those rigid paradigms is essential to the evolution of school science:

> The construction of an interdisciplinary didactics is based on the possibility of effecting intersubjective exchanges. In this sense, the role and posture of the teaching professional that seeks to promote any type of intervention with teachers, with a view to building a transformative or interdisciplinary didactics, should promote this possibility of exchanges, stimulate self-knowledge about the practice of each student and contribute to the expansion of the reading of undisclosed aspects of everyday practices. (FAZENDA,1994)

Going deeper on what the author discusses in her book *Interdisciplinarity: history, theory and research*, interdisciplinarity is about communication and participation. A participative group of students are the ones who have a learning environment that is based on an exchange of knowledge and experiences that should be guided by the teacher.

Fazenda (1994) also highlights the need to "desorganize what is organized by traditional didactics". She points out that a transformative didactics goes through interdisciplinarity and all the topics and subjects shared by teachers in their daily routines:

> The interdisciplinary methodology in its exercise requires, as a presupposition, a special attitude towards knowledge, which is evidenced in the recognition of competences, incompetencies, possibilities and limits of the discipline itself and its agents, in the sufficient knowledge and appreciation of other disciplines and of those that sustain. In this sense, it is essential to have qualified individuals to choose the best form and meaning of participation and, above all, to recognize the provisional nature of the positions taken, in the questioning procedure. (FAZENDA, 1994)

With this scenario, it is possible to state that approaches that take into consideration interdisciplinary methodologies and consequently epistemologies can be better explored within learning contexts. By defining what I am considering to be interdisciplinarity in this thesis, I will move to a further discussion of the relationship between the fragmentation of thought, systemic perspectives of the world and why is design a potential area to create connections with other fields.

The fragmentation of thought and the need for a systemic view

> Today, faced with the realities of a world transformed by a changing

15 FAZENDA, Ivani. Interdisciplinaridade: História, teoria e pesquisa. 11a Edição. Campinas: Papirus, 2003. 143 p.

> climate, humans are confronted with the irrefutable need to confront the design disaster that development is, and hence to engage in another type of elimination design, this time of the structures of unsustainability that maintain the dominant ontology of devastation. The collective determination toward transitions, broadly understood, may be seen as a response to the urge for innovation and the creation of new non exploitative forms of life, out of the dreams, desires, and struggles of so many groups and peoples worldwide. Could it be that another design imagination, this time more radical and constructive, is emerging? Might a new breed of designers come to be thought of as transition activists? (ESCOBAR, 2018, p. 6)

This discussion aims to bring an overview of the many reasons why design can be considered as a subject that is intrinsically interdisciplinary. Modern analysis about how designers should treat their tasks are related to systemic perspectives of the world, highlighting the ability of designers to transit in between many fields.

In the twenty-first century our biggest social challenge might be to clarify to people the connection established with our behavior and the environmental disasters that are happening more frequently every year. This behavior is linked to the way we see the world - as an infinite resource provider - and the way capitalism developed after the Industrial Revolution.

As Victor Papanek emphasizes at the beginning of his 1971 book *Design for the Real World*, design plays a significant role in shaping this perception, even if that role may not yet be immediately apparent:

> There are professions more harmful than industrial design, but only a very few of them. And possibly only one profession is phonier. Advertising design, in persuading people to buy things they don't need, with money they don't have, in order to impress others who don't care, is probably the phoniest field in existence today. Industrial design, by concocting the tawdry idiocies hawked by advertisers, comes a close second. Never before in history have grown men sat down and seriously designed electric hairbrushes, rhinestone-covered shoe horns, and mink carpeting bathrooms, and then drawn up elaborate plans to make and sell these gadgets to millions of people. (PAPANEK, 1973, p. ix)

It is possible to state that since Papanek brought the discussion about designing for real needs, real contexts and real groups of people, design has become an area of multiple methodological and political approaches. Directly related as an important player of the fragmentation of thought, it can also be seen as a connecting channel between resources and areas.

The understanding of what design is or should be in the modern world, runs through its practical application in various situations. It is most common to hear people define designers as a profession directly associated with "making things look nicer" or "giving a lift to a product". This kind of thought can be related to a remnant of the Industrial Revolution, where this was one of the only functions of designers.

As time passed and people like Professor Papanek started questioning this behavior, design migrated from being only a way to make things look more beautiful and started being considered a field where science and art are put together. Moreover, in the ultra connected world we live in today, there are many other mindsets that shape our perception of what design is and should be as a territory where practice and theory go together:

> The global boom of design with postmodernism and globalization has certainly had its ups and downs, its high and low moments. Reflections on design by its theorists and practitioners over the past decade, however, converge on some realizations and novel emphases. The first is the ubiquity of design - design is literally everywhere; from the largest structures to the humblest aspects of everyday life, modern lives are thoroughly designed lives. Second, social context is important for successful design, well beyond products' functional or commercial applications, or for effective services. Third, ecologically oriented fields in particular have realized design's vital role in creating a more livable world, with the concomitant need to come up with types of design that make a difference. The fourth signals what is perhaps the most radical change: the need to take seriously the notion of everybody designs, leading to a whole range of proposals for ethnographic, participatory, and collaborative design, and indeed a rethinking of the entire concept of design, "when everybody designs", as Italian design theorist and practitioner Ezio Manzini (2015) pronounced in the very title of his most recent, and compelling, book. (ESCOBAR, 2018, p.2)

Bringing back the educational context that was being woven earlier in this discussion, at this point it is possible to start creating connections between the many perspectives a learning environment can be built. Considering that schools can be spaces where knowledge is built in a participatory and collaborative way, the notion of connectivity (not necessarily a digital one) becomes present in this background.

Paulo Freire[16], a Brazilian educator and philosopher, states in his work a pedagogical way of treating knowledge built on the autonomy of students. Known as one of the most notable thinkers in the history of world pedagogy, Freire has influenced the movement called critical pedagogy.

In his book *Pedagogy of Autonomy* he discusses how education cannot be neutral, taking into consideration that people would never agree on individual and social ways of life, on the political style to be put into practice, on the values to be embodied:

> For education not to be a political form of intervention in the world, it was essential that the world in which it took place was not human. There is a total incompatibility between the human world of speech, perception, intelligibility, communicability, action, observation, comparison, verification, search, choice, decision, rupture, ethics and the possibility of your transgression and the neutrality of no matter what. (FREIRE, 1996, p. 109)

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16 FREIRE, Paulo. Pedagogia da autonomia: saberes necessários à prática educativa. São Paulo: Paz e Terra, 2004. 143p.

In this sense, the importance of showing students that what is learned in one subject is connected to another is essential. Therefore, the need to encourage the development of critical thinking at school becomes fundamental for people to perceive themselves as part of this larger organism that is planet Earth. The teacher's role then becomes necessary for this notion to be put into practice throughout a person's formative years, showing the student that their attitudes are part of this ecosystem:

> The democratic, coherent, competent teacher, who testifies to her zest for life, her hope for a better world, who attests to her fighting capacity, her respect for differences, knows more and more the value she has for changing reality, the consistent way with which he lives his presence in the world, that his experience at school is just a moment, but an important moment that needs to be lived authentically. (FREIRE, 1996, p.110)

The fragmentation of thought and the way it unfolded in the understanding of social processes permeates the construction of design and education as areas of articulation of knowledge, skills, attitudes and awareness. In this way, the role of the teacher - whether at school or at the university - is fundamental for the development of the student's critical thinking:

To continue deepening the construction of this reflection, I bring back more questions from Arturo Escobar, who aims, in his book *Designs for the Pluriverse*, to infer the positioning of designers about the importance of building a transition to a new look in their practice:

> Do design practices participate in the sociology of absences by overlooking nonexpert subaltern knowledges or by treating them as unable to provide the basis for other designs and design otherwise? Or by measuring productivity and efficiency through the monocultural yardstick of market economics? Conversely, can design practice contribute to broadening, and drawing on, the rich spectrum of experiences that should be considered viable alternative to what exists? (ESCOBAR, 2018, p. 68)

In the following pages, I intend to complete the framework of this initial theoretical background on design, interdisciplinarity and education so that we can move forward in the discussion of new possible scenarios for the development of their practical and theoretical relationships when seeking for Latin American epistemologies.

Why is design a vast field for dialoguing with other areas

From the reflection in this chapter, it can be said that design is built as an interdisciplinary area of study and practice, since it is concerned with the construction of systems and languages in face of the most diverse social, cultural, political and economic scenarios.

The "information age" has arrived for everyone – through fundamental changes in manufacturing, distribution and finance systems – and not just for those with personal computers at home. As the virtual world grows in scope, reality seems to melt into thin air. In a word, the "immaterial" has become the decisive factor in

almost all domains, especially in an area such as design. (CARDOSO, p.20, 2011).

In the search for a definition of epistemologies and methodologies for design, Ansari (2019) discusses and points out the transition from its role of producing and maintaining capitalism in agencies and consultancies, to a scenario where social relations are built. In this way, a precedent is opened for the understanding of design as intrinsically interdisciplinary, in the sense of possibly becoming an important articulator of thought and design processes in any area of knowledge:

> It is worth nothing, therefore, that "design methods" and "design thinking" emerged initially as diametrically opposed concepts: one prescribed an approach modeling itself along the formalized, rules, and procedures based epistemological structures of the sciences, the other sought to claim an approach peculiar to design and the arts, rooted in pattern sensing, reflexivity, intuitively and experientially informed judgment, rhetoric and discourse, etcetera. It is also worth noting that there was a distinction, albeit a subtle one, that the thinking or episteme of design practice was something that found its articulation in, but importantly, was not reducible to, its methodologies and processes. However, today, it seems that both methods and thinking have undergone a definitional synthesis, enjoying a joint heyday within contemporary professional practice, particularly as a design practice moved out of the realm of design agencies and consultancies to become a principal instrument of humanitarian organizations seeking to employ designerly practices in their own repertoires. (ANSARI, 2019, p. 418)

This thesis seeks to define the context in which Design in Teaching-Learning Situations takes place, based on the vision of a design with enormous potential for action in educational environments. The proposals for educational approaches guided by an interdisciplinary lens that establishes the relationship between Design and Education, allow a greater dialogue between teachers and students in classroom activities. The possibility the student has to contribute throughout the learning process is essential so that the content increasingly approaches their daily lives, encouraging them to participate and actively contribute to what is being discussed.

Adopting this viewpoint, Design emerges as a highly promising domain for enhancing pedagogical practices by facilitating individuals to connect their personal experiences with the surrounding environment. With that being said, it can be considered a great articulator of knowledge and creativity that, based on observations and experiments, can propose a more active and participatory teaching environment.

Interdisciplinarity then appears as a tool for building these more interactive spaces, based on the principle that the experiences of people who are within a learning environment have a lot to contribute with the content being discussed. Therefore, Ivani Fazenda calls into question the difficulties and differences of educational spaces that give importance to teaching based on interdisciplinarity:

> There are very few educational institutions that welcome committed teachers, who value their work, also providing the necessary infrastructure for their execution. In these few institutions we always

> find the germ of interdisciplinary teaching projects, in which the keynote is dialogue, and the mark, encounter, reciprocity. They are the "niches" where the successful teacher can anchor himself. They are fertile lands, where the seed of interdisciplinarity can take root, grow and bear fruit. These are institutions that already have a proposal for exchange, for co-participation, which is why they respect the work of successful teachers, as they believe that their personal project, born inside their classroom, can be gradually extended to their students and to the institution as a whole. (FAZENDA, 1994)

Aspects such as investigation and experimentation are essential in bringing Design and Education together, allowing teaching models and rules to be deconstructed and new dynamics to be tested. The subjectivity of the joint construction of knowledge by students and teachers also plays an essential role in the interest in learning on the part of students, since there is a greater identification of their importance as a thinking being within a classroom.

> The greatest contradiction I found was the indiscriminate proliferation of intuitive practices, as educators realized that it is no longer possible to hide the fact that interdisciplinarity constitutes the primary requirement of the current proposal for knowledge and education. The contemporary revision of the concept of science guides us towards the demand for a new conscience, which is not based only on objectivity, but which assumes subjectivity in all its contradictions. (FAZENDA, 1994)

It is possible to conclude that the practice of Design in Teaching-Learning Situations allows designers to deal with complex problems and understand how they can actively participate in the development of interdisciplinary processes and methodologies in the educational context. In addition to discussions about design theories and methodologies, its interdisciplinary characteristics and the understanding of the ways in which design can act in teaching-learning situations, this research also proposes to raise questions about the construction of these relationships from a epistemological perspective based on cultural understandings of Latin America and its strong influence on the construction of the notion of the Global South.

2.3
Chapter findings

The reflections and discussions conducted throughout this chapter allow us to consolidate a basis for the future articulation proposed by this work. As presented by a series of authors and thinkers, design processes built through social interactions enable the possibility of analyzing real contexts, based on specific cultural, economic and political characteristics. In this sense, pondering on a single world in which collaborative constructions take place guided by design methodologies does not seem enough to me.

In just a few decades of existence, design has proven to be potentially destructive and constructive on the same level. I believe that our current reflection as professionals

in the field should be where do we want to take the potential and challenges of the discipline. Do we want to continue repeating practices that have already proven to be ineffective? Or would we prefer to think about the interconnected system that is the world and its abundant nature?

As Arturo Escobar reinforces, it is essential that we understand that the world is a single living organism and that when tipping the scales in one direction, the other becomes unbalanced. Still, each territory needs to be looked at and worked on based on its uniqueness and specific needs. Therefore, proposing design-led approaches to solving complex problems in education based on a systemic vision means understanding design as an intrinsically interdisciplinary area of study.

Now that many of the customs that we repeat countless times without raising questions have been highlighted, it is possible to take a step forward to understand how different perspectives, methodologies and approaches to design exist, essentially related to other disciplines. In this way, it is possible to take control of this discourse and practice to create the parameters that make sense for our particular reality.

Recognizing that it is crucial to create a foundation for organizing and integrating the complex ideas surrounding the interdisciplinary relationship between design and education, the next chapter aims to deepen the level of detail and information brought about the possible paths to comprehension of southern epistemologies. It focuses on exploring the potential routes in establishing Latin American perspectives of design, navigating through its transitions in the construction of what Arturo Escobar named Pluriverse, which guide and create parameters for the exercise of design by professionals from our territory.

3
Paving the way: Establishing epistemologies of Latin American Design

The third chapter of this thesis builds from the ground up the paths for understanding and developing what are the possible Latin American epistemologies of design. To achieve this, it is relevant to search for this notion in dialogue with other areas of knowledge such as social sciences, anthropology and post-colonial studies. In this sense, Boaventura de Sousa Santos helps us institute and affirm the importance of looking at the world and things through the lens of "the South", in collaboration with Gayatri Spivak, who now crosses borders for an even greater search for interdisciplinarity of her contributions and studies. Furthermore, the views of Juan José Bautista, Marisol de la Cadena and Mario Blaser, complete this discussion through thinking from Latin America.

The intense search for recognizing ourselves as designers from the South goes through assimilation with a possible transition to a context of greater sustainability in the development of the activity in theoretical and practical scopes. The concept of Pluriverse amplified here by Arturo Escobar articulated with Terry Irwin's studies on Transition Design, added to the historical panorama of Victor Papanek, provide the backdrop for us to raise questions about epistemological constructions of design guided in Latin American territory.

3.1
Shifting the central axis of knowledge production

Building the notion of "Global South"

It is not new that we want to find objects, concepts and references of any and all types that are based on our daily experiences of the world, the place where we were born, grew up and settled. The ultra-connected and capitalist world has the ability to transform lifestyles into needs, ways of working into fundamental mindsets and especially specific future goals into universal ones. Modern science takes as its basis and, therefore, the only possibility of seeing and understanding the world, the way of life built in the Northern hemisphere. The problem with this is that, not necessarily and also very likely, people live differently and face very contrasting issues depending on where they are. Because of this, it is up to us, researchers who are at the other end of the globe, to question whether this *modus operandi* aligns with our culture and way of seeing the world.

To begin the discussion about the possibilities for building Latin American design epistemologies, it is important to define what epistemologies are. In this sense, Boaventura de Sousa Santos[17], professor at the University of Coimbra in Portugal, defines the understanding of the word:

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17 SANTOS, Boaventura de Sousa; MENESES, Maria Paula [orgs] Epistemologias do Sul. São Paulo: Cortez, 2010. 637p.

> Epistemology is any notion or idea, reflected or not, about the conditions of what counts as valid knowledge. It is through valid knowledge that a given social experience becomes intentional and intelligible. There is, therefore, no knowledge without practices and social actors. And as both do not exist except within social relations, different types of social relations can give rise to different epistemologies. (SANTOS, 2009, p.9)

One can question whether the notions of the world we follow today in the South come from what was built and "exported" to us, given that most of the countries that are geographically located here have gone through colonization processes in many different ways. As a result, we have always learned that the way of doing things is based on what we have been taught since the most diverse populations occupied our lands and practically exterminated the people and cultures originating in the region.

It is for this reason that the Indian critic and theorist of post-colonial studies Gayatri Spivak[18] in her text *Can the subaltern speak?* builds the notion of the Other and brings the global Subject as the European subject:

> It is impossible for contemporary French intellectuals to imagine the kind of Power and Desire that would inhabit the unnamed subject of the Other of Europe. It is not only that everything they read, critical or uncritical, is caught within the debate of that production of the Other, supporting or critiquing the constitution of the Subject as Europe. (SPIVAK, 1988, p.75)

Spivak's main criticism is of French intellectuals, who see the "Subject" as having the same rights, duties and experiences in many parts of the world. However, all the parameters on which this construction of the Subject is based are those of men, white and European, who definitely do not have the same life experience as political, cultural and economic minorities in other geographic contexts. Spivak also mentions her understanding that the colonized subject, which she called the Other, constantly encounters epistemic violence, in which their worldview does not seem to have the same validity as that put forward by the French intellectuals mentioned in her text:

> The clearest available example of such epistemic violence is the remotely orchestrated, far-flung, and heterogeneous project to constitute the colonial subject as Other. This project is also the asymmetrical obliteration of the trace of that Other in its precarious Subject-ivity. It is well known that Foucault locates epistemic violence, a complete overhaul of the episteme, in the redefinition of sanity at the end of the European eighteenth century. But what if that particular redefinition was only a part of two projects of epistemic overhaul worked as dislocated and unacknowledged parts of a vast-two engine? (SPIVAK, 1988, p.76)

In that respect, she highlights how this epistemic violence perpetuates asymmetrical power dynamics and erases alternative mindsets. Spivak's concept of the Other

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18 SPIVAK, Gayatri. Can the Subaltern Speak?. In: Cary Nelson and Lawrence Grossberg (eds) Marxism and the Interpretation of Culture, London: Macmillan, 1988, p.271–313.

underscores the ongoing struggle against this hegemonic construction of knowledge. Similarly, in his book *Epistemologies of the South*, organized with the Mozambican-Portuguese sociologist and anthropologist Maria Paula Meneses, Boaventura de Souza Santos raises the following questions:

> Why, in the last two centuries, has an epistemology dominated that eliminated the cultural and political context of the production and reproduction of knowledge from epistemological reflection? What were the consequences of such decontextualization? Are there alternative epistemologies? (SANTOS, 2009, p.10)

The questions he asked in 2009 - the year the first edition of the book was released - are still relevant. Since then, a lot has changed, we went through a pandemic, we are experiencing intense political instability, and above all, we are facing humanity's biggest challenge in the last century: climate change. Even though a lot has happened, these questions don't strike me as having been worked on much in the world of design. It appears that we continue to follow the production logic of large companies, teaching what the job market is looking for and increasingly training mere reproducers of technical skills instead of cultivating critical thinking in learning spaces.

A look at different epistemologies from the lens of the Global South is important so that we can strengthen our thinking in the face of the hegemony imposed by those who have always governed the world for their own benefit. Thus, in the case of this research, the focus will be on the American continent, adopted in an unconventional perspective, considering the south as the north and the north as the south.

"Thinking from Latin America"

Prior to diving into the discussion regarding the development of design as a discipline and area of study, it is relevant to add another layer to this analysis: that of Latin American thought. Thinking through a lens that deviates from the hegemonic worldview involves deconstructing foundations that are deeply rooted in a single perspective. It is possible to consider that the world as it was conceptually constructed throughout the social and economic development of recent centuries is mostly based on realities originating from the northern hemisphere, in the same way as the paradigms and systemic thoughts that guide lots of our actions.

Latin American thinkers, authors, and researchers were educated to interpret the world by integrating their conception of the relationships between institutions and the spaces of human development as perceived by Western countries. Our thinking was shaped by specific ideals, philosophies, and viewpoints that preceded them. In this context, in order to continue advancing in studies in any area of knowledge, it is essential that we look carefully at the references and experiences that are located on our continent.

As Juan José Bautista[19], Bolivian thinker and philosopher, puts it, we have experienced a construction of thought based on Europe and the United States and it is necessary to start thinking from Latin America:

> We have usually learned to think about reality and to think about ourselves from reality called Europe or the USA, but not from what modernity has produced as knowledge, science, technology and philosophy, all of it produced in Europe and the USA. That is to say, we nevertheless understand ourselves, we think and we value ourselves with knowledge and conceptions produced out of our reality, in whose theories or concepts are not contained in our reality but another.
>
> Now what it's about is thinking as for ourselves, but from the historical and cultural horizon of our own reality, from our own problems, from our own conceptions, from our own <<cosmovisions>>. But not as something unique and exclusively specific, but concerning the history of humanity, from our history. (BAUTISTA, 2014, p.83)

Over the course of his book *¿Qué significa pensar desde América Latina?* Bautista (2014) reinforces that it is not a matter of thinking only about our populations and productions, but from our perspectives and everything that has been inherited throughout our years of history. The author emphasizes that Latin American thinkers are unaware of their own history due to an excessive admiration for what modernity has produced or even a disregard for their own production of knowledge.

When we produce science based on other epistemic realities, we appropriate different parameters and concepts to interpret our existence and, as he concludes, we wind up living the other's reality instead of our own. In that regard, the knowledge produced outside the hegemonic axis ends up being made invisible:

> Perhaps that is why Latin American thinking is only now showing that what is called <<thinking from>> some place like Latin America, inevitably implies <<thinking>> in a radical way the prejudices that modernity has produced and that in part conceal the gravity of the present. Thinking from Latin America is now showing that what is called critical thinking can no longer start from the centrality of European modernity, but from outside it, from what it has always denied and excluded. Therefore, this radical exercise of thinking is now leading us to question not only capitalism as a mode of production that is constitutively destructive of nature and human work, but also the historical, ideological and philosophical project of modernity as a whole, but now in a global perspective, in the context of the other histories denied and covered up by modernity. (BAUTISTA, 2014, p.86)

Intending to search for new possibilities for the development of the field of design, taking into account the history, social, cultural and economic realities of the south of the world, I seek references from authors who have already carried out important reflections to affirm the need to look at Latin America with our own epistemologies.

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19 BAUTISTA, Juan José. ¿Qué significa pensar desde América Latina?. Madrid: Ediciones Akal, 2014. 285p.

Within this framework, Marisol de la Cadena[20], Peruvian anthropologist and scholar of indigenous peoples, and Mario Blaser, Argentine anthropologist, edited the book *A World of Many Worlds*, which seeks to explore the different ontologies and forms of knowledge that exist in the world. They provoke questions about possible dialogues between traditional and contemporary knowledge, locating in original Latin American practices a possibility of an epistemological paradigm:

> The moment of realization of the destruction of the Earth, the current historical moment, can be one when people reconsider the requirement that worlds be destroyed. It can also be one when the conditions for dialogues toward the reconstitution of worlds can be formulated. Thus, we want to pair up the threat posed by the Anthropocene with an opportunity of similar proportion, by taking the present moment to reconsider the material-semiotic grammar of the relation among worlds that dominates the fabrication of the current historical moment. It is toward the reconsideration that we propose the Pluriverse as an analytic tool useful for producing ethnographic compositions capable of conceiving ecologies of practices across heterogeneous(ly) entangled worlds. (DE LA CADENA; BLASER, 2018, p.xx)

In the introductory chapter of the book, Marisol and Mario propose an analytical tool that challenges the delimitation of other possible realities, which they call the Pluriverse, whatsoever can be understood as an inquiry into the boundaries imposed by Western conceptions of reality:

> Our proposal for the Pluriverse as analytic is not only an abstraction: being ethnographic, it emerges from our variously mediated (yet embodied) experiences of worldings that fieldwork confronted us with, and that incited us toward a disposition to be attentive to practices that make worlds even if they do not satisfy our demand (the demand of modern epistemology) to prove their reality (as they do not leave historical evidence, let alone scientific). (DE LA CADENA; BLASER, 2018, p.xx)

It is from this context that I bring reflections on the need to think about design from a Latin American perspective. In this chapter, I will introduce additional parameters to explore how the concept of the Pluriverse can be integrated into the reality of design. My goal is to find a new direction for the discipline, moving away from the limitations that have defined it over the years.

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20 DE LA CADENA, Marisol; BLASER, Mario (ed.). A world of many worlds. Durham: Duke University Press, 2018. 224 p.

3.2
Navigating possible design transitions towards the Pluriverse: Papanek, Escobar and Irwin's thoughts

Discussing new ways of seeing and understanding a discipline requires looking for external contexts to create an appropriate foundation. The interdisciplinary nature of design allows us to have this analytical approach that comes from the combination of applied social sciences and the practices of production and development of consumer goods.

This section aims to look at the development of design as a discipline in another conceptual direction, which is deeply connected with the need to understand the world through the Pluriverse. To do this, it is necessary to think about how to carry out this transition.

Exploring the possible design transitions towards the Pluriverse

Transition Design has been an area of study for Terry Irwin[21] in the last couple of years. Based at Carnegie Mellon University, in Pittsburgh - USA, Irwin is now the Director of the Transition Design Institute. This section aims to articulate Irwin's, Escobar's and Papanek's ideas in building a different approach to the understanding of Design.

In a lecture given by Arturo Escobar at Clark University in 2017, he presents a summarized diagram of his viewpoint on where Design stands when related to natural systems such as the planet Earth. This diagram gives us a wider perception of what will be discussed here, the Designs for the Pluriverse - and its relation to the transition Irwin is mentioning in her featured article called Transition Design: A Proposal for a New Area of Design, Practice, Study, and Research.

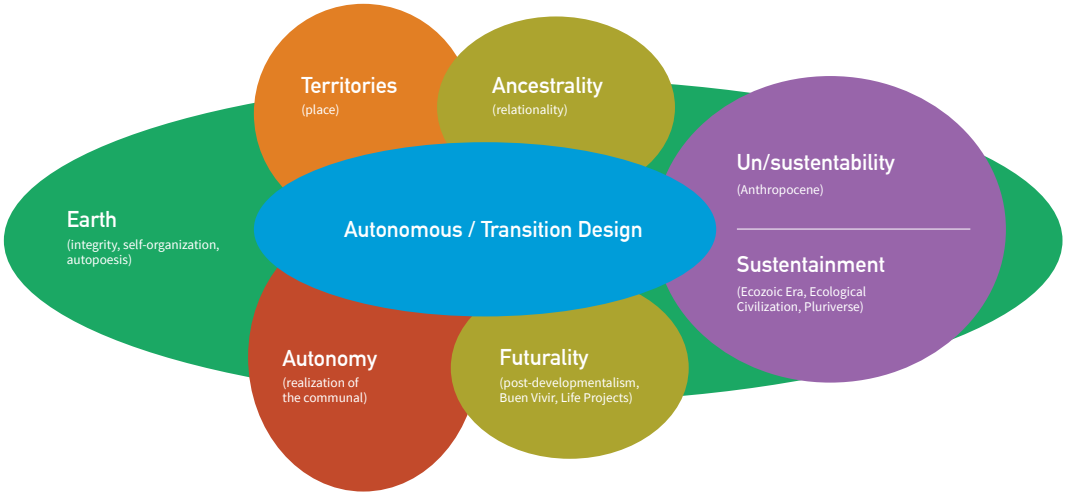

Figure 1: Arturo Escobar's diagram named Autonomy, design, sustainment presented in a lecture at Clark University. Source: Arturo Escobar.

21 IRWIN, T. Transition Design: A Proposal for a New Area of Design Practice, Study, and Research. Design and Culture, v. 7, n. 2, 2015, p. 229-246.

According to Escobar (2018), this transition towards the Pluriverse is strongly shaped by territories, ancestrality, futurality, autonomy and the dichotomy between the unsustainability (that we happen to be living at the present moment which is being called Anthropocene) and the sustainment (grounded in the idea of the Pluriverse). Escobar emphasizes that design is inherently a community-driven process, where every community practices its own form of design, reflecting its social relations, practices, and environmental interactions, which aligns with the principles of autonomy and autonomous design:

> 1 Every community practices the design of itself: its organizations, its social relations, its practices, its relation to the environment. If for most of history communities practiced a sort of "natural design" independent of expert knowledge (ontonomy, spontaneous coping), contemporary situations involve design based on both detached and embodied forms of reflection.
>
> 2 Every design activity must start with the strong presupposition that people are practitioners of their own knowledge and from there must examine how people themselves understand their reality. This epistemological, ethical, and political principle is at the basis of both autonomy and autonomous design. (Conventional development planning is intended to get people to practice somebody else's knowledge, namely, the experts'!)
>
> 3 What the community designs, in the first instance, is an inquiring or learning system about itself. As designers, we may become co-researchers with the community, but it is the latter that investigates its own reality in the codesign process.
>
> 4 Every design process involves a statement of problems and possibilities that enables the designer and the group to generate agreements about objectives and to decide among alternative courses of action (concerning the contamination of the river, the impact of large-scale mining, a particular food-production project, landlessness, the struggle to defend place and culture, discrimination against women, availability of water, etc). The results should be a series of scenarios and possible paths for the transformation of practices or the creation of new ones.
>
> 5 This exercise may take the form of building a model of the system that generates a problem of communal concern. Given this model, the question that every autonomous design project must face is: what can we do about it? The answer will depend on how complex the model of reality is. The concrete result is the design of a series of tasks, organizational practices, and criteria by which to assess the performance of the inquiry and design task. (ESCOBAR, 2018, p.184)

Before jumping into the main discussion, it is interesting to bring as a background some ideas developed by Victor Papanek, in 1971. It is possible to say that Papanek was one of the pioneer's when talking about design practices that do not corroborate with the exploitation of natural resources found in our planet, only for the sake of consumption not related to a true necessity. In the beginning of his most known book he defines the design practice and it's involved parts:

> All men are designers. All that we do, almost all the time, is design, for design is basic to all human activity. The planning and patterning of any act toward a desired, foreseeable end constitutes the design process. Any attempt to separate design, to make it a thing-by-itself, works counter to the fact that design is the primary underlying matrix of life. (PAPANEK, 1971, p.3)

More recently, Escobar (2018) presents the construction of the main argument in his work, going from the cultural studies of design to its autonomy towards the Pluriverse - all based in the Latin American epistemic, territorial and political perspectives and described in the table below:

Cultural studies of design Design has been a fundamental political technology of modernity and hence of unsustainability. To reclaim design for other world-making projects requires a renewed consciousness of this historicity.
Ontological approach to design The most appropriate mode of access to the question concerning design is ontological: examining critically the modernist ontology of separation in order to reorient design towards relational modes of being, knowing, and doing.
Design for transitions Given the current conjuncture, this reorientation can fruitfully be located within debates about civilizational transitions.
Design for autonomy towards the pluriverse This is a contribution from the perspective of Latin American epistemic, territorial, and political struggles.

Table 2: Escobar's Argument synthesis. Source: Arturo Escobar.

Arturo Escobar (2018) points out the importance of involvement of designers in other world-making, based on collective reflection in its practice. He also highlights that the contemporary world conjuncture of ecological and social devastation requires the need for significant cultural transitions. Thinking about collaborative and relational solutions for the new paradigms to come, depends upon a broader understanding of environmental, economic and social aspects. It is important to highlight Escobar's historical roots as a Colombian anthropologist creating this discussion into the Design field, elucidating his concerns related to Design practices and proposing solutions to a more inclusive and sustainable society. In the abstract of her article, Irwin (2015) emphasizes the need of addressing what is known as the wicked problems faced by the entire world in the 21st century. Some of those are concerns once related to Design and pointed out by Papanek 50 years ago, while others were increased with the advent of globalization and the development of capitalism:

> Fundamental change at every level of our society, and new approaches to problem solving are needed to address twenty-first-century "wicked

> problems" such as climate change, loss of biodiversity, depletion of natural resources, and the widening gap between rich and poor. Transition Design is a proposition for a new area of design practice, study, and research that advocates design-led societal transition toward more sustainable futures.
>
> This reconception of entire lifestyles will involve reimagining infrastructures including energy resources, the economy and food, healthcare, and education. Transition Design focuses on the need for "cosmopolitan localism," a lifestyle that is place based and regional, yet global in its awareness and exchange of information and technology. Transition Designers would apply a deep understanding of the interconnectedness of social, economic, and natural systems and the Transition Design framework proposes four key areas in which narratives, knowledge, skills, and action can be developed. (IRWIN, 2015, p.229)

By stating that our practices need to be based on the local structures in which we live - defined as "cosmopolitan localism" by Irwin, she dialogues with Escobar, who, throughout his investigation of how we can develop towards the Pluriverse, places the importance of not ignoring the Latin and the Global South epistemologies. In fact, Irwin reiterates that society is now coming to recognize and create awareness that the wicked problems we see today are interconnected and interdependent.

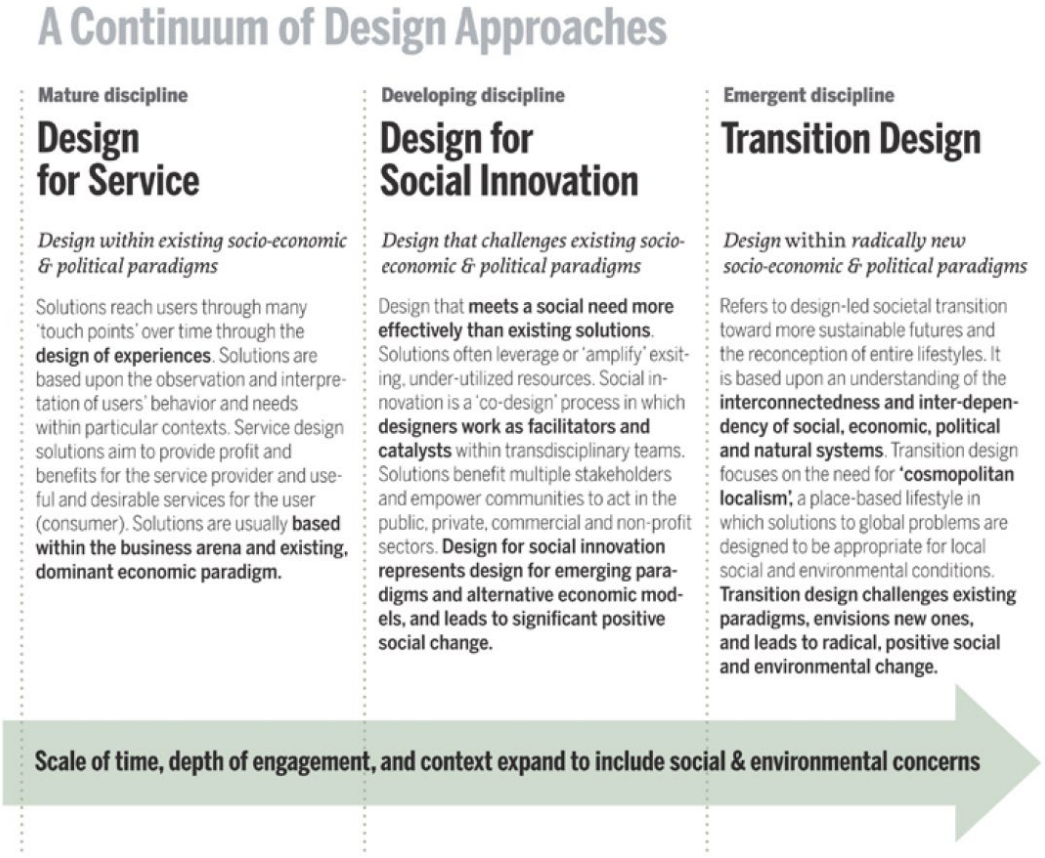

Figure 2: A Continuum of Design Approaches. Source: Terry Irwin.

As noticed in the diagram above, Irwin (2015) argues the need for a continuum

of Design Approaches. She states the importance of Service Design and Design for Social Innovation and stresses the demand for a new area of design research, practice and education (p.230): Transition Design - "based upon longer-term visioning and recognition of the need for solutions rooted in new, more sustainable socioeconomic and political paradigms":

> These are three areas of established, maturing, and emergent sub-disciplines, that they are related and complementary, and that they can be situated along a continuum in which spatio-temporal contexts expand and deepen. (IRWIN, 2015, p. 230)

The author sees Transition Design as an approach that provides long-term, lifestyle-oriented, and place-based solutions which can be situated in the center of the wicked problems that need different views and social participation in creating them.

In order to give more details about how Transition Design can be applied, Irwin presents a framework based on 4 steps that will be soon unraveled: Vision for Transition, Theories of Change, Mindset and Posture, and New Ways of Designing. Her understanding and what she brings is fixed on the fact that in actual circumstances we need to be designing for a more sustainable society, which is rooted in communities where people have place-based lifestyles and exchange technology and information to better develop their collectives.

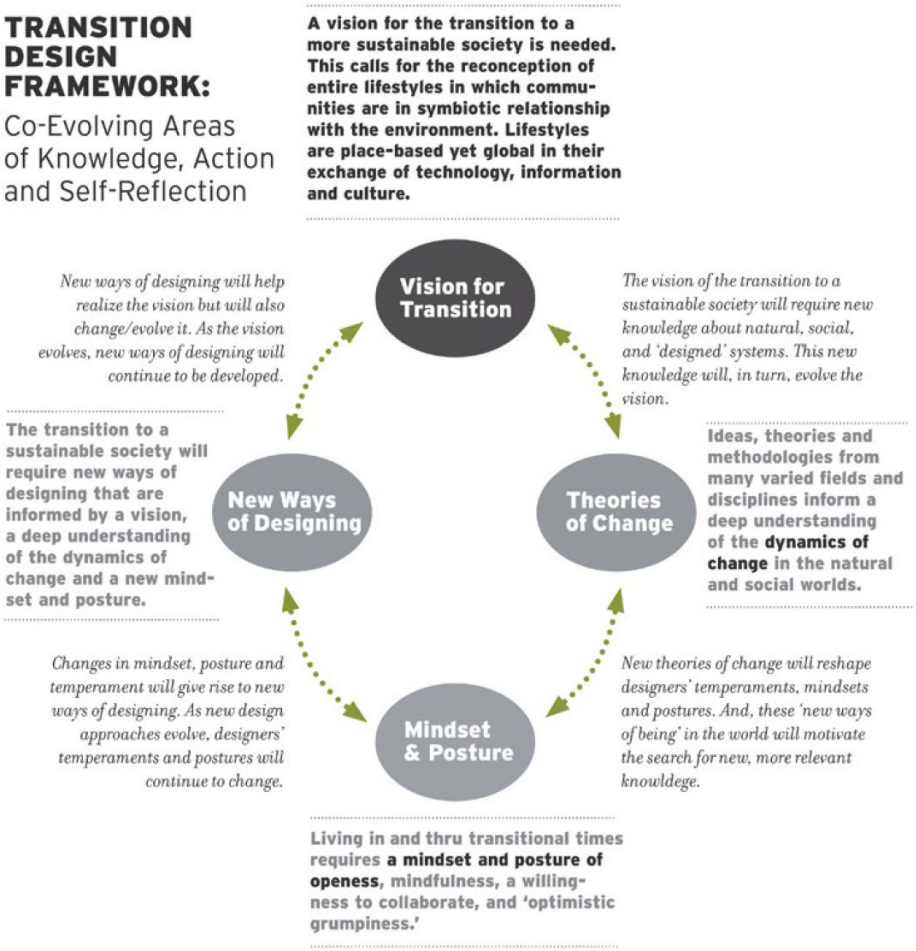

Figure 3: Transition Framework. Source: Irwin, Tonkinwise & Kossoff.

Turning back the discussion to what Papanek stated in 1971 and how Escobar provokes many years later, the anthropologist keeps asking in his work about evolving towards the Pluriverse:

> Can design be reoriented from its dependence on the marketplace toward creative experimentation with forms, concepts, territories, and materials, especially when appropriated by subaltern communities struggling to redefine their life projects in a mutually enhancing manner with the Earth? (ESCOBAR, 2018, xvii)

Looking through the Latin epistemic lens, it is essential that we understand our specific needs and where we are in this journey. It is necessary to think about how it will be possible to shape culturally different communities based on common sustainable values in order to achieve the same goals.

At this point, it is possible to start digging more into the framework of Transition Design. The first step is the Vision for Transition, which plans to create more compelling future-oriented visions. She affirms the need of bringing narratives about the future, aligned to high quality life and guided by design methodologies such as scenario development, future casting and speculative design. As Irwin completes:

> Transition visions are not conceived as blueprints for design – rather they remain open-ended and speculative. Future visions would continually change and evolve based upon knowledge gained from projects and initiatives in the present. Transition visioning is conceived as a circular, iterative, and error-friendly process that could be used to envision radically new ideas for the future that serve to inform even small, modest designs in the present. (IRWIN, 2015, p.233)

It is not possible to think about transforming a society without putting the concept of change into the center of this discussion. As a very typical process of design projects, theories of change are usually present as a planned course of action. In that regard, a transition to sustainable futures will demand a mobilization of all layers of society towards these changes:

> Transformational | societal change will depend upon our ability to change our ideas about change itself – how it manifests and how it can be initiated and directed. Transition Design proposes that in order for designers to act as agents for change, new approaches to design and problem solving must be based upon a deep understanding of the dynamics of change within complex social and natural systems. (IRWIN, 2015, p.234)

When Irwin (2015) talks about designers needing to investigate their own system of values, it brings this argument back to 1971 where Papanek was repeating many times the importance of grasping not only the context in which a project was being developed but also all the social circumstances involved in that practice. He was stating that designers need to create products for the real world, not to sell useless things for status. This point of view dialogues with what Irwin is putting as necessary in order to build transition designers:

> Designers' mindsets and postures often go unnoticed and unacknowledged but they profoundly influence what is identified as a problem and how it is framed and solved within a given context. Yet, design methodologies and processes rarely take these important factors into account. (IRWIN, 2015, p.235)

To continue this discussion, I will now present some interdisciplinary issues and questions that may arise between design and education when a transition to the Pluriverse is imagined.

How can interdisciplinarity be part of the transition to the Pluriverse?

Gathering all the topics exposed on the previous pages, it is possible to think of some questions: how is education involved in all these challenges? Can we think of interdisciplinary relations between design, education, sustainability that will play important roles in the transition towards the Pluriverse?

How do we move this massive transition that needs to be addressed into the center of discussions in educational environments? How can we educate designers to be transition designers? The goal is not to bring answers to all these questions but to raise thoughts about the possibilities of design's inputs within the field of education in order to create awareness of the importance of interdisciplinary actions in this context. With that in mind, and taking into consideration possible Latin and Global South epistemologies, it proves to be essential to look at it with a perspective based on cultural issues:

> The cultural studies of design will also study design's role in the current cultural-historical conjuncture - how design practices participate in fundamental processes of the production of reality and their articulation with forms of power. It does so "by taking culture as its starting point, its entrance into the complex balance of natural forces constructed out of the even more complicated relations of culture, society, politics, economics, everyday life, etc"(24). Cultural studies' radical contextuality implies its connection to transformative social practices and struggles. It is, finally, about the cultural work that needs to take place for the creation of new futures. Design is no doubt a main player in the making of the modern onto-epistemic formation, and hence a most appropriate subject for cultural studies. (ESCOBAR, 2018, p.51)

The understandings and writings of Hilton Japiassu (1976) on interdisciplinarity says that (p.59): "The interdisciplinary epistemological project is a project of knowledge, that is, of a critical discourse." In his book *Interdisciplinarity and Pathology of Knowledge* he also states that:

> In short, interdisciplinarity is not just a theoretical concept. More and more it seems to impose itself as a practice. In the first place, it appears as an individual practice: it is fundamentally an attitude of mind, made up of curiosity, openness, a sense of discovery, a desire to enrich oneself with new approaches, a taste for combinations of perspectives and conviction leading to desire to overcome the paths already beaten. As an individual practice, interdisciplinarity cannot be learned, only

> exercised. It is the result of continuous training, of a systematic refinement of mental structures. Second, interdisciplinarity appears as a collective practice. At the level of research proper, there can be no solid confrontation between the disciplines without the effective cooperation of highly qualified representatives from each of them. Everyone needs to be open to dialogue, able to recognize what they lack and what they can or should receive from others. This attitude of openness is only acquired in the course of interdisciplinary teamwork. (JAPIASSU, 1976, p.82)

When applied to the field of design, interdisciplinarity can be considered a valuable mechanism for establishing connections between diverse areas of knowledge. Rita Couto (1997) emerges as a prominent contributor to the discourse on design, highlighting its vocational inclination and emphasizing the nature of interdisciplinary approaches. Her studies mark one of the earliest written explorations of this subject in Brazil:

> The so-called 'interdisciplinary vocation of Design' has populated the discourse of those who, to some extent, understand this area as conducive to working together with other areas of knowledge. This perception that Design has an interdisciplinary vocation may have originated as a result of work carried out in conjunction with other areas of knowledge, both within the scope of the profession of designer and in academia. (COUTO, 1997, p.58)

Interdisciplinarity can then be perceived as a collective practice, which can only be understood when practiced. In this sense, in order to be exercised, it is extremely important that all social, cultural, economic and procedural aspects of design towards the Pluriverse are well articulated.

At the same time, the work of designers will be fundamental in order to make this transition possible. In the course of time, they are one of the social groups that participated and contributed - even if it was in a negative way - to where society is at this point and how we got trapped into the capitalist logic:

> Transition Design is also a process and methodology for making connections. Transition Designers have the skill, foresight, and ability to connect different types of solutions (service design or social innovation solutions) together for greater leverage (solutions' ability to co-evolve) and impact because they are connected to, and guided by, a longer-term objective or vision. (IRWIN, 2015, p.237)

It is relevant to underline that this argument goes beyond the actions of designers and requires a social commitment as a whole. Although we are discussing the future within the design field, this task needs to be addressed more broadly to the most diverse sectors. Still, Escobar (2017) brings Design to the center of questions "Can design be extricated from its embeddedness in modernist unsustainable and defuturing practices and redirected toward other ontological commitments, practices, narratives, and performances?" (p.15).

He concludes by asking if the design tools and methodologies would be directly involved in the changeover to the Pluriverse:

> Moreover, could design become part of the tool kit for transitions toward the Pluriverse? What would that imply in terms of the design of tools, interactions, contexts, and languages in ways to fulfill the ontological design principle of changing the ways in which we deal with ourselves and things so that futuring is enabled? (ESCOBAR, 2018, p.15)

Escobar, Irwin and Papanek's thoughts when considering a society grounded on the ability of developing itself on a local scale - even if presented at different times - converge to the same understanding of the world. The Pluriverse, led by transition designers, in a world where Earth, Territories, Autonomy, Ancestrality, Futurality are in balance, and where other decentralized epistemological perspectives of the world's capitalist hegemony, is a place wherein a more equitable society can be established.

A design-led societal transformation toward more sustainable futures becomes possible if done in consonance with the geographical context that is being applied. The framework of transition design represents a substantial intervention within the realms of design discourse and education.

3.3
Chapter findings

What should be the next steps in the design-education relationship?
The discussion being outlined in this thesis aims to delimit the scenarios in which it becomes possible to discuss the insertions of design in education. In this sense, the construction of thinking from what design means to positioning it in the center of Latin American territory is essential so that we can have a basis for understanding how these relationships occur in countries like Brazil and some of our neighbors.

These reflections take us to the scope of this work, seeking to bring perceptions, experiences and practices of ways in which designers can contribute to the development of more open and plural pedagogies in basic education environments, but also contemplate a little on the impacts of these insertions in the education of designers. In that regard, thinking meaningfully when designing a project is considered essential.

As highlighted previously in this theoretical-practical construction on the paths to design, it is fundamental to say that there are currently many tracks to understanding and practicing design. When seeking to insert it within schools, it is necessary that all actors involved in this place are prepared to deconstruct ideals of what it means to teach and learn so that this exchange is fruitful. Consequently, the importance of outlining a scope of meaning becomes the first step in thinking about an enriching interaction between designers and educators in Latin America.

Recent studies in the field of psychology point out the importance of connecting learning to the real world, contextualizing it territorially and bringing it closer to students' life experiences. In the same way, since the 1970s, with the questions raised by Victor Papanek, the need to develop projects for the real world has been discussed extensively in the field of design. Although these issues may have arisen before in the field of design, it can currently be said that the two practices are heading towards the same place of interest, as shown in the study conducted by Irene González-Ceballos, Montserrat Palma, Josep Serra and Moisès Esteban-Guitart in the Department of Psychology at the University of Girona in Spain:

> Taking the very notion of "learning ecologies" as a reference (Barron, 2004, 2006), Coll (2013) argues that we are facing a profound revision of the fundamental parameters that characterize educational practice (where, when, what, who with, why and how we learn). From a model focused on universal schooling, belonging to the twentieth century, we are now in a moment of transition toward distributed and interconnected emerging models. In this sense, we speak of "local learning ecosystems" (Hannon et al., 2019) to refer to a great multiplicity of interconnected educational scenarios and agents, linked to the development of basic competencies or skills for the 21st century, through participation in affinity groups or communities of practice, in different physical and digital mediums, as well as in distinct narrative formats (DiGiacomo D. et al., 2018; Lacasa, 2018) (GONZÁLEZ-CEBALLOS et al., 2021)

As discussed in this chapter, articulating the statements of Irwin and Escobar, the development of skills linked to practice in the field of design must be connected with a necessary transition in its praxis. In the same way, it is possible to question how teaching-learning should behave in this context of great challenges that we are experiencing in today's world. In this sense, when Ezio Manzini (2015) reflects on thinking about changes that can lead to the construction of a new civilization, he points out the relevance of thinking through innovations:

> When confronted with new problems, human beings tend to use their innate creativity and design capacity to invent and realize something new: they innovate. It has always been like that, but today these everyday innovations are spreading, appearing in unprecedented forms and making themselves felt with greater force. Their diffusion and character result from the combination of two main factors. The first is, of course, the nature of the problems to be dealt with on different scales, including everyday experience. The second is the pervasive diffusion of information and communication technologies and their potential in terms of organizational change. In such a situation, it is likely that a growing number of people facing a problem also see an opportunity and find a new way to solve it. (MANZINI, 2015, p.9)

The arguments presented here aim to reassert that the needs and challenges we face as a society today are interconnected. The connections between design and education that can be used to enhance training and foster the social and intellectual changes we believe are needed today, can be definitive for the success of human permanence on the planet. On account of this, thinking about interdisciplinary

actions becomes essential to find paths that respond to the urgencies of a locally positioned vision.

Furthermore, it is clear that to work with the development of teaching-learning by applying perspectives, processes and methodologies from the field of design, it is vital that we are thinking about the social, cultural and economic contexts originating in the Global South. I believe that at this point the reader understands that these constructions occurred in a very different way to the existing realities in the north of the world and, for this reason, they need to be looked at through the lenses that describe them based on their own experience.

Epistemologies designed in the south will be indispensable to continue deepening this discussion in the next chapter, which has the intention to bring to light the way in which design can be intertwined with education within learning spaces such as schools and universities placed in Latin America. Moreover, key concepts that are related to design in a teaching-learning situation and the way in which they can be deployed in thinking will be a common thread to find similarities in the historical processes of development of education in Brazil and other Latin American countries.

4
Basis for the interdisciplinary relationship between Design and Education

The fourth chapter of this thesis focuses on tracing the links between design and education, highlighting their interdisciplinary potential. Based on the entire theoretical, historical and epistemological context outlined in the previous chapters, the discussion will concentrate on the possible encounters that can happen when we look at education through the procedural lens of design. In this sense, I will rely on Allain Findeli's ideas regarding rethinking design education in order to understand the background for possible entries into basic education spaces. Ivan Illich's insights on the importance of decentralizing learning from traditional school settings will offer valuable reflections for understanding and comparing the historical and situational context of educational development principles in different Latin American territories.

Through examples, I will make a comparison of how these processes unfolded in Brazil and Chile because of the opportunity I had to spend eight months in Valparaíso through the CAPES-Print program at *Pontificia Universidad Católica*. Although the title of this thesis refers broadly to Latin America, the narrative is grounded in a specific lived experience in these two countries. Additionally, a brief overview of how the development of epistemological and methodological establishment of design teaching took place at the two universities where I studied will also help build this relationship between design and education.

4.1
Shaping Education in Latin America: the context of Brazil and Chile

How did we get here?

With the aim to provide a brief overview of how schooling developed in Latin America, to later focus on the similarities and differences between examples of the Brazilian and Chilean systems, we will go through a quick historical construction of the arrival of institutional education on our continent.

Formal education in Latin America, though introduced through similar processes across the region, developed differently depending on the country. Its origins trace back to the colonization of the Americas in the 16th century, when Spanish and Portuguese empires invaded and imposed their educational models. These early systems were primarily focused on converting indigenous communities to Christianity.

The first models established in an institutionalized manner aimed to educate mestizos, children of European colonizers and native indigenous populations, and focused on teaching Latin, Philosophy and Theology, based on the European educational system. Later, the first universities were built to educate the colonial elite, specifically in Law, Medicine, Theology and Philosophy. With this expansion,

the European way of seeing the world was becoming the hegemonic global perspective in guiding the construction of modern institutions. This was possibly what Europeans were looking for when expanding their pedagogical visions to this discovered new world:

> Eurocentrism is, as used here, the name of a perspective of knowledge whose systematic formation began in Western Europe before the middle of the seventeenth century, although some of its roots are, without doubt, much older. In the following centuries this perspective was made globally hegemonic, traveling the same course as the dominion of the European bourgeois class. Its constitution was associated with the specific bourgeois secularization of European thought and with the experiences and necessities of the global model of capitalist (colonial/ modern) and Eurocentered power established since the colonization of America.
>
> This category of Eurocentrism does not involve all of the knowledge of history of all of Europe or Western Europe in particular. It does not refer to all the modes of knowledge of all Europeans and all epochs. It is instead a specific rationality or perspective of knowledge that was made globally hegemonic, colonizing and overcoming other previous or different conceptual formations and their respective concrete knowledges, as much in Europe as in the rest of the world. (QUIJANO, 2000, p. 550)

Already in the 19th century, influenced by the independence movements in several territories that began to form in the region, leaders such as Simón Bolívar and José de San Martín were figures who advocated the importance of developing civic education between its citizens, stating that this was essential for the success of the newly formed republics in Latin America. At this time, education began to take shape in the way we know it today.

At the end of the 19th century and the beginning of the 20th century urbanization accelerated with the construction of industries and railways throughout the American territory, especially in Argentina, Brazil, Chile and Mexico. In this context, migration to large urban centers, already existing since the colonial period, quickened, with populations migrating in search of work in new factories and industries. Schools began to play an important role in the training of citizens and, progressively, also began to prepare workers to perform their functions in the industrial sector, especially through technical and vocational education. By then, mass education was established and teaching-learning spaces were gradually formed, always very similar to what was exported from Europe to Latin America.

It was only in a recent period that decolonial studies and Latin thinkers began to look at the past and seek to understand how these processes of institutionalization that we have experienced since the 16th century took place. To illustrate in more detail the way in which the construction of modern institutions developed, including education, I present the thoughts of Aníbal Quijano[22], a Peruvian sociologist who

22 QUIJANO, Aníbal. Coloniality of Power, Eurocentrism, and Latin America. In: Nepantla: Views from South, v.1, n.3, 2000, p.533-580.

worked throughout his life with issues of coloniality and decolonial studies.

His concept of Coloniality of Power seeks to guide us to understand the lasting effects of European colonialism on Latin American society in terms of knowledge, education and social structures. By establishing this power dynamic in relation to the Latin American continent, Quijano (2000) understands that by imposing a way of doing things and organizing ourselves as a society, Eurocentric views are perpetuated and indigenous and Afro-descendant knowledge systems end up being erased:

> As the center of global capitalism, Europe not only had control of the world market, but it was also able to impose its colonial dominance over all the regions and populations of the planet, incorporating them into its world-system and its specific model of power. For such regions and populations, this model of power involved a process of historical reidentification; from Europe such regions and populations were attributed new geocultural identities. In that way, after America and Europe were established, Africa, Asia, and eventually Oceania followed suit. In the production of these new identities, the coloniality of the new model of power was, without a doubt, one of the most active determinations. But the forms and levels of political and cultural development, and more specifically intellectual development, played a role of utmost importance in each case. (QUIJANO, 2000, p. 540)

The implementation of European education models across the continent directly impacted the production of knowledge from traditional cultures that already inhabited this land before the Portuguese and Spanish invasion. Quijano points out how European hegemony ended up placing multiple forms of articulation of thought in the same pattern:

> The incorporation of such diverse and heterogeneous cultural histories into a single world dominated by Europe signified a cultural and intellectual intersubjective configuration equivalent to the articulation of all forms of labor control around capital, a configuration that established world capitalism. In effect, all of the experiences, histories, resources, and cultural products ended up in one global cultural order revolving around European or Western hegemony. Europe's hegemony over the new model of global power concentrated all forms of the control of subjectivity, culture, and especially knowledge and the production of knowledge under its hegemony. (QUIJANO, 2000, p. 540)

Even though a large number of scholars are currently writing about this, there is a very long way to go before we can understand which aspects of our local heritage we want to rescue so that we can continue proposing epistemological paths located in Latin America.

External Influences and Educational Reforms in Brazil and Chile

By chronologically constructing where I want to go with the discussion of educational models and approaches, we arrive at the main section of this work.

Due to personal experiences involving my participation as a student in Brazil and Chile, the objective of this segment is to find points of intersection between how influences from Europe and later the United States occurred in the development of local structures and laws in education.

To build these relationships, I separated two historical moments - one in Brazil and the other in Chile - that have a direct relationship with the New School movement, led by John Dewey and the implementation of the Alliance for Progress political project during John Kennedy's government in the United States. Below is a diagram of the parallels drawn throughout the discussion of this subchapter:

Chile	Brazil
16th-19th Century	
European ideals and knowledge production imposed by colonization	
1920s-1940s	
Influence of New School Movement and John Deweys ideas of Education	
Pedro Aguirre Cerda and his role as Minister of Education and President of Chile	Manifesto of the Pioneers of New Education and Anísio Teixeira
1960	
Implementation of Alliance of Progress in Latin America	
Educational reform of 1965	Enaction on the first law on basic guidelines for Brazilian education (LDB)

Table 3: Comparative table of influences on the development of education in Chile and Brazil. Source: Personal archive of the author.

As presented previously, Latin American education was shaped by different external influences. At first, these arrived with the Europeans during their process of territorial expansion throughout the 16th and 17th centuries. However, despite the European roots having been planted in terms of hegemony of thought, one of the major influences on Latin American education emerged later: the ideals of John Dewey[23] and the New School movement.

Dewey was a very relevant educator for the 20th century. His perspective on democratic education highlighted the importance of not only an individual perspective on the learning process, but also a collective one. He believed that by presenting students with ways to think critically and collaborate with each other, we

23 DEWEY, John. Experiência e Educação. Tradução de Anísio Teixeira. São Paulo: Editora Nacional, 1971. 97p.

could build more participative societies, as highlighted in one of the passages from his most important work, *Education and Democracy*, first written in 1916:

> A democracy is more than a form of government; it is primarily a mode of associated living, of conjoint communicated experience. The extension in space of the number of individuals who participate in an interest so that each has to refer his own action to that of others, and to consider the action of others to give point and direction to his own, is equivalent to the breaking down of those barriers of class, race, and national territory which kept men from perceiving the full import of their activity. (DEWEY, 2001, p. 63)

Furthermore, other important points of his thinking are learning through experience, interaction with the environment and continuous growth. Dewey can be considered one of the most influential educators in the structures and pedagogies that shaped modern education. When we think about how the processes of establishing it in Brazil and Chile took place, we must understand that many of its basic concepts permeated the ideas of John Dewey.

From that perspective, and revisiting the issue of access to education advocated by political and educational leaders in Latin America, I will bring as an example the 1965 Reform in Chile, which was implemented during the government of Eduardo Frei Montalva (1964-1970) as Ursula Exss[24] (2022) says:

> The reform in consideration has been frequently presented by historians of Chilean education as a process in which they decant the contributions of a set of previous experiences, first in experimental schools and also in experimental educational plans, which were carried out in Chile during the previous decades. Among the antecedents that the historiography identifies, the definitive text of compulsory and free primary education - original from 1920 - stands out, which ended in the beginning of a complete reform and counter-reform process carried out between 1928 and 1929. With the final text of the education law, a type of experimental fiscal school was created, which would exist simultaneously with the traditional school.
>
> The line of experimental schools allowed various pedagogical trials to be carried out within the public system. Many of the ideas that were resumed in primary education came from the North American "New School", which put value on active learning around evaluation by teachers. (EXSS, 2022, p.48)

The structural transformations that occurred in Chilean education during Montalva's government followed the American Alliance for Progress program, which aimed to promote economic development and shape socioeconomic change in Latin America as an alternative to the Cuban Revolution. Due to the political context of the time and the growing strength of left-wing movements, it can be considered that projects

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24 EXSS, Ursula. Escuelas para todos: De la racionalización constructiva a la arquitectura sistemátia para la reforma educacional de 1965. Valparaíso: Ediciones e[ad], 2022. 237p.

of democratization and modernization of education aimed at economic and social development, had a direct relationship with the imperialist interests of countries in the Global North, especially the United States. These ideas normally arrived in Latin America masked by an intention to control political instability, which were only revealed and became clear to the population much after the military coups that occurred in both Brazil (1964) and Chile (1973).

Therefore, the objectives of the 1965 Chilean educational reform decree encompassed the following legislative measures (EXSS, 2022):

> - Achieve better and harmonious development of all aspects of the individual's personality;
> - Qualify people for work life;
> - Inhabit it so that the individual participates intelligently in the process of cultural, social and economic development of the country.

In Brazil, this influence of American ideals was not very different from how they were developed in Chile. One of the main objectives of the Alliance for Progress program was to provide technical assistance to Latin countries to promote social reforms, especially with regard to the educational structure and its values, according to them to strengthen democratic governments, combating communism and poverty. Coincidentally, the first law on basic guidelines for Brazilian education (*Lei de Diretrizes e Bases da Educação Nacional*) was enacted in 1961, the same year in which the Alliance for Progress gained strength and established roots in Latin America.

The law's basic principles were the universalization of freedom of education and recognizing the coexistence between public and private schools. It was the result of debates that began in the 1930s through the figures of Anísio Teixeira and Fernando de Azevedo who, influenced by the ideas of John Dewey and the New School movement, wrote one of the first and main fundamental landmarks and directions for thinking and developing education in Brazil: the Manifesto of the Pioneers of New Education in 1932. Anisio Teixeira was one of the main disseminators of Dewey's education ideas and had a huge role in writing this document that proposed a profound reform in the country's educational system:

> The new education, which is certainly pragmatic, aims to serve not the interests of classes, but the interests of the individual, and which is based on the principle of linking the school with the social environment, has its ideal conditioned by current social life, but deeply human, of solidarity, of social service and cooperation. The traditional school, established according to a bourgeois conception, had been keeping the individual in his isolated and sterile autonomy, resulting from the doctrine of libertarian individualism, which had, in fact, its role in the formation of democracies and without whose assault the rigid frameworks would not have been broken. of social life. The socialized school, reconstituted on the basis of production activity, in which work is considered as the best way to study reality in general (active acquisition of culture) and the best way to study work in itself, as the foundation of human society,

> organized itself to reconnect the current and reestablish, among men, the spirit of discipline, solidarity and cooperation, through a profound social work that goes far beyond the narrow framework of class interests. (DE AZEVEDO et. al, 1932, p. 40)

Given the scenario above, it can be said that interventions in the way of structuring, thinking and carrying out education in both Brazil and Chile, coming first from Europe and then from the United States, shaped the vision and values which are still rooted in our educational models, even after so many years. Although Dewey incorporated ideals of democracy, interaction with the environment, and student freedom to explore their abilities into his educational philosophy, this conception may be unconsciously tied to a political, social, and economic context of imperialism. It suggested a dynamic where 'developed' countries exerted influence over 'underdeveloped' countries, reinforcing the notion of subordinating local development to the interests of those who historically dominated these territories. Even with the approval of the *Lei de Diretrizes e Bases da Educação Nacional* (LDB) and it's late implementation in Brazil and also the 1965 educational reform in Chile, education and schools continued to be structured under the same logic, still very similar to what existed in the 19th century from a methodological perspective.

Tying Ivan Illich's[25] ideas to the argument being outlined throughout this chapter, it is important to highlight the disruptiveness of his work as a historian and social critic. Born in Austria, Illich worked most of his life in Mexico, where he founded the Intercultural Documentation Center (CIDOC), a place dedicated to teaching and debating topics such as education, development, colonialism and criticism of modern institutions. He was an important figure in the development of ideas against schooling and argued that hierarchical learning models limited human potential. For him, the existence of rigid curricula ended up standardizing teaching and this was the perfect recipe for transforming knowledge into merchandise, as pointed out in the excerpt:

> The deschooling of society implies a recognition of the dual nature of learning. Insisting only on practical instruction would be a disaster; equal emphasis should be placed on other kinds of learning. If schools are the wrong place to learn a skill, they are the wrong place to get an education. The school performs both tasks poorly; partly because it doesn't know how to distinguish the two. The school is inefficient in teaching skills, mainly because it is curricular. (ILLICH, 1972, p.31)

In one of his most successful books, Illich introduces the concept of deschooling, which designs learning in a self-directed way and based on people's interests and experiences. In a visionary and modern approach, akin to other influential educational thinkers like Paulo Freire, he highlights that learning networks could be created in which people teach things to others in a horizontal and collaborative way.

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25 ILLICH, Ivan. Deschooling Society. New York: Harper & Row, 1972. 186p.
ILLICH, Ivan. Tools for Conviviality. New York City: Harper & Row, 1973. 135 p.

In the same way that he subverted the institutionalization of school, Illich also argued in another work called *Tools for Conviviality*, society's excessive dependence on technical and complex systems that alienate individuals who inhabit them. Therefore, his proposal for a model of coexistence in which technology is an extension of human skills would promote greater autonomy and social freedom:

> I call a convivial society one in which modern tools are at the service of the person integrated into the community and not at the service of a body of specialists. Coexistence is the society in which man controls the tool. (ILLICH,1973, p.4)

The connection of the *Tools for Conviviality* with the notion outlined by Illich in relation to the school institution are tied to an attempt to transform the values established in society and social relations. In a certain way, it ends up reflecting on the means in which human beings deal with the tools that are around them and shape modern institutions as they are, often disconnected from the realities in which they exist.

It is interesting to look at Illich's work through deconstruction. His profound criticisms on education provoke us to think about how these processes could be constructed in a completely different way than they were in the past, taking into account the social, cultural, political and economic ecosystem of the place we are in:

> Universal education through schooling is not feasible. It would be no more feasible if it were attempted by means of alternative institutions built on the style of present schools. Neither new attitudes of teachers toward their pupils nor the proliferation of educational hardware or software (in classroom or bedroom), nor finally the attempt to expand the pedagogue's responsibility until it engulfs his pupils' lifetimes will deliver universal education. The current search for new educational funnels must be reversed into the search for their institutional inverse: educational webs which heighten the opportunity for each one to transform each moment of his living into one of learning, sharing, and caring. We hope to contribute concepts needed by those who conduct such counterfoil research on education—and also to those who seek alternatives to other established service industries. (ILLICH, 1973, ix)

Just like Papanek, Illich also had a visionary thought. He pointed out issues in society and also about education that were ahead of his time and that can currently be considered contemporary. It can be said that the complex challenges we presently face are deeply rooted in the discussion of modern institutions. In this context, design can offer a potential solution, allowing us to approach these issues through affection, collective collaboration, and by viewing the world from a transitional and interdisciplinary perspective. Conviviality, for him, then means the opposite of industrial productivity:

> I choose the term 'conviviality' to designate the opposite of industrial productivity. I intend it to mean autonomous and creative intercourse among persons, and the intercourse of persons with their environment;

> and this in contrast with the conditioned response of persons to the demands made upon them by others, and by a man-made environment. I consider conviviality to be individual freedom realized in personal interdependence and, as such, an intrinsic ethical value. I believe that, in any society, as conviviality is reduced below a certain level, no amount of industrial productivity can effectively satisfy the needs it creates among society's members. (ILLICH, 1973, p.24)

With the aim of finding the links between design and education and how these two areas relate, given the entire panorama previously constructed, I once again bring to light the importance of placing these bonds in a specific context. We are in a territory that suffered invasions, was colonized, and has always followed existing educational models that were exported here, possibly with the intention of creating a hegemony of thought in the world. Being able to visualize, structure and apply pedagogies located in Latin America is a current struggle and should be a goal for the future.

As we move forward, the next step of this chapter is to find other points of similarity between the development of different design educational perspectives between Brazil and Chile, linked to my own experiences in learning spaces over the last 10 years.

4.2
A poetic journey across America: where do we find design?

Understanding Illich's concept of deschooling and seeking to connect with design thinking structures, it can be said that there are synergies in relation to how both work. In creative processes, it is very important to develop skills that are coherent with the contexts that will be worked on. In this sense, approaches that balance the learning of practical skills and also the immersion in everyday situations can be very rich for the designer's training.

To illustrate this statement, the objective of this subchapter is to describe the university environments that I was able to experience in order to understand how design is taught by them and how the means of collective construction are effective ways of generating knowledge and skills. Still, the experiences I had led me to a much more valuable conclusion, that the understanding of "design thinking" could be part of any knowledge construction in educational environments. This section is a short trip through two Latin American countries that aims to show how the pedagogical projects of the Pontifical Catholic University of Rio de Janeiro and the Pontifical Catholic University of Valparaíso were shaped by the broader historical context of education and particularly design education that both countries experienced. They support moving away from a rigid and closed model of education, focusing on the collective construction of knowledge and the non-linearity of design processes.

Social Design at Pontifícia Universidade Católica do Rio de Janeiro

The curriculum primarily implemented at the Pontifical Catholic University of Rio de Janeiro was the initiative of professors José Luiz Ripper and Ana Maria Branco in the early 1970s. It was a decade later, after developments in the methodological approach that was being implemented, that Social Design was consolidated as the school's characteristic methodology.

Professor Ana Maria Branco says that initially the course was designed to follow the hierarchical knowledge model of the Superior School of Industrial Design (ESDI) in Rio de Janeiro, at first inherited from the logic of the Bauhaus, one of the first design schools in the West. This perspective suggested that students enter university with little knowledge or experience, and that throughout their training, they gain sufficient information to become professionals in their field**.**

In the article *Social Design at PUC-Rio*, professor Rita Couto (2017) brings some of these reports given by Ana Branco, which tell the story of how the disruptive movements began for the unique pedagogical construction that the school has built since its beginnings:

> Ana Branco recalls that, because they did not agree with these ideas, a group of professors proposed changes to the Design course at PUC-Rio. These changes led to discussion about the student's position when entering university and about taking advantage of the wealth of information and experiences that they brought with them.
>
> The professor also states that, in the field of design, for example, it was impossible not to consider the experience that the student brought, as they engaged in a series of activities and actions in their daily lives, through which, steps of a design process could be identified. These activities and actions, once organized, would configure a project method. To the university was reserved the role of organizer of the empirical experience, so that it could become an object of study and reflection. (COUTO, 2017, p.33)

As previously mentioned in the second chapter, even though there are methodologies more aligned with the practice of Social Design, the main point of identification of this approach is the interaction between the designer and the target population. The procedural complexity of each project can present different degrees of entanglement and is much more reflected in the designer's way of seeing and interpreting the world than in a specific model of designing.

In this sense, observation becomes an extremely relevant factor as the population interacts with the object or digital product. The transformative role of design becomes evident, since what was designed only has life and meaning in the world when it is in constant interaction with human beings:

> It can be said that Social Design prioritizes user logic and not the logic of the means of production. The act of designing and building little by little, allowing continuous participation of individuals and the

> expression of their desires, is part of the way of seeing the object as a result of interactive work between the designer and the user, allowing mythification. (COUTO, 2017, p.35)

Greatly influenced by the ideas of Victor Papanek and other thinkers of the time, the teaching proposal was solidified based on this logic, of designing for the real world. When presenting itself to the world, the Arts & Design school at PUC-Rio positioned itself as an integrator of the university space with the social, economic, cultural and political context of the neighborhood and city in which it was located.

Providing an example of how the department presented itself at events and spaces outside the university, here is the course description and its perspective on the world of design, as presented at the 3rd Latin American Association of Industrial Design (ALADI) Congress in 1984. The excerpt below reinforces how the university already brought a decolonial perspective, placing teaching and learning in a local and collaborative context:

> Our colonial heritage has marked us as mere consumers of finished products originating from the metropolis. Colonial and neocolonial dependence leads us to overlook the object as a signifier, as a material support for ideas, and as a human product of a given culture. Accustomed to consuming what is produced as a "superior and universal" model, we devalue our craftsmanship, our artisanal work, discriminating it as a lesser activity and renouncing our own identity. By failing to recognize that CREATING is giving form to an idea, transforming it into an object, our cultural tradition has not only inhibited this creation but has also emphasized the "superiority" of erudition and liberal professions. The introduction of Industrial Design schools aimed to reclaim the importance of risk as a specific field of creation. At PUC, "design" was integrated into a Center for Human Sciences rather than one for technology, as it involves expressing the creative and transformative sensitivity of humans in relation to their environment. Thus, we aim to emphasize the PROCESS OF CREATION much more than the product itself, avoiding the practices of pure and simple repetition imposed by a universe saturated with pre-existing products. In this way, one ends up discovering a NATIVE THEME, that is, the demands of a reality much closer whose desires and needs imply not only new solutions but solutions tailored to that reality. This aims to integrate the student into the university environment without turning technical knowledge and theoretical knowledge into doctrine, but rather something they incorporate into their education, adapting it to the cultural and socioeconomic context in which they will operate. Therefore, university education converges towards the approximation of areas where the designer's knowledge expands, allowing their skills to develop in accordance with contemporary needs. The notion of a native theme refers to the construction of a unique identity that will characterize our design, not only distinguishing it from others through its cultural complexity but also integrating it into a transcultural universe. (Excerpt from a document that presents a teaching proposal from the Department of Arts at PUC-Rio at the 3rd Latin American Association of Industrial Design, ALADI, 1984 - mimeo).

As the presentation of the thinking behind the teaching structure already makes clear, the way of seeing design as a collective and practical learning discipline and integrated into the Human Sciences Center was and continues to be essential for the identity of Arts and Design at PUC-Rio and its students.

Building on this scenario and recognizing the connection Social Design creates with the surrounding community, the course's key feature is its structuring subject, "Project," which accompanies students throughout their studies, from the first to the last semester. The idea of having a structuring subject throughout the course was precisely to make it a laboratory, so that the student could experiment and apply the knowledge they learned during their academic career. In this sense, it was often necessary to provide specific skills for the development of specific tasks.

The teaching of Industrial Design at PUC-Rio through the PPD course proposes a design, not simply of an object, but of an object linked to the human being, linked to those who will give meaning to the existence of something.

> This thought that makes drawing alive and teaching even more alive has still been shared with students on this course from the time they arrive at university until they graduate. There are six semesters of this subject that is simply called "Project". The first one that is offered to students is the "Basic Project".
>
> During our research and development of this documentation project, we saw that its didactic function, aimed mainly at elementary students, deserved special attention. The unpreparedness of the student who arrives at university for the exercise of discovering others, of the desire for a group, of something different from oneself, of the exercise of walking and not of pushing buttons, of writing and not of making crosses in front of oneself, is a reality, determined spaces. The exercise of logic linked to a social reality and not linked to the analyst's own logic. The great exercise of arriving empty, without prejudice, in a social group.
>
> This subject proposes all of this, believing that by walking, writing, drawing without prejudice, but with a lot of involvement, a project will actually come to fruition.
>
> However, it is recognized by teachers and students that this stance needs to make use of, as it is often new as a practice, all possible resources so that it can be clarified to students who naturally have difficulty understanding it. (Handwritten text - Heliana Pacheco, Archive of the Arts and Design Department at PUC-Rio, 1990)

By expressing in this report the students' difficulty in understanding how the construction of the proposed object should work, Pacheco[26] (1990) highlights the methodological rupture that exists between the design of PUC-Rio and other teaching environments, such as the basic schools from which these students possibly came from. Thus, it is also possible to challenge the notion that the student arrives

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26 PACHECO, Heliana. Manuscript. Archive of the Arts and Design Department at PUC-Rio, 1990.

at university empty of knowledge and experiences, since the lack of understanding shows that they are mentally tied to a specific teaching model, even if they have been shaped in this way unconsciously.

It was from this pedagogical construction and the possibility of thinking and teaching design from a social perspective that the PUC-Rio's Arts and Design department developed, which in 2025 celebrates 47 years of existence.

Poetic Design at the Pontifical Catholic University of Valparaíso

It is not surprising that the construction of the *Escuela de Arquitectura y Diseño* at PUCV originally took place through the union of professors, artists and friends who found themselves in a teaching environment in which they did not fit. The origins of the development of schools and universities in Latin America were based on European and North American standards and systems, which often did not match our social, cultural, territorial and economic reality. Ana Vanessa Siviero Pérez[27], a former Chilean teacher of the Escuela, tells in her doctoral thesis, carried out in the Graduate Program in Design at PUC-Rio, how the union of Latin American Architecture and Art professionals began in Santiago, in an avant-garde way when thinking of university education:

> The School of Architecture and Design of the PUCV (from now on we will only call it "La Escuela"), proposes an original approach about the conception of poetry and art with the trades, in this way it has created a particular pedagogy from its foundation to the day of today.
>
> This trajectory of more than sixty years starts from the collective. When we refer to the beginnings of this new UCV School of Architecture, a few decades after the founding of the pre-existing Architecture degree, there is a key element that comes about when hiring a group of eight professors who came from Santiago to provide services in the year 1952. This group arrived constituted, it was a group that in Santiago met to discuss architectural issues and problems of the city. (PÉREZ, 2018, p.30)

Built from the perception and recognition that observation and hands-on doing are the main means of building knowledge, *La Escuela* proposes a formative process that understands architecture and design as a piece of art in itself, orchestrated through transformative practical experiences. The crafts are based on a permanent bond with poetry, which gives meaning and feeds the students' creativity. The school's academic project is purposeful, disruptive and visionary and aims to train people who can later propose this vision of education in many contexts, strengthening their ties with the region and country. As Pérez reports in her thesis, in the early 1960s, the professors who were proposing this rupture in the way of teaching Architecture

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27 PÉREZ, Ana Vanessa Siviero. Enseñanza-aprendizaje inicial en Diseño: Taller de proyecto como generador de conocimiento teórico y habilidades creativas en el curso de Diseño de la Escuela de Arquitectura y Diseño, PUCV. Tese (Doutorado em Design) - Departamento de Artes e Design, Pontifícia Universidade Católica do Rio de Janeiro. Rio de Janeiro. 177p. 2018.

shared their proposals for this new way of approaching teaching in the area at the First Conference of Latin American Faculties of Architecture:

> We think that architecture is fixing at some point the intimacy of life seen through the face, its manifestations of space, always constituting works that trace, signal, and constitute the present time. We have wanted to give these coordinates at the University. We have wanted to put students in contact with living, with intimacy. We have wanted them in contact with space and we have wanted to put them in contact with the present. So, all our efforts are those. All our work is absolutely that. (CRUZ C., 1959, p.1 apud PÉREZ, 2018, p.40).

The way of thinking that was exposed by professor Alberto Cruz foresaw the understanding of architecture from a new perspective. It sought to look at the city, the urban spaces, the people who circulated there, the social events, among other questions arising from the observation:

> How do we know life? We think that as we see it through space, going out to the city to explore it. It is not known inside the classrooms. It is not known from the testimonies of others. It is known by going out to the city to tour it. Our city is a port on hills by the sea. It is a three-dimensional space. (CRUZ C., 1959, p.2 apud PÉREZ, 2018, p.40)

The unique pedagogy developed at PUCV is based on the idea that Architecture and Design are in their deepest sense an expression of art. The school becomes a real community of life, work and study founded on freedom and self-management and expects its students and teachers to actively participate in building its learning space. The educational proposals developed at *Escuela de Arquitectura y Diseño* in Valparaíso have the role of giving shape to human habitation from observations and practical experiments with characteristics of creativity brought in the works carried out within the world. In a speech about the beginning of construction of the school and its commitment to *Ciudad Abierta*, Fabio Cruz, one of the members of the founding group, reported:

> Fundamentally, what we transmitted and taught was the reflection of our own creative adventure, which was based on and illuminated by two affirmations: one: that man by his very nature is poetic, which incessantly leads him to reinvent himself; each time, the figure of the world; and the second affirmation: that the work of architecture originates from the observation or praise of everyday reality, through drawing and the word (ESCUELA DE ARQUITECTURA Y DISEÑO PUCV, 2003 apud PÉREZ, 2018, p.40).

One of the visions that guides the thought developed by the school is *Amereida*, a poem written by its founders, which is based on a permanent question about being American from the recognition of the appearance of America seen as something that was found or a gift. As it's presented in the *Escuela*'s website "From the first page of the poem, the encounter with the unknown opens up the possibility of starting to think of the new world as a gift, a gift. Its main sign: the Southern Cross, the light that rises on the horizon and orients in the north."

Amereida is the beginning of the pedagogical project called *Travesía*, which consists of poetic journeys through America with the intention of inhabiting the intimacy of the continent and its inner sea to which it sings. During the "*travesías*", Architecture and Design students are encouraged to register artistic interventions made in the space, understanding that "this new design aims to integrate the canonical aura of this historical archive with the almost playful fluidity that is generated from the cataloging tools provided to the user."[28]

The interventions proposed during the *travesías* constitute an extensive observation exercise that students undergo throughout their formation process. Its relationship with poetry and words, drawing and relief, establishes the identity of the school, which constantly seeks to build an American identity located in the south of the world. It was in 1970, a few years after its formalization as a *Escuela de Arquitectura y Diseño*, that *Ciudad Abierta* was inaugurated based on the "need of its founders and inhabitants to have a space to develop, in the light of *Amereida*, the project of creating a new life, work and study."[29]

Most of the founders of this space were poets, architects, designers, sculptors, philosophers and artists from the school, in addition to others who came from Latin American countries and Europe. Its origins occur in the *Travesía de Amereida* in which the participants asked themselves what was the meaning of America, seeking to understand their way of being in the world and what it meant to be Americans. *Ciudad Abierta* was then considered the "creative meeting of life", a place that combined work, study and that proposed to carry out a great exercise of hospitality with all its visitors and residents. During the poetic act of its inauguration in 1970, the following words resounded across the dune terrain near Ritoque beach:

> Today, hit by the crisis and despised by the arrogance of the First World, we hear that "history is dead", and that the rigidity of the world system allows only one profoundly unjust and disorderly "order". We Latin Americans, however, are aware that in the agony of ideologies, ideas die. We have seen that our shortcomings are transformed into greater creativity, that our values of solidarity and common action are stronger than individualistic selfishness, consumerist triumphalism and vain Enlightenment models. We are aware of the great limitations we have, but also of our enormous possibilities. For us, utopias are not dead: we have faith in a better world and we work to achieve it. In other words, we are able to continue building utopias which, unlike the original ones, have a concrete place: our America. This is possible because we do not seek our way: we are certain we have found it. (Historic Archive José Vial PUCV apud BRIGHENTI, 2018, p.25)

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28 Excerpt taken from the Escuela de Arquitectura y Diseño de Valparaíso website: ead.pucv.cl

29 Excerpt taken from the Escuela de Arquitectura y Diseño de Valparaíso website: ead.pucv.cl

Games have also been present in the collective construction of its learning space. Not only during the *travesías* but also at the beginning of the semester and in celebration of important dates, students and teachers come together to bring meaning to the territory in which they find themselves. The act of building in *Ciudad Abierta* space becomes playing, an essential element to stimulate creativity and take the student out of their comfort zone:

> Building architecture in the Open City therefore becomes playing the game which, as we know from the start, has its own rules. These rules are made by the teachers together with the students through exercises such as the task, and they change depending on the "game" that is played, imposing themselves in a different way from time to time. It is the professor who invents the rules from time to time, becoming himself a participant in this exercise which has a high creative potential and puts him in a position to learn and question himself every time. Play leads to invention. There are no losers or winners because what matters is just playing the game, participating in the game with maximum commitment and coming out richer and more mature. The student is very often put in the position of not immediately understanding what the professor has talked about, he finds himself faced with a game that he doesn't really know how to deal with, but from which he must try to take an "act of faith" and, based on what he has received from the teacher up to that point, try to play the game. (BRIGHENTI, 2018, p.40)

Just like the Department of Arts and Design of the Pontifical Catholic University of Rio de Janeiro, the *Escuela de Arquitectura y Diseño de Valparaíso* has very valuable characteristics regarding the way in which subjects are taught. Experimentation plays a vital role in the development of both students' and teachers' work. What's even more interesting is that, because the university and teaching are a living ecosystem, the projects conducted there are always linked to real-world situations.

As reported here, the *Escuela de Arquitectura y Diseño* is a favorable environment for the training of critical professionals who will be able to work from an interdisciplinary collective construction that involves poetics, philosophy, walking, observing and proposing interventions that will continue to be developed by the students who come over the years.

Taking the example of the pedagogical projects of the two design schools presented above, the potential for a leading role of design in the establishment of new educational approaches, more based on the effective participation of students, in dialogue, in exchange, in the relevance of concrete experiences, becomes clear. Therefore, in the next stage of this chapter, I aim to bring to light the epistemological understanding of how design can impact the current educational practices and those we aim to develop in the future.

4.3
How Can Design Influence and Shape Educational Practices Today

Even though there is no evidence that some classic educational methodologies such as the Freinet tour class, the Montessori method or even the Freirean teaching-learning perspectives have influenced the development of design thinking, it is important to question how they can be related. We can consider that the routes of reflection on design, its functions and contributions to the social and economic development of the world have already crossed many ideals previously situated in the field of education.

Célestin Freinet, a noted French pedagogue and educational reformer, for example, believed that education should prepare citizens for free and creative work, making students capable of dominating and transforming the environment around them. In this sense, he understood that teachers had the function of encouraging children to live experiences and seek answers to their needs and concerns:

> Freinet believes that the students' interest was more focused on what was happening outside than inside the school. Thus, the author used the "tour class" as one of his pedagogical techniques, which aims to seek extracurricular motivations in the teaching-learning process. During these "tour classes" students were able to express themselves freely, use experimental groping to make discoveries, put their sense of cooperation into practice and reflect on their individual and collective activities. Such freedom will facilitate the process of students' intellectual ascension, in addition to enabling them to become free, autonomous, more responsible humans who are able to contribute to the transformation of society. (COSTA, 2006, p.27)

In a very similar way, design schools typically guide their students by emphasizing teaching through practical activities. Due to its essentially hands-on nature, professionals often develop reasoning through manual skills. On top of that, designers as well as educators work in complex systems, in which the approach created and used to deal with existing issues are decisive for the tracks towards which social behaviors are directed. Alain Findeli[30], Design Professor at the University of Quebec in Montreal, in his text *Rethinking Design Education for the 21st Century* published in the journal Design Issues in 2001, discusses this complexity in procedural design models:

> The potential of complex systems theory for design has been identified by some authors within the last decade. Emphasis has been put mainly on the complexification of the models describing the design process, and on the semiotic complexification of the perception and reception of the products of design. All of these endeavors tend to remain within the domain of design, however. My suggestion is that we should not

30 FINDELI, Alain. Rethinking Design Education for the 21st Century: Theoretical, methodological, and ethical discussion. In: Design Issues, v.17, n.1, 2011, p.5-17.

> restrict ourselves thus, but, instead, open up the scope of inquiry, i.e., in systems theory terms, and push back the boundaries of our system in order to include other important aspects of the world in which design is practiced. (FINDELI, 2001, p.11)

The practice of design, when applied in educational spaces, can be characterized through Design in Teaching-Learning Situations, a line of research developed with the intention of exploring pedagogical approaches that integrate design methods and processes in the educational context. This system, which can also be considered a way of perceiving and analyzing learning processes in a non-linear way, consists of the interaction of actors and objects present in these environments.

This line of research emerged at LIDE, the Interdisciplinary Design Education Laboratory at the Pontifical Catholic University of Rio de Janeiro, that began to stand out in the nineties due to its multidisciplinary approach, which combined design, education, psychology and technology. Currently, research carried out in this laboratory and guided by Design in Teaching-Learning Situations are aligned with the main aspirations and needs of 21st century education, to create more meaningful experiences in the school environment and involve students with the content and construction of knowledge.

Delving deeper into the meaning of this possible interrelation between design and education, the system described above has key concepts that compose it. Devised to understand how design can be applied to facilitate learning, promote collaboration, stimulate creativity and solve complex problems, they are: culture, knowledge construction, concrete experiences, critical reflections, interdisciplinarity and paradigm shift, concepts that are related in an unstructured, changeable and cyclical way.

Due to the possibility of exercising multidirectional thinking in the structuring of non-traditional pedagogies that dialogue with the needs and obligations of basic education, design stands as a promising field to stimulate the development of activities and projects in which students learn through their own experiences. In this sense, the process proposed by Design in Teaching-Learning Situations can begin from actions prompted by dialogue between the people involved to solve complex problems, based on mandatory school content listed by Ministries of Education.

The relationships that can be fostered throughout this collective construction are less hierarchical and, therefore, more collaborative. In this context, the teacher plays a role more as a facilitator of the learning process than as a transmitter of knowledge, thus implementing learning through experience. This cycled system was designed and studied to “reach its end” with intense participation from students and teachers, promoting interaction and generating critical reflections on the subject of the proposed activity within a school subject.

These complex systems that can be established in the interaction between design and education are based on the theoretical-practical relationship of the two fields.

The potential that can be developed for the benefit of learning processes, enable people involved in imagining and creating new paradigms for the future. Therefore, Findeli contributes to the reconstruction of possible perspectives to cultivate the transition to other ways of doing and thinking about design:

> Within these complex systems, designers are expected to act rather than to make. In other words, making (poiesis) must be considered only a special case of acting (praxis), to the extent that even "not making" is still "acting." In philosophical terms, one would say that design pertains to practical, not to instrumental, reason; or else that the frame of the design project is ethics, not technology. In existentialist terms, this could sound as follows: design responsibility means that designers always should be conscious of the fact that, each time they engage themselves in a design project, they somehow recreate the world. (FINDELI, 2001, p.14)

The concern with situating our project practices in the place where we live is not necessarily recent and, just as in design, teaching-learning processes should be no different. The importance of connecting people's experiences with their work and learning spaces is directly tied to their involvement and identification with these processes. In light of this, thinking about and promoting education based on principles and challenges that are located in the Global South, provides the development of scholarly epistemologies focused on our own interests.

John Dewey, as mentioned before, was one of the most important thinkers and defenders of learning through experience. Albeit maybe under a different name, the need to think about education in a democratic, student-centered way and with an integrated curriculum was already being promoted by Dewey and his companions since then. As such, reflections brought in Education and Democracy, address the importance of playing for learning in multiple senses:

> Modern psychology has substituted for the general, ready−made faculties of older theory a complex group of instinctive and impulsive tendencies. Experience has shown that when children have a chance at physical activities which bring their natural impulses into play, going to school is a joy, management is less of a burden, and learning is easier. Sometimes, plays, games, and constructive occupations are resorted to only for these reasons, with emphasis upon relief from the tedium and strain of «regular» school work. There is no reason, however, for using them merely as agreeable diversions. Study of mental life has made evident the fundamental worth of native tendencies to explore, to manipulate tools and materials, to construct, to give expression to joyous emotion, etc. When exercises which are prompted by these instincts are a part of the regular school program, the whole pupil is engaged, the artificial gap between life in school and out is reduced, motives are afforded for attention to a large variety of materials and processes distinctly educative in effect, and cooperative associations which give information in a social setting are provided. In short, the grounds for assigning to play and active work a definite place in the curriculum are intellectual and social, not matters of temporary expediency and momentary agreeableness. Without something of the kind, it is not possible to secure the normal estate of effective learning. (DEWEY, 2001, p.136)

The perspective and awareness that an effective way to learn is through one's own experience leads us to realize that aspects such as culture, politics, lifestyle and local customs can have a huge influence on the way we can structure learning-teaching spaces. If taken into account the interactions and elements that each student can add to the dynamics proposed by a non-traditional line of teaching, these aspects become definitive in the implementation of the collective construction of the path to knowledge. Hence, approaches more situated in territorialities could be a way to transform educational practices that exist today.

In this aspect, the practice of design and education appear as hopeful fields for a possible transition of paradigms, which can go hand in hand to build new parameters in the development of a society more concerned about its future. However, for these fields to act jointly and interdisciplinary in the search for a more resilient society, it is essential to discuss the current paradigms in which they are intertwined.

Because of its inherently practical nature, design may be more open to challenging closed and globalized ways of thinking, particularly in understanding the world and its realities as a unified whole. The first step in reflecting about a world of transitions is to question the reproduction of epistemologies and methodologies developed in the north of the world in a completely different economic, social and cultural reality, such as what can be observed in the Global South.

With this in mind, Design in Teaching-Learning Situations presents itself as a possible path to guide a break in paradigms in the school space, from the moment that it calls into question the activities and relationships created in the face of traditional education thinking. This understanding primarily involves the deconstruction of the concepts of teaching and learning and goes through the writings of Ivan Illich (1972):

> The school system also rests on a second great illusion, that most of what is learned is the result of teaching. Teaching, it is true, can contribute to certain kinds of learning under certain circumstances. But most people acquire most of their knowledge outside of school. (ILLICH, 1972, p.27)

In order for it to be possible to claim an interconnected social transformation, we need to reformulate concepts and propose collective constructions of parameters with actors from the most diverse fields of knowledge. In the case of the discussion proposed in this doctoral thesis, we are examining how these basic structures can be built from an interdisciplinary perspective between design and education.

4.4
Chapter findings

In this chapter I sought to draw a profile to illustrate how the interdisciplinary bases exist between design practices in two Latin American schools. These practices are not necessarily situated completely within the interrelationships between design

and education. However, it is worth saying that this is not the case due to the multiple influences that the pedagogical projects presented had, from social science, architecture, poetry to philosophy.

Still, this research also aims to find these common points so that we can build an evolution in the way we see, understand and practice the epistemology of design in our reality in the Global South and more specifically, Latin America. The need to look carefully at the professionals we are training is evident, as today's world demands more specific exercises in design, for example, in complex problems that are increasingly present.

The focus is on the crucial vision of transitioning into the professional role of a designer. This transition is rooted in collaboratively creating more human-centered projects that address today's challenges from a local perspective. In this way, Design in Teaching-Learning Situations presents itself as one of the possible paths for this construction. Since it highlights the experiences of the people involved, the interdisciplinary relationship between design and education, it seeks dialogue and continually looks at the iteration of the community to build futures that are more conducive to human life on planet Earth.

The next chapter will present two examples of projects developed at the Pontifical Catholic University of Rio de Janeiro and the Pontifical Catholic University of Valparaíso that had as their guiding principle the interaction of design with the field of education. In this way, I seek to illustrate the possibilities that this meeting brings to the development of perspectives of visions located in our reality in the Global South.

5
When design method and design thinking go to schools: STEAM&Gender and *Inventação*

Chapter five aims to provide examples of how the interdisciplinary relationship between design and education can occur in the school environment. We will explore a service design project and a product design project, both of which illustrate the potential of the methods and concepts established in design.

STEAM&Gender, a service design project developed by the Pontifical Catholic University of Valparaíso, seeks to promote an educational experience that sparks the interest of children and adolescents (especially girls) in science, technology, engineering, arts and mathematics (STEAM). Upon noticing a huge gender gap in career choice between boys and girls, the Chilean government began to support a series of initiatives on the topic. I created the *Inventação* toy with the aim of supporting primary school teachers in carrying out practical and interactive activities at school. Its pieces have different shapes that stimulate construction skills, in addition to helping promote positive group dynamics and exchange of experiences between students.

My aim is to show how the relationships outlined and substantiated throughout the thesis can be applied in a practical way through these projects in Latin American educational settings, guided by Design in Teaching-Learning Situations. It is important to highlight that the two projects described have different natures, but are applicable to the scenario discussed in depth in this work.

5.1
STEAM&Gender

About the Project

STEAM&Gender is a project developed by the Pontifical Catholic University of Valparaíso in 2023. It comes from the need to understand how the constant technological expansion, with increasingly complex challenges, reflects on the context of school education. It is based on this scenario that new pedagogical models emerge, such as STEAM (Science, Technology, Engineering, Arts, and Mathematics) methodology, which seeks to develop not only scientific, technological and artistic skills but also competencies based on practical learning, focused on projects and problem solving.

This method has interdisciplinary and experiential learning as its key features, promoting an approach to critical thinking and the collective construction of knowledge. STEAM can be understood today as a greater proximity to what can be considered modern education. However, it is worth highlighting before going into more details, that the practice of STEAM in basic learning spaces was born in the Global North and is still very little applied and adapted in schools in the Global South.

The focus of the project described in the *Escuela de Arquitectura y Diseño de Valparaíso* in 2023 was the challenge of understanding how to apply the STEAM methodology without advancing gender stereotypes within schools, with the aim of promoting equal participation by all people.

Research by the Chilean Ministry of Education published in 2020 reveals significant gender disparities in academic training, such as master's and doctorate degrees, and in leadership roles within scientific-technological centers. This data indicates a cultural bias against women in the country. In response, Chile's Ministry of Foreign Affairs emphasized in 2022 the need for public policies to promote genuine inclusion.

The goal of the project is to create a comprehensive development model for monitoring STEAM educational trajectories in technical schools from a gender perspective, with the intention of achieving an impact on local, regional and national education. According to the report (JELDES et al., 2023), the project comprises three dimensions: training, awareness and support:

> Training: The program designs and delivers experiences for EMTP (Technical-Professional Media Education) students in gender studies, STEAM, and Design Thinking. It incorporates the mobile FabLab (PUCV-Aconcagua FabLab) and resources from the PUCV *Escuela de Arquitectura y Diseño* to introduce digital fabrication and develop scientific, technological, and artistic skills.
>
> Awareness: It employs communication strategies and organizes events to encourage enrollment in technical schools in Villa Alemana, specifically targeting women and members of the LGBTIQ+ community. It promotes the use of new technologies for STEM/STEAM education through internships and talks led by industry leaders.
>
> Support: The initiative aims to assist EMTP (Technical-Professional Media Education) institutions by developing strategies to identify and overcome barriers that hinder the educational paths of women and members of the LGBTQIA+ community. These techniques should be integrated into a comprehensive support model for EMTP students.

Design Challenge

Given the dimension of awareness, where the group of designers were placed to work, the main challenge identified in the beginning was to understand how to awaken students' interest in the projects to be developed and in the use of complex knowledge tools. Added to this, there was also familiarization with the STEAM methodology, which must be thought of and applied in a way that is sensitive to gender perspectives.

Juan Carlos Jeldes, the professor in charge of the Aconcagua Fablab and the project's design nucleus, provides a foundational concept that can be used to address this challenge, which he refers to as the "Body of Design Value". It includes three

dimensions: language (what to do), technology (how to do it) and collaborative doing (who to do it with). For him, "the body of value increases as these dimensions remain integrated while they become more consistent" (JELDES, 2017, p.22).

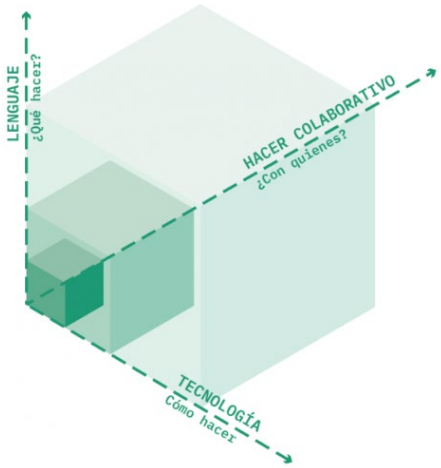


Figure 4: Three-dimensional diagram of the body of design value.
Source: Juan Carlos Jéldes (2017).

One of the main principles of the project's design core was to ensure that experiences were developed based on three key aspects: replicability, associativity, and commitment to the users who would utilize the devices created for STEAM activities and projects.

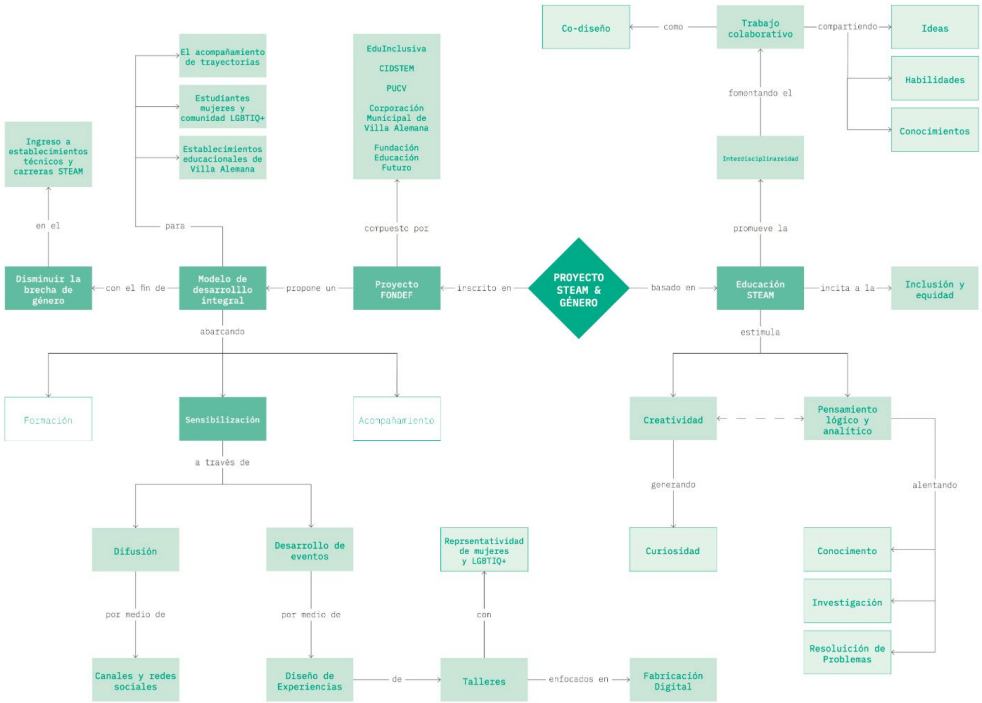


Figure 5: Detailed Design Challenge Scheme. Source: Escuela de Arquitectura y Diseño de Valparaíso Archive.[31]

31 The detailed image is included in the appendix.

Research Focus Overview

Delving deeper into the specifics of the project, two research questions are posed to guide the development of the work: How to trigger the interest of students in subjects related to STEAM disciplines applied in the workshops taught and that will continue to be held? And How could we create and measure an interest index to validate the attraction generated in the participants?

In light of these questions, it is essential to reiterate that approaches like STEAM (Science, Technology, Engineering, Arts, and Mathematics) remain rare exceptions in public education across Latin America. Furthermore, there is a lack of data that can help us understand student engagement with educational initiatives of this nature.

The hypothesis formulated as the foundation for the investigation was:

From the Design of Experiences, practical-theoretical workshops are carried out with gender representation and performativity strategies, which will captivate and capture the attention of the students, triggering interest and involvement in digital manufacturing, developing design thinking and awakening curiosity in the STEAM disciplines that have been taught in our workshops (JELDES et al., 2023).

According to the online project report (JELDES et al., 2023), the overall goal was to develop a service model centered on educational interventions and workshops that utilize digital design and manufacturing. This model will include strategies aimed at building communities that implement STEAM education while incorporating a gender perspective.

The specific goals of the project are (JELDES et al., 2023):

1- Implement learning instances with interactive workshops that promote the participation of girls, women and members of the LGBTQIA+ community in STEAM education.

2- Develop a model with strategies that allow support, incentives and motivate the trajectory of participants, especially women and students part of the LGBTQIA+ community in STEAM subjects.

3- Grant the model the quality of replicability, allowing it to scale beyond educational units, aiming at the design and execution of workshops and experiences with social communities and with a diversity of age ranges.

Teoretical Framework

The project's model is the integral development of everyone involved, from teaching staff to students and also the psychosocial support center. This model was chosen due to its greater flexibility to replicate in educational environments, seeking to encourage everyone's participation in addition to generating a greater connection between logical thinking and creativity. Furthermore, the STEAM&Gender project

seeks to promote the establishment of creative communities, driven by the idea of promoting positive social changes permeated by the concept of sustainability. Its members are characterized through the diversity of skills, knowledge and perspectives they present and, through collaboration and active participation, these communities can develop ideas that aim to address their social, economic or environmental challenges.

Conceptual Framework

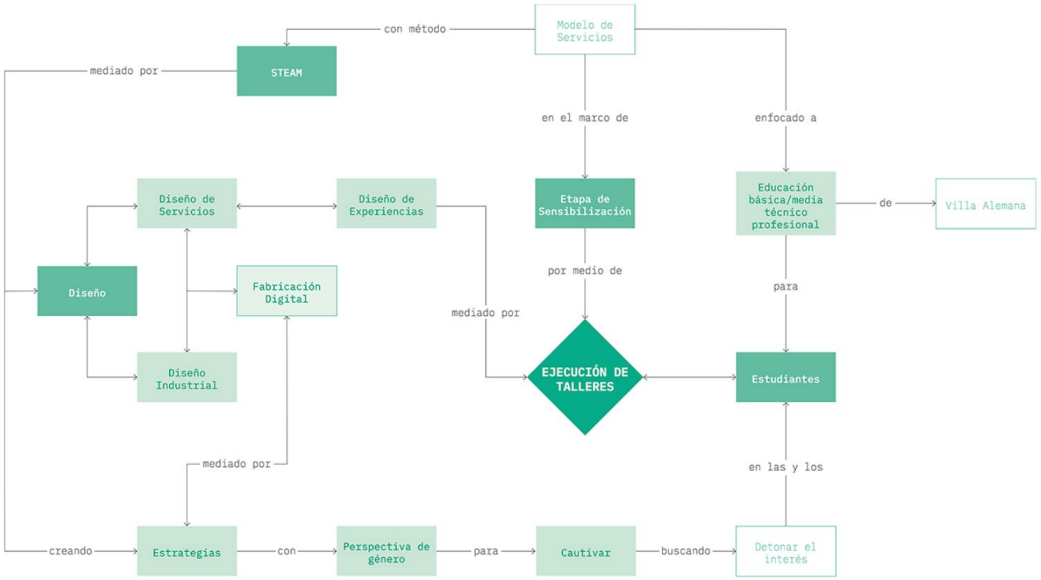


Figure 6: Detailed Conceptual Framework Schema. Font: Escuela de Arquitectura y Diseño de Valparaíso Archive.[32]

The project's conceptual framework is based on four concepts: STEAM, digital manufacturing, the knowledge society and the Tinkering method. When articulated, these concepts form part of the necessary background for the theoretical and practical construction of the project, which had its launch version in 2023. The concept of STEAM, an updated version of the original STEM, is one of the starting points for the design of the workshops that are being taken to students at selected public schools in the municipality of Villa Alemana in the Valparaíso region:

> The acronym STEM was created during the 1990s by the National Science Foundation of the United States to refer to a set of science, technology, engineering and mathematics disciplines (Science, Technology, Engineering and Mathematics). The literal meaning of the word in English is such and results applicable to the notion that, from these four disciplines, new solutions could emerge that boost the country's competitiveness as a world leader in innovation and development. (JELDES et al., apud BYBEE, 2013)

32 The detailed image is included in the appendix

Over the years and the deepening of studies in relation to STEM, the evolution of the acronym emerged in South Korea. The integration of arts and design was adopted by some countries because in an interdisciplinary way it brings together students who are interested in both science and creative arts. The new notion, currently called STEAM, aims to connect logical thinking and creativity, seeking to overcome dichotomies established in the past.

To build workshops based on STEAM learning, the project's design core was the concept of digital manufacturing:

> Digital Manufacturing is the process and series of operations for the materialization of an object. Through CAD (Computer Aided Design) software, the design and geometries of a part are produced, which are then transferred to a CAM (Computer Aided Manufacturing) program that defines operations that are then read by a manufacturing machine to produce said product. Depending on the object that needs to be manufactured, the type of manufacturing will be determined to best achieve its form and purpose; These technologies are divided into additive manufacturing and subtractive manufacturing, which roughly refers to the way machines operate, either adding the material layer by layer, or conversely, in a machining process the material is gradually eliminated. (JELDES et al.,2023)

The relationship between STEAM and digital manufacturing is direct, as digital manufacturing tools provide users with extensive opportunities to explore their creativity, learn software, and incorporate in their creations concepts from science, technology, engineering, arts, and mathematics. In this context, the knowledge society plays a crucial role in guiding economic and social development through educational practices, such as those proposed by the STEAM&Gender project, which contribute to a society rooted in knowledge and information. According to Cortes (2023, apud Jeldes et al., 2023), the knowledge society requires a culture of continuous learning and an advanced technological infrastructure to maximize its potential.

Finally, the Thinkering Method presupposes constant experimentation based on creativity and playfulness, in order to respond to rapid changes in society and the environment in which we live. Some characteristics of this method are (JELDES et al., 2023):

1- Technological disobedience
2- Learning by doing
3- Experiment with materials and ideas to understand their capabilities
4- Iteration with learning, having ideas and constantly experimenting with them
5- Create, think and invent with your hands
6- Learn from your own mistakes
7- Unstructured time to explore and invent
8- Playful and exploratory methodology
9- Tests the student's limits

10- It is generally related to the maker movement and the holding of workshops
11- Use of the body and body expressiveness

The conceptual and theoretical frameworks when read in an intertwined way represent the complexity of the service model that began to be developed in this partnership led by *Escuela de Arquitectura y Diseño de Valparaíso*. Design stands as a great articulator of different areas and practices, managing to provide a foundation for something that has the potential to become a public policy in the future.

Structure of workshops
To define a basic structure for the workshops, the design group, responsible for creating the dynamics, created a first draft in 2023 of the service model for monitoring STEAM&Gender education. This outline included: planning and welcoming of participants, the theoretical and practical definition of the workshop content, the rhythm and schedule to be followed, the presentations and other visual resources, tools, materials and recruitment and training of monitors, as detailed below:

1- Planning and welcoming: Organization of the time and space for the activity, including the number of students, confirmation of arrival and departure times, and the assignment of monitors.

2- Theoretical and practical definition of the workshop content: Definition of the phenomenon—whether physical, biological, chemical, or mathematical—that will be studied. Establish a direct relationship between the content and a physical object to develop a device that can represent the phenomenon and can be reproduced using machines and FabLab technologies.

3- Workshop rhythm and schedule: Start with a welcome and an icebreaker activity to encourage participants to bond as a work team. This will be followed by a development phase that includes a theoretical explanation of the chosen phenomenon and an overview of the practical activity to be conducted. The climax will allow participants to present the results of their practical tasks. Finally, create a sharing environment where participants can express their sensations, feelings, questions, and comments about the experience.

4- Presentation and visuals: The speaker leading the workshop should have a thorough understanding of both the content and time management. They must also be adaptable, able to adjust the activity as needed in response to unforeseen circumstances. Additionally, the speaker is responsible for introducing the team facilitating the workshop, ensuring that all members are well-represented. Their presentation should foster an environment of trust and acceptance at all times. It is essential that the presentation captures the students' attention and remains concise. Consideration should also be given to audiovisual and sound support.

5- Material resources: Prepare materials so that each participant can take home a gift that serves as a reminder of their workshop experience. Organize tool kits containing all the pre-made materials needed for the activities, and bring extra materials to

account for any errors. Create a playlist with songs for specific moments during the workshop. Additionally, make an inventory of all tools and materials, and ensure the group has a vehicle capable of transporting digital manufacturing machines.

6- Recruitment and training of monitors: Monitors should have a general grasp of the content to effectively highlight the project's focus. Ideally, they should be women or members of the LGBTQIA+ community; if this is not feasible, the group should reflect equitable and inclusive diversity representing various backgrounds. Monitors must fully understand their roles and the specific group of students they will be working with, and they should actively encourage participation from everyone.

After testing this model in some workshops created and held throughout the second semester of 2023, students from the design group proposed a model, which they called proactive perception design. This model contains a manual so that the service can be replicated in other school contexts through STEAM workshops organized and applied in fablabs.

5.2
Case Study: Workshops in Villa Alemana

In this subchapter, I will share personal experiences related to the processes and activities in which I participated as a member of the design research group within the STEAM&Gender project at the *Escuela de Arquitectura y Diseño de Valparaíso* between november 2023 and june 2024. These experiences illustrate some of the evolution of complexity and depth of the service designed with the aim of minimizing gender gaps in interest in STEAM careers in Chile.

The reports are organized into three chronological stages. The first stage relates to the project's inception, during which students, guided by Professor Juan Carlos Jeldes, aimed to develop workshops that integrated extracurricular content using the STEAM methodology. In the second stage, another group of students and researchers from the design center organized training activities for teachers from the project's partner schools, focusing on familiarizing them with digital manufacturing technologies. The third stage addresses the most advanced phase I experienced, in which design students collaborated with school teachers to co-create STEAM workshops that aligned with the mandatory curricular content established by the Chilean Ministry of Education.

Creating STEAM workshops with extracurricular contents
The first workshop I attended as an observer was about fractal mosaics. Its objective was to make students aware of the existence of the concept of fractal and its application in the study of natural phenomena such as plant growth or the formation and crystallization of snowflakes. Fractal shapes are tiny and therefore invisible to the human eye. However, due to the algorithms and complex calculation systems, it is possible to visualize and study them through codes.

The dynamic of the session was dedicated to working on possible forms for a fractal from its immateriality (in codes and digital drawings) to its materiality. To do this, each of the students learned how to create a simple code to generate a fractal. In the second step, the design was transferred to the Silhouette software, which operates a portable cutting and marking machine commonly used for cutting various materials. This process transformed the previously created coded design into a tactile and visual format. Seeking to expand the possibilities of materiality, students were guided to create a vacuum mold based on their own formal composition. In the last step, the mold they made was filled with chocolate so they could take home a *souvenir* of the workshop and the new knowledge they learned.

Figures 7 and 8: Fractal Mosaics Workshop. Source: Personal archive of the author. Pictures: Amanda Scattolini.

This workshop was held with students of different ages and, although using a language unknown to most of them, all groups (regardless of age, gender or previous knowledge) engaged in the activity and were curious to learn about the new technologies that were made available to them. It was conducted three times, at *Escola Básica Diego Portales* (Primary Education), *Liceo Tecnológico de Villa Alemana* (Technical Education) and *Escuela Básica Latina Inés Gallardo Orellana* (Lower Secondary Education) in the municipality of Villa Alemana, Valparaíso region, Chile.

In the second workshop I participated in, I played the role of monitor, being responsible for helping students carry out the proposed dynamics tasks. The theme chosen by the design students was geometric shapes and bodies and the main activity consisted of build a stool that was given to each person in a planned manner. The mathematical content that was inherently present was applied practically by encouraging logical thinking. This process involved exploring how the planned drawing could be transformed into a three-dimensional object.

Another important aspect of the STEAM&Gender workshops, as previously mentioned in relation to their structure, is personalization. In the case of assembling the stools, customization is based on simple stamps that were developed by the design group itself. A good variation of paint colors was available, in addition to the encouragement to mix them to discover new colors that could be used in the individual creation of the stools.

Learning by doing in this specific workshop played an important role in breaking down barriers that eventually appear when we are faced with mathematics or logical thinking exercises. Due to the fact that, formally speaking, these contents were hidden, the children were not afraid of making mistakes and tried to assemble the benches according to the instructions given.

This workshop was held only once, at the *Cerro Merced* toy library. The toy library is a facility operated by the Pontifical Catholic University of Valparaíso, designed to provide a space where children and young people can interact, receive tutoring, and participate in workshops focused on extracurricular content.

Figure 9: Building a Stool Workshop. Source: Personal archive of the author. Picture: Amanda Scattolini.

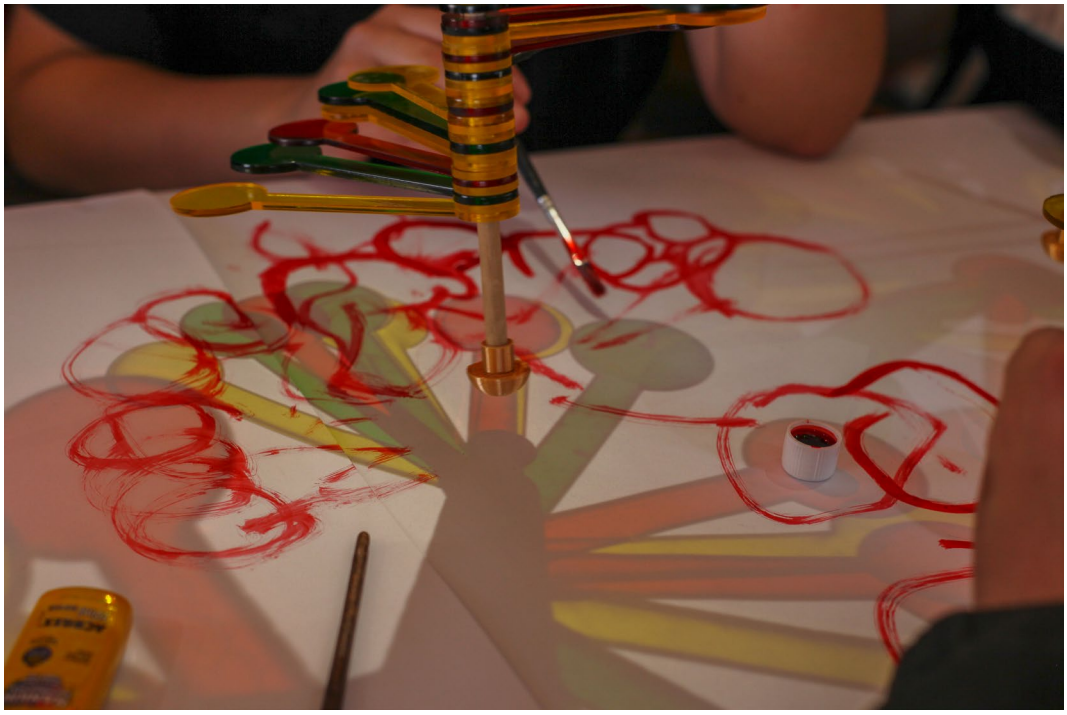
Figures 10,11, 12 and 13: Building a Stool Workshop. Source: Personal archive of the author. Pictures: Amanda Scattolini.

The third workshop was also held in the toy library and, like the second, I played the role of monitor, being closer to the children and young people to support them in carrying out the proposed activity. The selected theme was phyllotaxis, which in botany is related to the arrangement of leaves, flowers and other plant structures around a central axis in one or several spiral systems.

The activity was to assemble a structure with geometric figures that resembled branches. Made of acrylics in yellow, green and orange, the objective was to cause the perception of light and shadow through a provocation of this phenomenon. By observing the different shapes and colors generated by the projection of the object onto white paper, students had the freedom to draw based on what they saw from this reflection.

This workshop sought to deepen artistic and imagination skills by asking participants to create different figures based on their own knowledge and visual repertoires. From the reaction and participation of children and young people, it can be concluded that visual elements are key points for engagement in the activities proposed in the STEAM&Gender project.

Figure 14: Phyllotaxis Workshop. Source: Personal archive of the author. Picture: Amanda Scattolini.



Figures 15 and 16: Phyllotaxis Workshop. Source: Personal archive of the author. Pictures: Amanda Scattolini.

The last workshop I participated in during the initial phase was held at MadLab, the project's design core located on the PUCV Viña del Mar campus. The participants were also the same children who attended the *Cerro Merced* toy library and who participated in the shapes and structures and phyllotaxis workshops. On this occasion I also played the role of monitor, being responsible for facilitating the workshop stages with a specific group of students. The topic chosen was cyanotype, one of the oldest photographic printing processes in the world that produces images in shades of blue.

As an icebreaker for this workshop, I had the opportunity to plan and implement a quick activity about stories that the children had already experienced on transport in the city of Valparaíso. Using the frottage technique, participants were encouraged to try different ways of tracing an image using different combinations and colors. When they finished their drawings, they were invited to tell their remarkable story.

The activity involved creating a drawing on a white sheet of paper, which served as the foundation for the workshop. Once the drawing was complete, monitors assisted participants in vectorizing it using digital software, converting pixels into vectors. The design was then sent to a laser cutting machine, which transformed it into a tangible material. Participants were invited to use this material to assemble a collage-style composition that would be exposed to sunlight, allowing them to produce their own cyanotype prints.

The highlight of this workshop for me was the end in which the cycle of 3 activities with the children in the play library ended. The design nucleus, responsible for conducting the dynamics, prepared a collective snack with a structure to showcase the participants' productions on the day of this event.

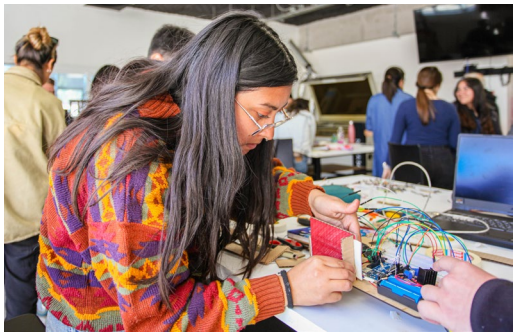
Figures 17, 18 and 19: Cyanotype Prints Workshop. Source: Personal archive of the author. Pictures: Amanda Scattolini.

How to empower school teachers in a hands-on STEAM workshop

In order to present the machinery and also the possibilities of STEAM to teachers from the schools involved in the project, the design and psychology groups organized a training session to carry out some activities. I participated in this workshop as an observer, without having any specific task or interacting directly with the participants.

As an introduction, teachers who worked in the same schools sat together and engaged in the task of assessing what they considered to be their school's strengths and weaknesses. After the reflection, they shared it with the whole group. Right away, the main activity had the goal to familiarize teachers from all the three partner schools with the newly designed space intended for their classroom dynamics. To facilitate this, guiding questions for collective discussion were proposed:

What things would I like to do/achieve with the FabLab?
What could working with FabLab add to my way of teaching classes?
How would I like to feel inside the FabLab space?
What apprehensions/fears do I have with the FabLab?

Figures 20,21, 22 and 23: Teacher's Training. Source: Personal archive of the author. Pictures: Amanda Scattolini.

Some points raised by teachers in this discussion were:

- Innovate teaching methodologies based on interdisciplinary and collaborative work to achieve meaningful learning;
- Use materials that can bring tangible support to knowledge, developing skills and competencies for the 21st century;
- Promote the feeling of freedom to experiment and encourage exchange activities between learners;
- Accessing the space for a limited period of time and not keeping training for using the machinery up to date.

The exchange session aimed to engage participants in planning the organization of the laboratory spaces. The hands-on activity allowed teachers to freely design the layout of the FabLab space to align with their teaching goals and aspirations. Unlike other activities I observed or participated in, this training session was designed with practical activities to allow teachers to experience FabLab activities firsthand. It took place at MadLab on the *Escuela de Arquitectura y Diseño de Valparaíso* campus, which is equipped with machinery similar to what will be available in their schools and it was the first concrete contact teachers had with the FabLab technologies.

Figure 24: Teacher's Training. Source: Personal archive of the author.
Picture: Amanda Scattolini.

How to co-create with teachers STEAM&Gender workshops with curricular contents

The last phase I experienced in the project marked a turning point in relation to everything that had been developed up to that moment. Initially, at the beginning of the project, the challenge was to awaken the interest of students and teachers in STEAM, motivate them and make them increasingly involved with the workshops carried out by the design nucleus.

To achieve this, a structural model of facilitators and monitors was implemented, which needed to be re-evaluated in this phase. Previously, all these individuals were essential for the workshop to occur. However, at this more advanced stage, the challenge was to determine how a single teacher could effectively structure, organize, and facilitate the workshop using the STEAM methodology. As the aim of the project is to develop a service for schools, its structure cannot change the staff capacity that each of them had.

Furthermore, another requirement for the success of the project was to keep school teachers in a constant process of learning a different perspective on education. In its formal training, this type of classroom dynamics is not taught, much less practiced, making the practice path even more complex. In this sense, in order for it to be possible to co-create the workshops with school teachers, it was necessary to

immerse some students from the design group in their daily lives. For some weeks, the students attended classes with the mathematics teacher, collaborating with him and the school to determine the content they would plan for a joint workshop.

The program content selected for the workshop focused on scales, specifically for a 6th-grade elementary school class. The workshop was divided into two parts: first, an explanation of the concept of scales, followed by exercises with the class to reinforce their understanding and illustrate its connection to real-world objects. To help the students grasp the differences in size and how these are represented on a scale, examples from Chilean fauna were used.

The practical part of the workshop consisted of transforming the animals that were presented in the theoretical activity to scale in their real sizes. For this, white TNT sheets were made available with the silhouette lines of each of them so that the children could paint and see what shape would come out. Each of the TNT sheets contained a part of an animal, either its eye (in the case of a whale, for example) or a part of its body (such as a penguin). In the end, the sheets were tied together to form 1x1 meter cubic structures. By placing these cubes next to each other, the entire animal (or a part of it) could be seen as a complete representation.

This workshop made clear the enormous potential for transformation of the STEAM&Gender project within traditional education environments. It is through initiatives like this that the possibility of understanding learning from a playful, collective and horizontal perspective is put into practice. Collaborative design methodologies and processes can be essential tools so that a new way of understanding school and education as a whole is possible.

Critical Reflections

Challenges Encountered

As this project relied on the involvement of many individuals to be implemented (a group of students and coordinators from design, psychology, and pedagogy), careful logistical planning was required, particularly regarding the scheduling of school visits. Although the project had its own funding, it still depended on the coordination between the university and each of the participating schools.

Furthermore, when we reached the phase of designing activities alongside teachers (one of the major goals for 2024), the co-creation methodological process revealed flaws that needed to be mutually addressed as the project progressed. A major difficulty lay in establishing effective contact with the teachers of the selected subjects, in order to ensure that the proposed activities were aligned with their lesson plans and also adhered to the parameters established by the STEAM&Gender project.

Lessons Learned

Unfortunately, in most cases, the timeline defined by the funding of an interdisciplinary initiative like this does not align well with the daily routines of the institutions involved. To carry out a STEAM&Gender activity in one of the partner public schools, it was necessary to reorganize the academic calendar or even

restructure the semester's lessons. In this regard, one of the key lessons learned was the importance of reserving in advance some "buffer days" within the internal schedule, to be used in case certain plans did not unfold as expected.

Contradictions Faced

A particularly striking contradiction, also shared with the *Inventação* project, is the lack of infrastructure in schools and learning spaces to support creative knowledge construction. The Chilean schools that partnered with the project had conventional classrooms, small in size and equipped with the same objects (chairs, individual desks, books, chalkboards, and chalk) that were used in the early days of traditional education in Europe and the United States.

In this context, there was limited room for highly creative initiatives to be implemented, especially when considering the students' and teachers' own repertoires and familiarity with methods that depart significantly from traditional approaches.

5.3
Inventação

About the Project

The *Inventação* toy arose from a personal concern regarding the methodological possibilities that I had contact with throughout my school journey. My frustrations and interactions with alternative methods of learning and acquiring knowledge and skills helped me recognize the limitations of our current school education system. When I reached the final stage of the undergraduate course in product design at PUC-Rio in 2018, I proposed the creation of a toy that would allow teachers and students to have a different experience at school.

The object was created using a collaborative design methodology, during which I (the designer) continuously observed how both children and adults interacted with it. This observation aimed to inspire new ideas and improvements based on the intuitive use of the object. One of the main objectives was to distance the figure of the teacher as the holder of knowledge within the classroom, providing students with the protagonism of their ideas and dialogues alongside their peers.

Another goal of *Inventação* was to promote play, which is vital for developing essential skills and competencies needed in adulthood. By giving children autonomy to deal alone with the issues that emerge between them, playing can be an excellent tool to nurture healthy human relationships throughout childhood.

Design Challenge

The intention behind the creation of the *Inventação* toy permeated the possibility of applying alternative methodological approaches in traditional teaching settings, encouraging the use of different objects to decentralize the transmission of knowledge from teachers and enhance the construction of collective knowledge - between students and teachers. To implement this idea in schools in Rio de Janeiro, it was essential to select teachers from a specific grade along with different groups

of students to partner in designing this object, which aimed to shift perspectives on the meaning of learning and teaching.

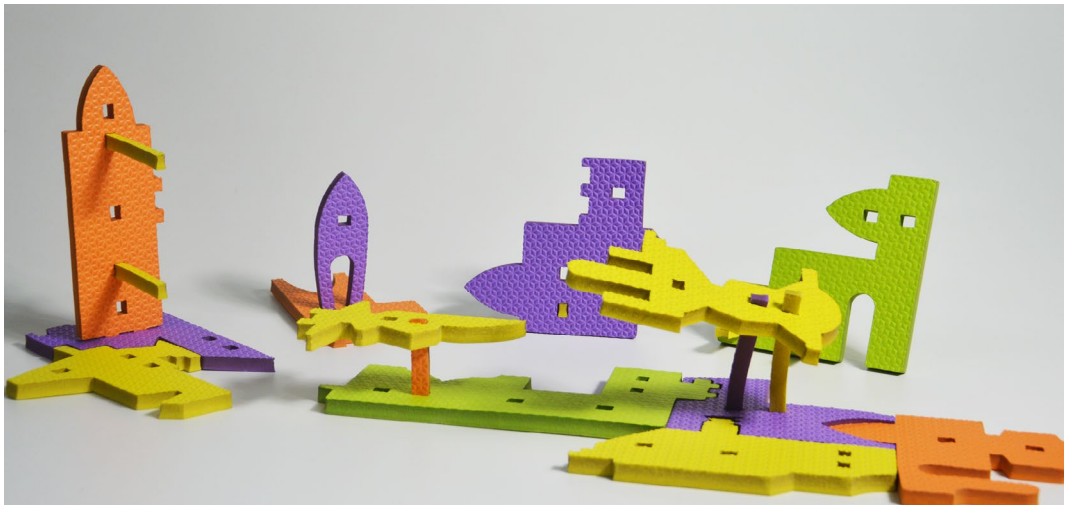


Figure 25: Parts that comprise the *Inventação* toy.
Source: Personal archive of the author.

Over the course of eight months, I developed various prototypes and activities to expose children to a wide range of interactions with the object. Each activity prompted formal changes to the object, which were re-evaluated and redesigned accordingly. In this sense, looking at Donald Schön's principle of reflection in action, it was taken into account that:

As the designer reflects-in-action on the situation created by his previous attitudes, he must consider not only the current choice, but the three or four subsequent ones to which it will lead, each with different meanings in relation to the design systems. implications established by previous actions (Schön, 2000, p.59)

	REFLECTION	ACTION	REFLECTION	ACTION
Barbara designing the object	What would be the ideal materials, forms and dynamics to apply learning by doing in the classroom?	Design the first version of the object with a specific content activity	How did the way students interacted with each other, with teachers, with the material and with the dynamics influence changes in the object's characteristics?	Create a new dynamic and a new set of pieces to continue exploring the use and specific characteristics of the object
Students who have gone through this experience		Carry out experiment 1	Students worked with narrative content in Portuguese and asked when they would have another activity like this	Carry out experiment 2

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Figure 26: Donald Schön's Reflexion-in-Action applied to the Inventação creation process. Source: Personal archive of the author.

Research Focus Overview

The main research question posed is: Can pedagogical resources that enable the exploration of possibilities of use be effective for the teaching-learning process of formal content and personal training, from the perspective of Design and Education?

As described in the dissertation published by Pontifical Catholic University of Rio de Janeiro (BETTS, 2021), to work with this starting point, throughout the development of the toy I sought to answer the following guiding questions:

• How can design thinking contribute to bringing schools closer to the daily lives of its students?
• Can designers play an important role in developing teaching resources that stimulate creativity and imagination in schools?
• Can the design methodology help the school to deal with the student's personal development?

The object of study of the research are the activities mediated by pedagogical resources planned to be applied in the classroom. Looking at the research problem posed and the guiding questions, the general objective of the development of the *Inventação* toy was to study the relationship established by the teacher when coming into contact with pedagogical resources aligned to Design and Education. With a view to generating reflections and arriving at directions to achieve the central objective, the following specific objectives were outlined (BETTS, 2021):

1- Present the *Inventação* toy and its attributes;
2- Theoretical foundations of education based on experiential learning and its relationship to design;
3- Characterize the key concepts of Design in Teaching-Learning Situations based on the Inventação toy;
4- Establish relationships between Design and Education thinkers with the key concepts of Design in Teaching-Learning Situations;
5- Bring my personal practice, as a designer, closer to the context of traditional education, especially that of the teacher;
6- Create educational dynamics with a teacher based on topics approached in the classroom to be applied with the toy Inventação.

Theoretical Framework

The theoretical framework is grounded in experiential learning, where Inventação toy serves as a practical tool for implementing this methodological approach in schools. This model was chosen with the intention to encourage the active participation of students, enhancing creativity, causing constructive interactions between students and teachers and making the journey construction of knowledge a joint work. Moreover, the toy was designed to be accompanied by a hands-on activity, that should take into account the skills and competencies that the teacher wants to develop your students with certain content. Based on this perspective, learning is based on four types of skills according to Kolb (1984): concrete experiences skills, reflective observation skills, abstract skills conceptualization and active experimentation skills.

Conceptual Framework

The main concept linked to Inventação toy is Design in Teaching-Learning Situations. This line of research has been under development at the Interdisciplinary Design Education Laboratory (LIDE) at the Pontifical Catholic University at Rio de Janeiro, since the beginning of the 2000s. While exploring the types of research that could be integrated into this design perspective for teaching and learning situations, I identified key concepts that I organized into a diagram. This diagram illustrates my perspective on the interdisciplinary relationships between design and education and it was used as a basis for this conceptual framework.

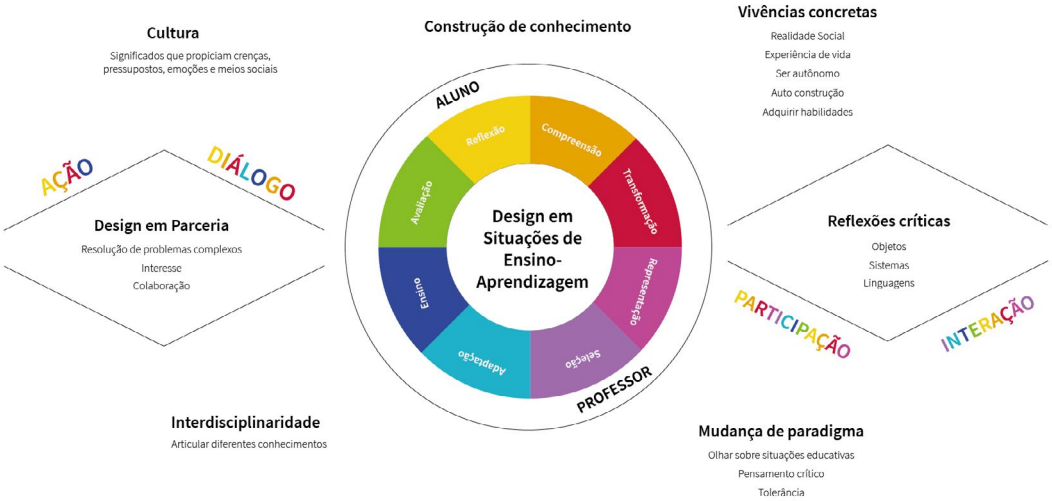


Figure 27: Design in Teaching-Learning Situations key concepts diagram. Source: Personal archive of the author.[33]

Whereas there is generally a certain order to the stages of design-mediated interactions in teaching and learning situations, each project developed under this research line is unique and follows its own development path. Therefore, it's important to note that the sequence of events is not fixed, and certain concepts may or may not be present in specific contexts. The aspects that must be taken into consideration are:

1- Designing in Partnership: methodological approach that has as its main characteristic the effective participation of the individual with whom it is designed - project partner - in practically all stages of the object configuration process.

2- Interaction between students and teachers: refers to moments when hands-on activities occur, allowing the collective construction of knowledge in joint activities.

3- Critical reflexions: based on the use of specific objects, systems and languages, and occurs through participation and interaction.

4- Student's culture: directly influences the way relationships work throughout the activities.

33 The detailed image is included in the appendix.

5- Knowledge construction: in this case, knowledge is constructed by the students, as it is generated through their interactions with systems, objects, and languages they have conceptualized and engaged with.

6- Concrete experiences: life experiences that students carry with them, shaped by their local context.

7- Interdisciplinarity: a framework for considering the intersections between disciplines, aimed at integrating thinking in a systemic manner.

8- Paradigm shift: integrate complementary methodologies to seek a paradigm shift from traditional teaching to more participatory teaching.

When a teacher develops a practical activity using the *Inventação* toy, it can encompass all the aspects described from the design perspective in teaching and learning situations. The school environment is made up of a complex system of interpersonal relationships of its actors with the space, and the way in which the teacher organizes and plans this location reflects the way interactions between the parties involved take place (BETTS, 2021).

The reflection and exploration of concepts related to knowledge construction processes, facilitated by the study of Design in Teaching-Learning situations, allows for an in-depth understanding of the relationships among these key elements.

Structure of activities

For teachers to effectively use the Inventação toy in the classroom, it is essential that they receive a presentation and training on its features and educational objectives. As it is an object that was created with the intention of being used with dynamics based on more participatory methodologies, the change in paradigm and perception of the elements that constitute an educational activity involves primarily an adaptation by teachers. Before identifying the key elements for an activity with students using the toy, it is crucial for the school and teachers to be open to stepping outside their comfort zones in order to create new educational experiences.

To stimulate creativity and also share examples of what can be done with Inventação, I developed a small book with some ready-to-run activities. The book features straightforward activities organized in stages, along with the skills and competencies that will be developed with students in each of them. It also serves as a tool for teachers to assess how well each class engages with it and which specific skills and competencies are being addressed.

Furthermore, the book also specifies which toy pieces will be used and the role of each piece in each of the proposed activities. Once familiar with the nature of the activities that can be done with the Inventação toy, teachers can take the freedom to create their own dynamics based on the syllabus they are working on with each of their classes.

An example of a structured activity of the book might be:

Part 1: Introducing the story
Children are divided into groups of 5-6 people. They receive the green blocks and with the guidance of "assemble something to tell a story" they start the activity. The teacher must emphasize that in the exposition it is necessary to build a place where the story takes place and the characters that are inserted in it.

Part 2: Rising Action
The teacher presents 3 possibilities for development paths to be followed: (a) a villain's entry into the story; (b) a terrible thing happens; (c) the story has to be told from that moment on during the year 2555. New blocks delivered by the teacher must be inserted in the story.

Part 3: Climax
At this stage, each group must reach the critical moment in the creation of history so that the resolution - later moment - is inevitable. A third set of blocks is delivered.

Part 4: Resolution
To finish the story each group receives another kit of 10 blocks and they need to tell how the story ended.

This structure model can be replicated in any subject and age group, requiring only an adaptation of the content and also the skills and competencies that aim to be developed by the teacher.

5.4
Case Study: The development of *Inventação* toy

First definitions
When I began developing the toy, my primary goal was to create activities within the school environment that utilized a hands-on, experiential learning approach. I aimed to promote playful and effective learning through this object. The initial brief defined to begin formal experiments included the following directions:

1. Project-Based Learning: The foundation of the project must center around project-based learning methodologies.

2. Focus on Hands-On Activities: The core of the project should prioritize active "doing" as a key component of the learning process.

3. Representation of "Experiential Learning": The project should include an object that embodies and communicates this concept.

4. Decentralized Learning Spaces: It should encourage learning beyond a single, centralized location, promoting flexibility in where learning occurs.

5. Modular and Adaptable Design: The object should be modular and capable of being adapted or changed as needed.

6. Tangible Outcomes: The project should aim to produce concrete, measurable results that reinforce learning.

7. Cross-Disciplinary Use: The object should be versatile enough to be utilized across various disciplines and subjects.

8. Intuitive Use: The design must be intuitive, allowing users to interact with it easily and effectively.

To create potential shapes for the toy, I explored three alternative design paths. This process helped me narrow down and select a more specific direction for the final design. The chosen approach was to create scenarios where the toy parts could serve a variety of functions in experiential learning.

First formal experimentation

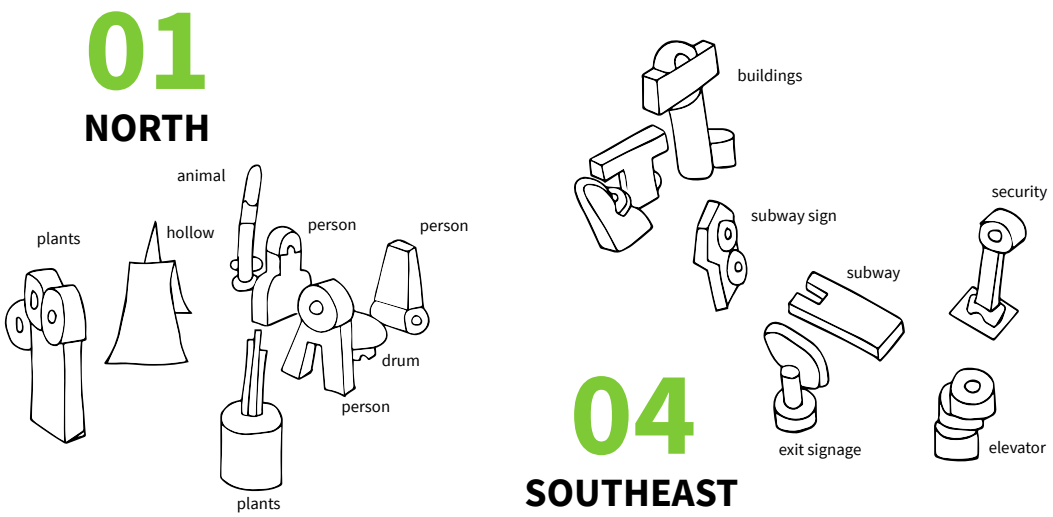


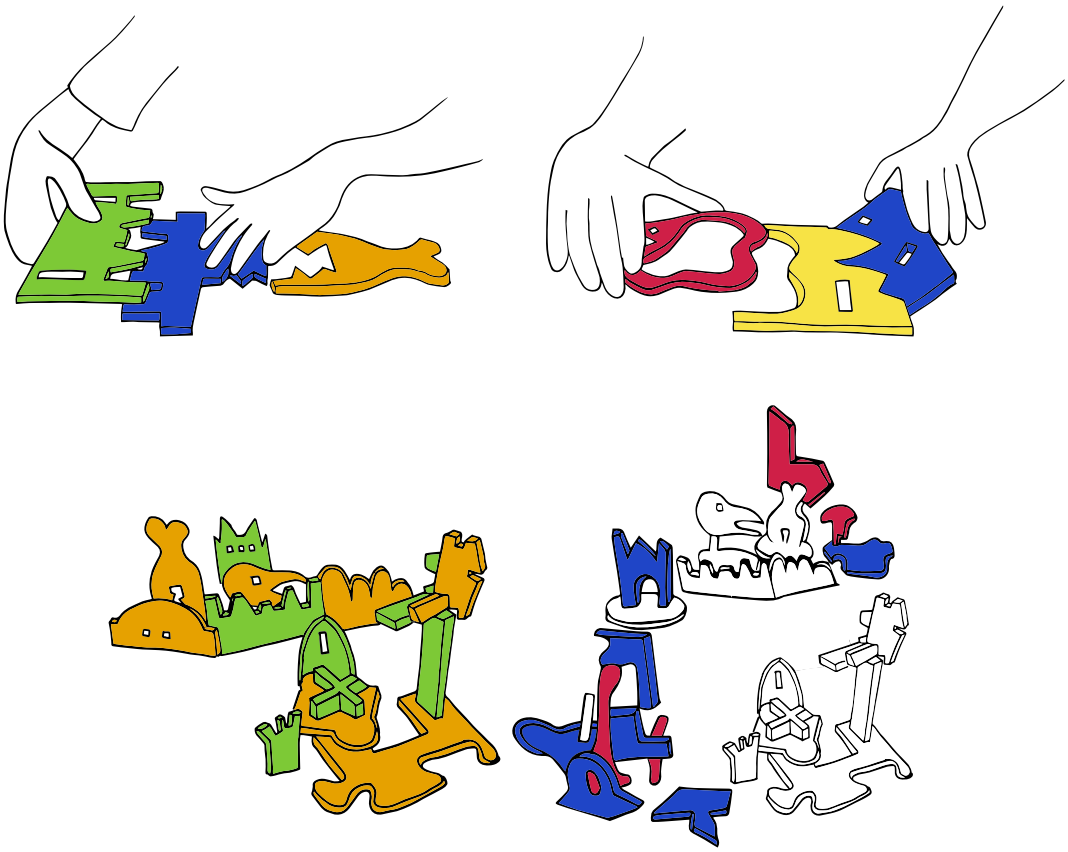
Figure 28: First formal experimentation - scenarios developed by students. Source: Personal archive of the author.

To develop the pieces in any part of the process, it was necessary to create a practical activity to be applied alongside the use of the toy. To start the experiments, I thought of an activity that combined the studies of Portuguese language with the geography of Brazil. At first, my objective with the design of the object was to understand whether, when handling the pieces, children would be able to attribute specific meanings to abstract shapes. The pieces were constructed with expanded polyethylene in a three-dimensional manner and with little possibility of exploring ways of arranging them to create scenes.

At the end of the activity, I observed that the children not only used their imagination to create stories with abstract pieces, assigning different meanings to them, but also drew inspiration from their everyday lives to craft these narratives. The first set of pieces allowed me to observe aspects that could be improved for its second version. The main development points were: thinking about a format that could be used in multiple ways and made with a more flexible material.

Second formal experimentation

For the second group of pieces created I also thought of a Portuguese language activity, based on narrative structures. This time, I used 8mm EVA sheets in 6 different colors as material. The design logic for the piece's design was based on the concept of fitting together. Their manual production was inspired by the image formed when two existing pieces are joined.



Figures 29 and 30: Second formal experimentation - creating the toy pieces and construction of scenarios. Source: Personal archive of the author.

My goal was to incorporate the use of color to enhance understanding of the narrative structure, which includes the introduction, development, and conclusion. The pieces created in EVA brought the possibility of construction in multiple dimensions and also more flexible handling, reinforcing the importance of the creativity and imagination of the students who participated in the proposed activity.

The second formal experiment carried out confirmed the direction of the material and also the importance of the flexibility of its use in the construction of the scenarios. This aspect was aligned with the parameter set out in the brief to create a toy that enabled modular construction, bolstering the countless possibilities for building knowledge.

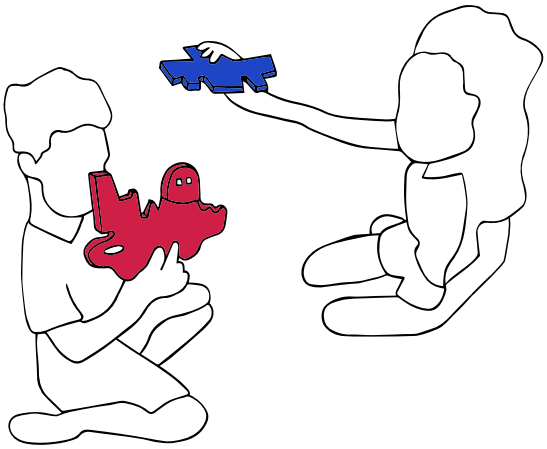


Figure 31: Second formal experimentation - students interacting with *Inventação* toy. Source: Personal archive of the author.

Third formal experimentation

The third version of the set of pieces focused on reducing the formal complexity present in the previous version. The second set, created by combining two existing pieces, resulted in components that were completely different from each other and lacked a consistent fitting pattern or shape. I recognized that simplifying the design would be crucial for achieving greater consistency in how the toy is used and understood. Consequently, I committed myself to identifying both simple and complex patterns that could be applied to the pieces.

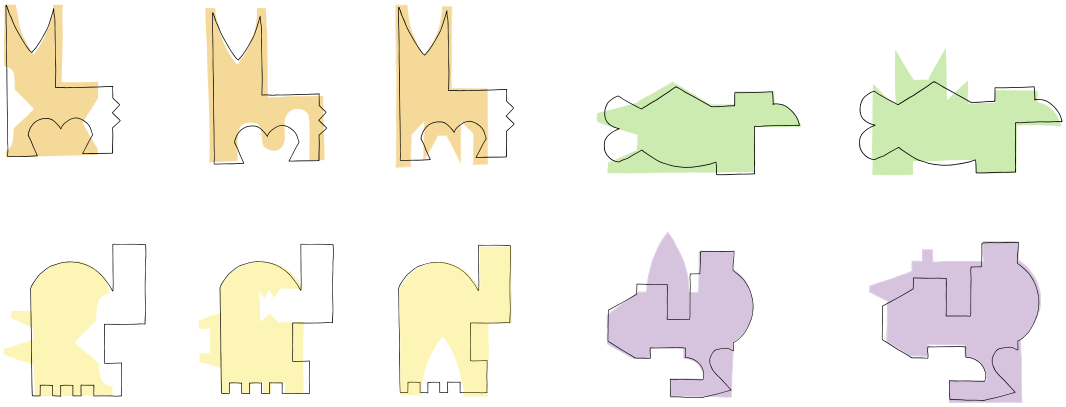


Figure 32: Third formal experimentation - design simplification studies. Source: Personal archive of the author.

This study enabled the creation of not only formal patterns but also a method for storing the pieces, such as using a rug. For this experimentation, I also created a Portuguese language activity to explore the concept of fitting pieces together in multiple plans. I found that the patterned shapes of the pieces helped the children understand they could also organize them in this way, instead of joining them vertically.

Color logic also played an important role in the study of shapes, as it assigns a specific color to more complex pieces and another to less complex pieces, according to the drawing below:

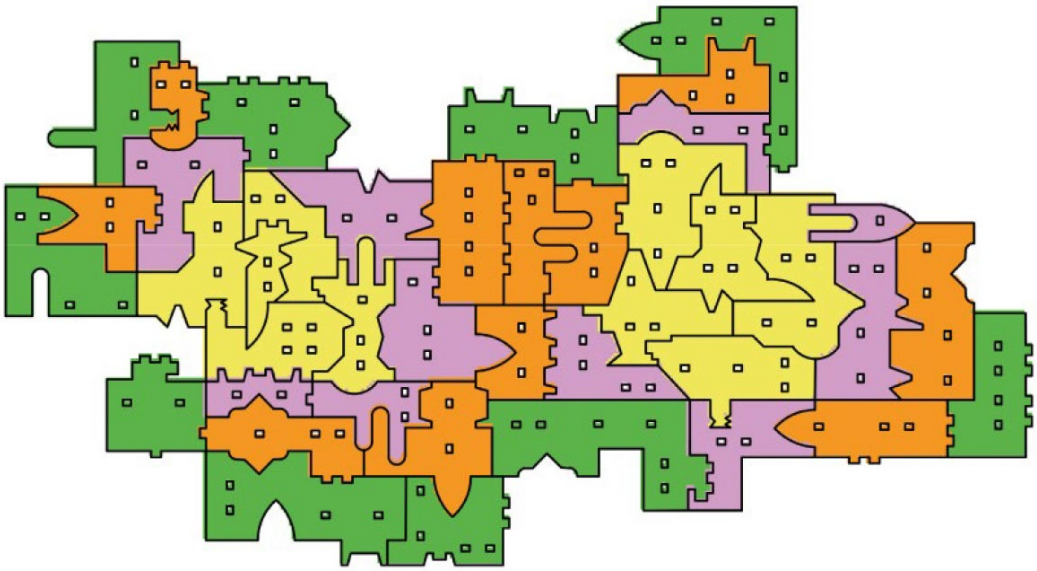


Figure 33: Third formal experimentation - pieces forming a rug. Source: Author's personal archive.

Developing this toy expanded my understanding of how design can be integrated into educational settings through collaboration and guidance. Following its creation, we conducted testing activities with children, young people, and teachers to refine it further. The primary goal of creating *Inventação* was to offer students and teachers a fresh educational experience and to inspire a new perspective on what learning environments in schools can look like.

Critical Reflections

Challenges Encountered

Since the project was primarily developed during my undergraduate thesis, I had neither funding nor institutional support to maintain consistent contact with my target audience. Over the course of a year, I had to find alternative paths and rely on people who were willing to help connect me with potential partners. There was no official backing to carry out the workshops I had planned as part of the development of the final material I presented. Everything was made possible thanks to the support of friends and fellow researchers, who generously volunteered to help with facilitation and documentation of the activities.

In addition, it was extremely challenging to find a group of children aged 12 to 13 who had attended public schools in the city of Rio de Janeiro, which was essential for the project.

Lessons Learned

In my view, one of the most important lessons in any design project is related to time management. Achieving planned outcomes within the timeline outlined at the beginning of the project is often very difficult. When I reached the end of my undergraduate program and presented Inventação to the evaluation panel, I felt that the project was still incomplete. Today, I realize that it marked the beginning of a long-term endeavor. It's no coincidence that, nearly six years later, I continue to

reflect on it and explore ways to improve its structure and other elements needed for it to reach new levels of impact in educational settings.

Contradictions Faced

The most striking contradiction I recognize in this project is the tension between a growing movement among designers to broaden the scope of institutionalized education and the limited progress in discussing how these systems can be meaningfully transformed. Now that the use of mobile phones has been banned in Brazilian schools and similar policies are being adopted elsewhere, it remains to be seen whether more interactive and creative dynamics, supported by pedagogical tools, will finally be acknowledged as powerful assets for learning.

5.5 Intersections and Divergences

The two projects under examination, STEAM&Gender and *Inventação*, present distinct yet complementary approaches to the integration of design within Latin American educational contexts. A brief comparative analysis reveals important contrasts and convergences across institutional settings, methodologies, stakeholder participation, outcomes, and challenges.

Institutional Context

The STEAM&Gender initiative was embedded within a well-established university research laboratory (MadLab) at the *Escuela de Arquitectura y Diseño de Valparaíso*. This institutional positioning afforded the project access to external funding, structured long-term planning, and formal involvement of both faculty and undergraduate students. Conversely, *Inventação* was developed as an independent undergraduate thesis project with minimal institutional support. The lack of university resources beyond academic supervision required the project leader to navigate partnerships and resource acquisition independently. This divergence highlights how institutional backing can shape the scale, reach, and sustainability of educational design initiatives.

Methodological Approach

Both projects employed participatory design methodologies but differed in scope and formality. The STEAM&Gender project adhered to a consistent, parameter-driven framework to ensure all activities met defined criteria, promoting coherence across workshops with students and teachers. In contrast, *Inventação* utilized a cyclical co-creation process grounded in Design in Partnership, where iterative testing and modification of toy components were informed directly by observations of children's and teachers' interactions. This flexible, user-centered approach allowed for responsive adaptation but was less formalized within institutional structures.

Teacher Participation

Teacher engagement in STEAM&Gender was focused to those faculty members who held explicit roles within the project across design, pedagogy, and psychology disciplines. This constrained involvement to a relatively small group of educators

directly connected to the initiative. In *Inventação*, teachers participated informally through their involvement in testing sessions, without formalized roles or institutional mandates. The comparison underscores differing degrees of institutional integration and formal collaboration within educational design projects.

Observed Results

The STEAM&Gender project facilitated interdisciplinary collaboration between undergraduate and graduate design students and strengthened partnerships between the university and local government, particularly in the city of Villa Alemana. These outcomes demonstrate the potential for academic projects to influence broader community engagement and institutional partnerships. Meanwhile, *Inventação* inspired sustained personal commitment and interest in further development, suggesting its promise as a tool for reimagining traditional teaching and learning frameworks. Although smaller in scale, it offers significant potential for future expansion in collaboration with educators and students motivated to explore innovative pedagogies.

Limitations

Both projects faced notable constraints. The principal limitation for STEAM&Gender was logistical: coordinating the schedules of design students with the academic calendar and activities of partner schools proved challenging, resulting in fewer implemented activities than anticipated. For *Inventação*, limitations were more fundamental, stemming from a lack of institutional support, funding, and formal validation mechanisms. These factors hindered resource availability and the ability to secure committed partners, ultimately affecting the project's scope and development.

5.6 Conditions for Scaling and Replication

In order for *Inventação* and STEAM&Gender to be scaled and implemented in other cities or countries, they require different types of structure and support, tailored to their specific scopes and complexities.

STEAM&Gender, for example, is a more complex, institutionally embedded initiative. Its replication depends on the involvement of a larger team and the establishment of formal partnerships to connect the university with local schools. Each academic department involved (design, psychology, and pedagogy) has distinct responsibilities within the project. As such, the project's development requires coordinated interdepartmental collaboration, making it highly dependent on institutional infrastructure.

In addition, STEAM&Gender requires appropriate physical infrastructure within schools. In the early phases of the project, when digital fabrication labs had not yet been implemented, activities were conducted in regular classrooms. These spaces limited the kind of learning experiences the project aimed to promote. Since these were the first steps in building the partnership, and the facilities were still being defined, the initial activities had to adapt to these constraints.

Inventação, on the other hand, is a more flexible, small-scale initiative. However, for it to be implemented effectively in new contexts, it also requires a specific support structure. The most critical element is teacher training, to ensure that educators understand the pedagogical objectives behind the toy and know how to develop meaningful learning activities with it. One of the main features of *Inventação* is its ability to promote peer-to-peer exchange and encourage creative perspectives on learning, an outcome that depends on careful, ongoing collaboration between the designer or facilitator and the teachers who receive the project.

That said, *Inventação* also requires financial support, particularly for the production of the toys and the implementation of teacher training sessions. While it may be more adaptable and operate on a smaller scale than STEAM&Gender, it still needs dedicated resources to ensure its quality and sustainability.

By contrast, STEAM&Gender demands not only teacher training but also a much more robust financial and logistical structure. Without these two elements, the project is not viable for replication. Indeed, the original implementation of STEAM&Gender was supported by specific external funding, which made possible the development and delivery of its activities.

5.7
Chapter findings

As detailed throughout this chapter, the two projects are examples of possibilities for entanglement in the fields of design and education in Latin America. While projects of this nature are not widely integrated into school environments at present, there is a strong tendency for design, as a foundational concept, to play a vital role in transforming the current educational landscape.

As the complex challenges of a world based on rising technologies are established, it becomes increasingly important to promote schools as a space for coexistence and collective construction of knowledge. In this context, design can be viewed as a tool that encourages hands-on activities and helps dismantle the barriers to creativity often imposed by a Cartesian approach to teaching.

As we reach the end of the research raised by this work, it becomes clear the many possibilities of enhancing education through practices linked to design in schools. The objective of this thesis was to explore the various perspectives on what it means for us in Latin America to design reflecting on our own culture, society, and worldviews. It aims to incorporate these concepts into education and understand how to nurture socially responsible children in our ever-evolving world.

6
Final Considerations

Having completed this thesis, I've realized that the process of writing it has been the most valuable learning experience as a researcher. Over the past four years, I've adjusted my approach, made new discoveries, discussed ideas with others, and explored unfamiliar areas. The most rewarding aspect of this process was the opportunity to explore the intersection of design and education in greater depth, and to witness different methodologies and approaches being implemented in actual learning environments.

My interest in this area of study spans from my undergraduate degree in product design, to my completed master's degree and now this doctorate thesis. The world has changed a lot in the last twelve years and the practices, theories and epistemologies that permeate the design universe need to keep up with these transformations, as I have argued throughout this work.

I was never a traditional, by-the-book student, I struggled with math-heavy subjects that involved a lot of calculations. I questioned why we spent so much time in the classroom when our school had a large outdoor space where students could interact. I was always the student who asked "why," and that ultimately led me to choose design as a profession, a creative field of experimentation, offering countless ways to build something, free from rigid right or wrong answers, and filled with endless possibilities. The theme of this research developed over my years as a researcher, heavily shaped by my own experiences in a variety of teaching and learning settings.

Understanding this context is crucial because, as I explore further, design, although often presented as straightforward, is actually quite complex. As discussed in chapter two, it's a multifaceted field populated by open-minded professionals who are constantly trying to engage with current global issues. There's no universally accepted definition of design. Therefore, it's essential to understand the specific context in which design is being applied, so that we can properly examine it as a subject of research and study.

My Capes-Print scholarship in Chile was crucial in helping me establish this contextual understanding, particularly as it applies to Latin American design practices and epistemologies. Brazil's unique language and culture often create a sense of isolation, distancing us from a broader feeling of Latin identity. Being able to experience such a different way of perceiving and teaching design at the *Escuela de Arquitectura y Diseño de Valparaíso* was inspiring to unravel its multiple visions, especially when connected to educational environments.

The collaborative environment and community-building fostered by *Escuela*'s continuous learning approach allow us to imagine a form of teaching that prioritizes human relationships. By applying this vision to education, we can foresee fundamental changes in these spaces, which are so critical for contemporary

society. These collaborative methods provide the very tools we need to navigate the complexities of design. Such practices make our field of study increasingly interdisciplinary, as they bring diverse perspectives and experiences together for discussion.

This research aimed to explore, analyze, and present diverse theories, methodologies, and epistemologies of design, emphasizing their historical backgrounds and current significance. Throughout the study, historical contexts were developed to complement the specific theme of each chapter, ensuring a cohesive integration of past, present and future perspectives. Furthermore, it proposed to seek for Latin American epistemologies of design by engaging with interdisciplinary fields such as social sciences, anthropology, and post-colonial studies, incorporating local knowledge and practices. These possible paths to building our own epistemologies were developed throughout the first chapters, always pursuing to connect a Latin vision of design with the social and anthropological understanding of today's world.

This thesis also enabled a deeper exploration of the theoretical and practical connections between design and education, as something I have been developing since the beginning of my research journey. By bringing this reflection to life with a high level of detail and investigating perspectives from multiple areas beyond these fields, it enriched and made the panorama more engaging. This allowed for thoughtful consideration of how to transform basic education curricula and methodologies, promoting innovative teaching practices that reflect Latin American contexts.

The entire structure of this work was designed to achieve the ultimate goal of establishing a theoretical foundation for understanding the interdisciplinary connections between design and education. Additionally, it aimed to provide examples of how these connections can be applied practically in daily school settings. My primary objective was to demonstrate and encourage the integration of designers into these environments, bringing a more hands-on and thought-provoking perspective. This involves proposing collective and collaborative activities within curricular subjects.

The analysis arising from this research highlights the need to carefully consider Latin identity in design, an identity often overshadowed and suppressed by a dominant, hegemonic culture that has dictated what design is or should be globally. Learning to observe, listen, and build collaboratively is a key characteristic of our culture and heritage, and this is reflected in our unique perspective of what can be achieved when combining design and education.

This work aims to enrich the theoretical and epistemological landscape of design by promoting deeper discussions about our origins and their potential connections to diverse learning trajectories. It aspires to serve as a catalyst for a broader movement in Brazil, one that rekindles the long-neglected ties between territorial and cultural identity, interwoven through the realms of design and education.

The result of this thesis nurtures a closer connection between designers from Brazil and Chile, who, while shaped by similar historical and cultural influences, have developed their disciplines in different ways. This integration could pave the way for stronger collaboration among Latin American countries, enabling us to define our own standards for advancing the field. This research is also a gesture of respect for our culture, an effort to place it at the center of educational practices and frameworks.

By sharing this study, I hope to connect with other Latin American researchers who are eager to collaborate in telling our own story. I envision our children learning through more active, participatory methods and becoming protagonists in the construction of their own knowledge. I also hope to see young designers grow professionally with a deep awareness of their history and cultural context, strengthening both our cultural identity and its long-term vitality, while encouraging its development in children from an early age.

As possible future developments, I hope to deepen my study of design practices, methodologies, and epistemologies in other Latin American countries. Immersing myself in contexts like Argentina, Colombia, Peru, and Mexico would be a powerful step forward in the construction of an epistemological path that truly represents us. Connecting with researchers and professors in these countries, as I had the chance to do in Chile, would greatly enrich this work and benefit not just me, but a wider community of scholars involved in the search for a form of design that truly represents us.

These theoretical investigations and practical articulations feed into one another: understanding different design epistemologies strengthens the creation of educational approaches that are more attuned to local contexts, while the implementation of concrete practices can generate new insights that nourish academic research.

Exploring new ways to design more participatory and inclusive educational practices, by involving professionals from diverse fields throughout the process, is a dream that took root during my undergraduate studies and is now beginning to grow. Coordinating projects like those presented in this thesis in partnership with public institutions could help bring innovative, locally grounded educational approaches to a broader audience. In this way, we can collectively build more sustainable paths for the future.

I close with an open invitation for support and collaboration: for these ideas to reach new places and possibilities, there must be those who are willing to listen, engage, and walk this journey together. I hope that this study will inspire further exploration and deepening of the issues it raises, and that we can continue to strengthen our powerful Latin American identity.

7
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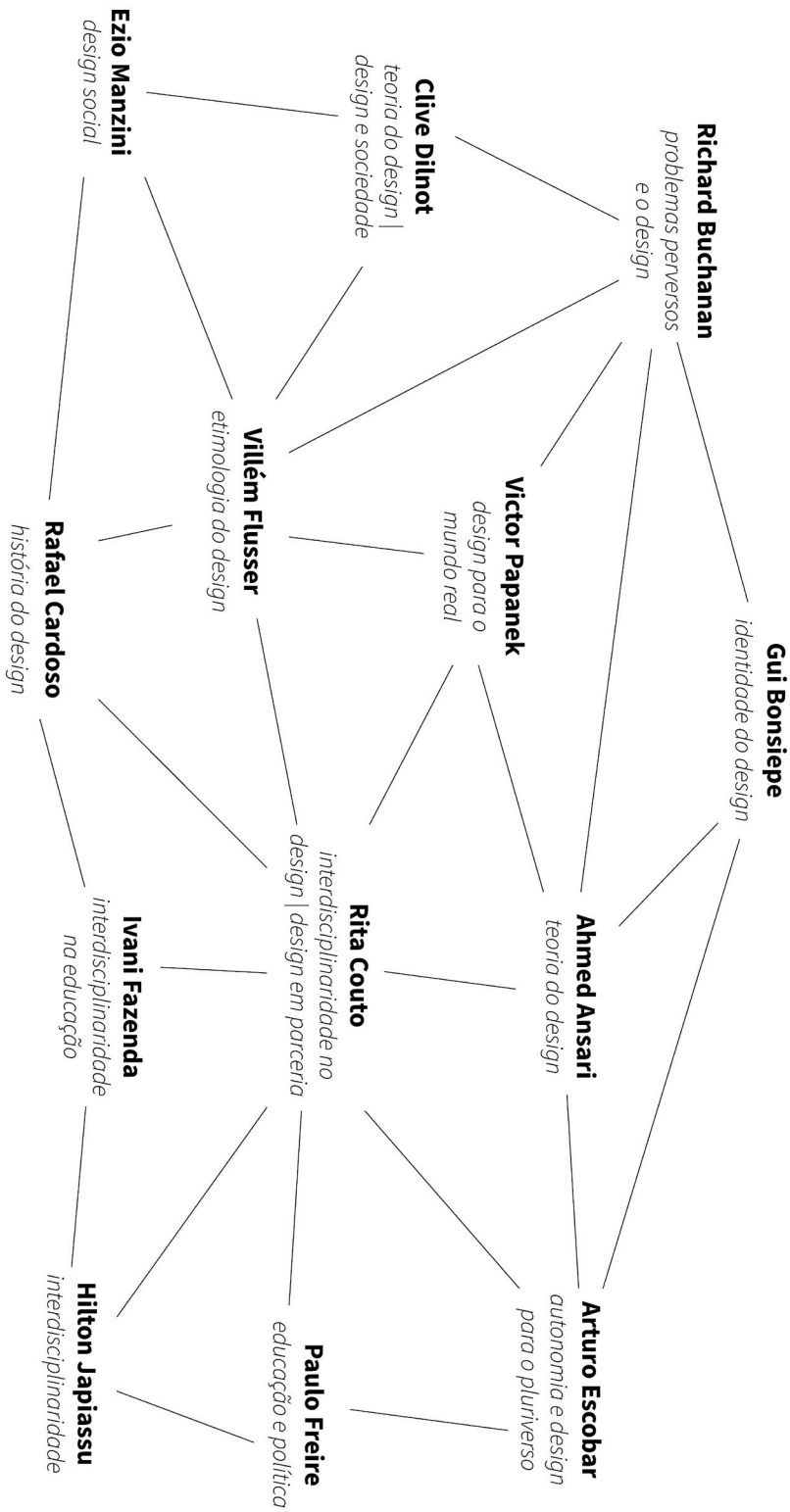
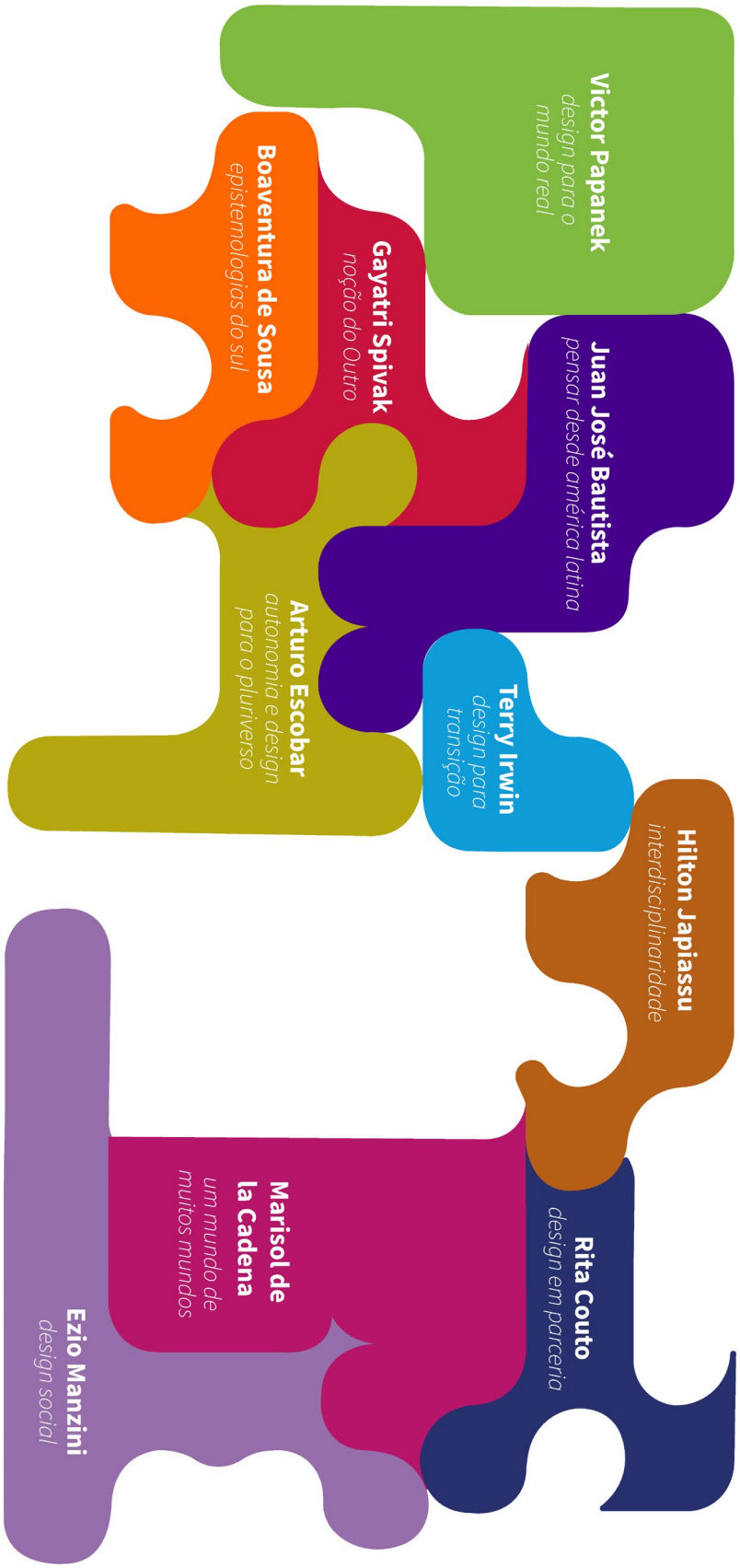
8
Appendix 1: Chapter 2 Authors

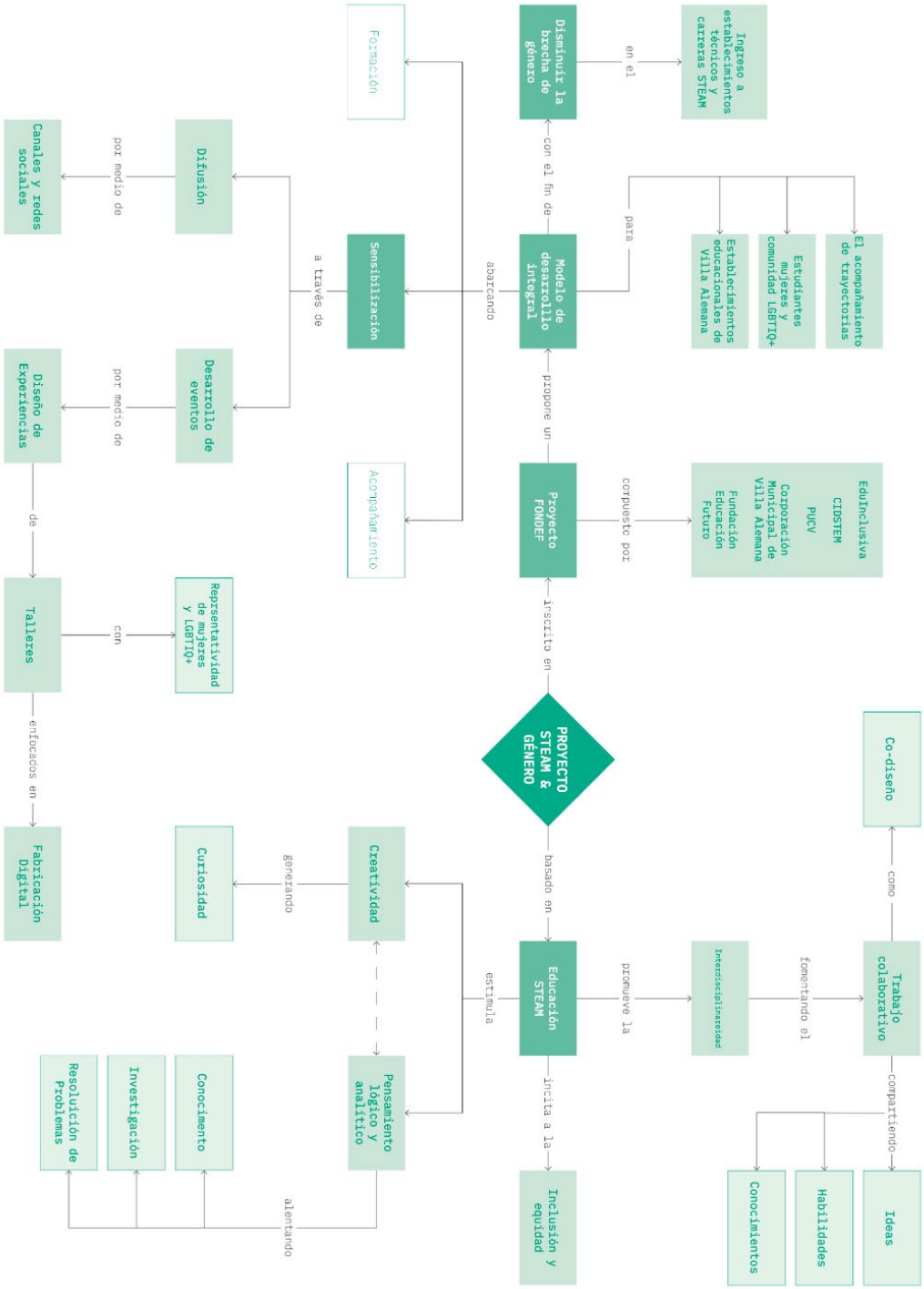


Appendix 2: Chapter 3 Authors

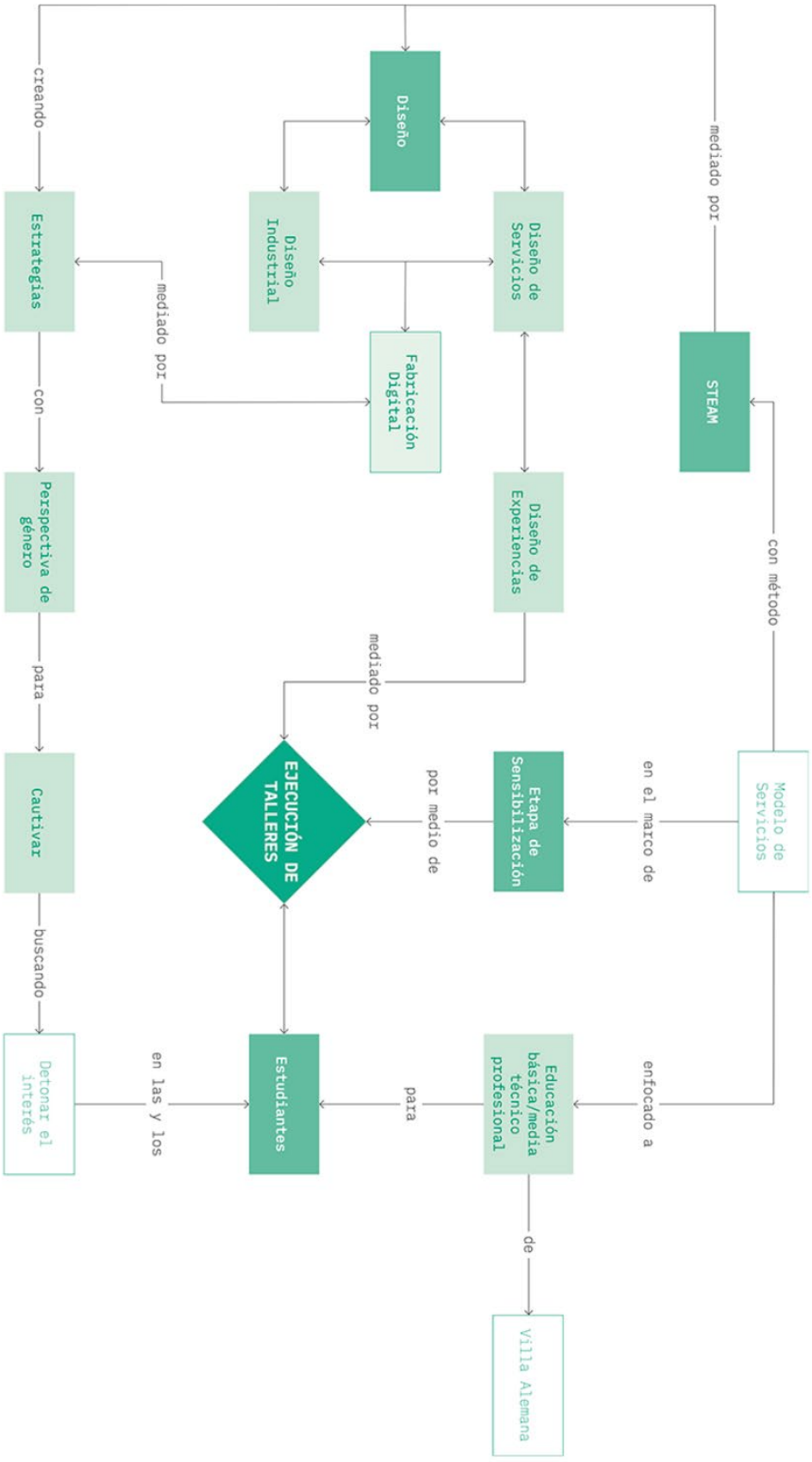


Appendix 3: Chapter 4 Authors

Appendix 4: STEAM&GENDER Detailed Design Challenge Scheme



Appendix 5: STEAM&GENDER Detailed Conceptual Framework Schema



Appendix 6: Design in Teaching-Learning Situations Key Concepts Diagram

9
Annex A: Citations in the Original Languages of the Authors

This annex compiles the quotations included in the dissertation in their original languages, in order to preserve the integrity of the texts and allow for potential comparative analyses. The quotations are organized in the order in which they appear throughout the work.

> Em inglês, a palavra design funciona como substantivo e também como verbo (circunstância que caracteriza muito bem o espírito da língua inglesa). Como substantivo significa, entre outras coisas, "propósito", "plano", "intenção", "meta", "esquema maligno", "conspiração", "forma", "estrutura básica", e todos esses e outros significados estão relacionados a "astúcia" e a "fraude". Na situação de verbo - to design - significa, entre outras coisas, "tramar algo", "simular", "projetar", "esquematizar", "configurar", "proceder de modo estratégico". A palavra é de origem latina e contém em si o termo signum, que significa o mesmo que a palavra alemã Zeichen ("signo", "desenho"). E tanto signum como Zeichen têm origem comum. Etimologicamente, a palavra design significa algo assim como de-signar (ent-zeichnen).
> (FLUSSER, 2007, p.179)

> As palavras design, máquina, técnica, ars e Kunst estão fortemente inter-relacionadas; cada um dos conceitos é impensável sem os demais, e todos eles derivam de uma mesma perspectiva existencial diante do mundo. No entanto, essa conexão interna foi negada durante séculos (pelo menos desde a Renascença). A cultura moderna, burguesa, fez uma separação brusca entre o mundo das artes e o mundo da técnica e das máquinas, de modo que a cultura se dividiu em dois ramos estranhos entre si: por um lado, o ramo científico, quantificável, "duro", e por outro o ramo estético, qualificador, "brando". Essa separação desastrosa começou a se tornar insustentável no final do século XIX. A palavra design entrou nessa brecha como uma espécie de ponte entre esses dois mundos. E isso foi possível porque essa palavra exprime a conexão interna entre técnica e arte. E por isso design significa aproximadamente aquele lugar em que arte e técnica (e, consequentemente, pensamentos, valorativo e científico) caminham juntas, com pesos equivalentes, tornando possível uma nova forma de cultura.
> (FLUSSER, 2007, p.181)

> O design nasceu com o firme propósito de pôr ordem na bagunça do mundo industrial. Entre meados do século XVIII e fins do século XIX - o período que corresponde, grosso modo, ao surgimento do sistema de fábricas em boa parte da Europa e dos Estados Unidos - houve um aumento estonteante da oferta de bens de consumo, combinado com queda concomitante do seu custo, ambos provocados por mudanças de organização e tecnologia produtivas, sistemas de transporte e distribuição. Nunca antes na história da humanidade, tantas pessoas haviam tido a oportunidade de comprar tantas coisas. Era a infância da sociedade de consumo. Para muitos observadores, à época, o processo

teria gerado um declínio preocupante da qualidade e da beleza dos produtos. Certa ou errada (o que é bem mais provável), essa percepção serviu de estímulo para a ação. Entraram em campo artistas, arquitetos, reformadores e burocratas, governos industriais, associações comerciais e profissionais, museus e instituições de ensino, com o intuito de melhorar o gosto da população e a configuração das mercadorias que lhes eram oferecidas. As atividades de projetar e fabricar artefatos, exercidas há muito em relativo silêncio, migraram para o centro dos debates políticos, econômicos e sociais.
(CARDOSO, 2012, p.15)

Entre 1850 e 1930, aproximadamente, três gerações de novos profissionais - alguns já apelidados de designers - dedicaram seus esforços à imensa tarefa de conformar a estrutura e a aparência dos artefatos de modo que ficassem mais atraentes e eficientes. Sua meta era nada menos do que reconfigurar o mundo, com conforto e bem-estar para todos. Seu lema era adequação dos objetos ao seu propósito: fitness for purpose, em inglês, ou Zweckmässigkeit, em alemão (as primeiras grandes discussões sobre o tema foram conduzidas em alemão e inglês). Mais ou menos no final desse período, por volta da década de 1930, popularizou-se o mote mais conhecido entre nós: “a forma segue a função”, frase condensada de um enunciado distante do arquiteto americano Louis Sullivan. A visão que “forma” e “função” seriam o cerne das preocupações do designer persistiu por bastante tempo.
(CARDOSO, 2012, p.16)

Social, todo Design é, dizem alguns. É verdade. Mas o Design voltado para questões sociais é muito mais do que isto. Ele tem limites e, quando se trabalha. neste campo, é mandatório conhecer profundamente as pessoas com e para quem se está projetando, bem como atentar para suas reais necessidades e desejos. No âmbito do Design Social, é preciso ter a habilidade de trocar com as pessoas sentimentos e experiências, colocando-se, na medida do possível, na mesma situação que elas, fazendo o que elas fazem e do modo como elas fazem. E, em todos os casos, é preciso ter uma visão holística das variáveis que compõem o problema de projeto.
(COUTO, 2017, p.31)

Para compreender o significado de uma identidade, recomenda-se fazer uma lista das suas diferentes manifestações. A identidade do design se materializa da seguinte maneira:

Modos de materialização do design
Em forma de um grupo de características formais ou cromáticas (stilemi);
Na estrutura da taxonomia dos produtos, vale dizer, os tipos de produtos característicos de uma cultura, por exemplo, uma cuia de cabeça que foi criada na cultura guarani;
No uso de materiais locais e métodos de fabricação correspondentes;
Na aplicação de um método projetual específico (empatia por uma tradição e uso desses atributos arraigados em determinada região);
Na temática (necessidade) específica do contexto.
(BONSIEPE, 2011, p.64)

O designer é um profissional que se preocupa com a compreensão sobre a forma de vida e com os projetos que desenvolve com e para o ser humano. Reconhece a diversidade, a identidade das pessoas, compreende seus limites e suas potencialidades. É um profissional que deve ser capaz de entender os diversos caminhos que podem tomar uma solução e de prever suas consequências em um ambiente natural e em um sistema cultural peculiar.
(COUTO, 2017, p. 31)

[...] tem dupla origem: uma interna, tendo por característica essencial o remanejamento geral do sistema das ciências, que acompanha seu progresso e sua organização; outra externa, caracterizando-se pela mobilização cada vez mais extensa dos saberes convergindo em vista da ação. (p.42)
Original excerpt from Japiassu (1976), translated in the main text as an indirect quotation.

[...] o que podemos entender por disciplina e disciplinaridade é essa progressiva exploração científica especializada numa certa área ou domínio homogêneo de estudo. Uma disciplina deverá, antes de tudo, estabelecer e definir suas fronteiras constituintes. Fronteiras estas que irão determinar seus objetos materiais e formais, seus métodos e sistemas, seus conceitos e teorias.
(JAPIASSU, 1976, p.61)

Em primeiro lugar, aparece como uma prática individual: é fundamentalmente uma atitude de espírito, feita de curiosidade, de abertura, de sentido da descoberta, de desejo de enriquecer-se com novos enfoques, de gosto pelas combinações de perspectivas e de convicção levando ao desejo de superar os caminhos já batidos. Enquanto prática individual, a interdisciplinaridade não pode ser aprendida, apenas exercida. Ela é fruto de um treinamento contínuo, de um afinamento sistemático das estruturas mentais. Em segundo lugar, a interdisciplinaridade aparece como prática coletiva.
(JAPIASSU, 1976, p.82)

A construção de uma didática interdisciplinar baseia-se na possibilidade da efetivação de trocas intersubjetivas. Nesse sentido, o papel e a postura do profissional de ensino que procure promover qualquer tipo de intervenção junto aos professores, tendo em vista a construção de uma didática transformadora ou interdisciplinar, deverão promover essa possibilidade de trocas, estimular o autoconhecimento sobre a prática de cada um e contribuir para a ampliação da leitura de aspectos não desvendados das práticas cotidianas.
(FAZENDA,1994)

A metodologia interdisciplinar em seu exercício requer como pressuposto uma atitude especial ante o conhecimento, que se evidencia no reconhecimento das competências, incompetências, possibilidades e limites da própria disciplina e de seus agentes, no conhecimento e na valorização suficientes das demais disciplinas e dos que a sustentam. Nesse sentido, torna-se fundamental haver indivíduos capacitados para a escolha da melhor forma e sentido da participação e sobretudo no reconhecimento da provisoriedade das posições assumidas, no procedimento de questionar.
(FAZENDA, 1994)

Para que a educação não fosse uma forma política de intervenção no mundo era indispensável que o mundo em que ela se desse não fosse humano. Há uma incompatibilidade total entre o mundo humano da fala, da percepção, da inteligibilidade, da comunicabilidade, da ação, da observação, da comparação, da verificação, da busca, da escolha, da decisão, da ruptura, da ética e da possibilidade de sua transgressão e a neutralidade não importa de quê.
(FREIRE, 1996, p. 109)

A professora democrática, coerente, competente, que testemunha seu gosto de vida, sua esperança no mundo melhor, que atesta sua capacidade de luta, seu respeito às diferenças, sabe cada vez mais o valor que tem para a modificação da realidade, a maneira consistente com que vive sua presença no mundo, de que sua experiência na escola é apenas um momento, mas um momento importante que precisa ser autenticamente vivido.
(FREIRE, 1996, p.110)

A "era da informação" chegou para todos - por meio de mudanças essenciais em sistemas de fabricação, distribuição e finanças - e não somente para quem tem computador pessoal em casa. À medida que o mundo virtual aumenta em abrangência, a realidade parece desmanchar-se no ar. Em uma palavra, o "imaterial" passou a ser o fator decisivo em quase todos os domínios, mormente numa área como o design. (CARDOSO, 2011, p.20).

São muito poucas as instituições educacionais que acolhem o professor comprometido, que valorizam seu trabalho, propiciando também a infraestrutura necessária para sua execução. Nessas poucas instituições encontramos sempre o germe de projetos interdisciplinares de ensino, em que a tônica é o diálogo, e a marca, o encontro, a reciprocidade. São os "nichos" onde o professor bem-sucedido pode se ancorar. São terrenos férteis, onde a semente da interdisciplinaridade poderá vingar, crescer e dar frutos. São instituições que já têm uma proposta de troca, de coparticipação, por isso respeitam o trabalho do professor bem-sucedido, pois acreditam que seu projeto pessoal, nascido no interior da sua sala de aula, pode ser gradativamente ampliado aos seus alunos e à instituição como um todo.
(FAZENDA, 1994)

A contradição maior encontrei na proliferação indiscriminada das práticas intuitivas, pois os educadores perceberam que não é mais possível dissimular o fato de a interdisciplinaridade constituir-se na exigência primordial da proposta atual de conhecimento e educação. A revisão contemporânea do conceito de ciência orienta-nos para a exigência de uma nova consciência, que não se apoia apenas na objetividade, mas que assume a subjetividade em todas as suas contradições.
(FAZENDA, 1994)

Epistemologia é toda a noção ou ideia, reflectida ou não, sobre as condições do que conta como conhecimento válido. É por via do conhecimento válido que uma dada experiência social se torna intencional e inteligível. Não há, pois, conhecimento sem práticas e actores sociais. E como umas e outros não existem se não no interior de

relações sociais, diferentes tipos de relações sociais podem dar origem a diferentes epistemologias.
(SANTOS, 2009, p.9)

Por que razão, nos últimos dois séculos, dominou uma epistemologia que eliminou da reflexão epistemológica o contexto cultural e político da produção e reprodução do conhecimento? Quais foram as consequências de uma tal descontextualização? Haverá epistemologias alternativas?
(SANTOS, 2009, p.10)

Habitualmente hemos aprendido a pensar la realidad y a pensarnos nosotros mismos desde la realidad llamada Europa o EUA, o, si no, desde lo que la modernidad ha producido como saber, conocimiento, ciencia, tecnología y filosofía, todo ello producido en Europa y EUA, es decir, todavía nos comprendemos, nos pensamos y nos valoramos con conocimientos y concepciones producidos fuera de nuestra realidad, en cuyas teorías o conceptos no está contenida nuestra realidad sino otra.

Ahora de lo que se trata es de pensarnos a nosotros mismos, pero, desde el horizonte histórico y cultural de nuestra propia realidad, desde nuestros propios problemas, desde nuestras propias concepciones, desde nuestras propias <<cosmovisiones>>. Pero no como algo único y exclusivamente específico, sino en relación con la historia de la humanidad, pero desde nuestra historia.
(BAUTISTA, 2014, p.83)

Tal vez por eso recién ahora el pensar latinoamericano esté mostrando que lo que se llama <<pensar desde>> algún lugar como América Latina, implica <<pensar>> inevitablemente de modo radical los prejuicios que la modernidad ha producido y que en parte encubren la gravedad del presente. Pensar desde América Latina ahora está mostrando que lo que se llama pensamiento crítico no puede partir más desde la centralidad de la modernidad europea, sino desde fuera de ella, desde lo que ella siempre ha negado y excluido. Por ello, este ejercicio radical del pensar ahora nos está conduciendo a cuestionar ya no solamente el capitalismo como modo de producción constitutivamente destructor de la naturaleza y del trabajo humano, sino también el proyecto histórico, ideológico y filosófico de la modernidad en su conjunto, pero ahora en perspectiva mundial, en el contexto de las otras historias negadas y encubiertas por la modernidad.
(BAUTISTA, 2014, p.86)

Em suma, a interdisciplinaridade não é apenas um conceito teórico. Cada vez mais parece impor-se como uma prática. Em primeiro lugar, aparece como uma prática individual: é fundamentalmente uma atitude de espírito, feita de curiosidade, de abertura, de sentido da descoberta, de desejo de enriquecer-se com novos enfoques, de gosto pelas combinações de perspectivas e de convicção levando ao desejo de superar os caminhos já batidos. Enquanto prática individual, a interdisciplinaridade não pode ser aprendida, apenas exercida. Ela é fruto de um treinamento contínuo, de um afinamento sistemático das estruturas mentais. Em segundo lugar, a interdisciplinaridade aparece como prática coletiva. No nível de pesquisa propriamente dita, não pode

haver nenhum confronto sólido entre as disciplinas sem o concurso efetivo de representantes altamente qualificados de cada uma delas. É preciso que estejam todos abertos ao diálogo, que sejam capazes de reconhecer aquilo que lhes falta e que podem ou devem receber dos outros. Só se adquire essa atitude de abertura no decorrer do trabalho em equipe interdisciplinar.
(JAPIASSU, 1976, p.82)

La reforma en cuestión ha sido presentada con frecuencia por historiadores de la educación chilena como un proceso en el cual decantaron los aportes de un conjunto de experiencias previas, primero en colegios experimentales y luego planes educativos también experimentales, que se realizaban en Chile durante las décadas anteriores. Entre los antecedentes que la historiografía identifica, se han destacado el texto definitivo de la educación primaria obligatoria y gratuita - original de 1920 -, que terminó de fijarse luego de un complejo proceso de reforma y contrarreforma llevado a cabo entre 1928 y 1929. Con el texto definitivo de la ley de educación, se creó un tipo de escuela fiscal experimental, que existiría de manera simultánea a la escuela tradicional.

La línea de escuelas experimentales permitió realizar diversos ensayos pedagógicos dentro del sistema público. Muchas de las ideas que se retomaron en la educación primaria venían de la "escuela nova" norteamericana, que ponía en valor un aprendizaje activo en torno a la evaluación por parte de los docentes.
(EXSS, 2022, p.48)

A educação nova que, certamente pragmática, se propõe ao fim de servir não aos interesses de classes, mas aos interesses do indivíduo, e que se funda sobre o princípio da vinculação da escola com o meio social, tem o seu ideal condicionado pela vida social atual, mas profundamente humano, de solidariedade, de serviço social e cooperação. A escola tradicional, instalada para uma concepção burguesa, vinha mantendo o indivíduo na sua autonomia isolada e estéril, resultante da doutrina do individualismo libertário, que teve aliás o seu papel na formação das democracias e sem cujo assalto não se teriam quebrado os quadros rígidos da vida social. A escola socializada, reconstituída sobre a base da atividade e da produção, em que se considera o trabalho como a melhor maneira de estudar a realidade em geral (aquisição ativa da cultura) e a melhor maneira de estudar o trabalho em si mesmo, como fundamento da sociedade humana, se organizou para remontar a corrente e restabelecer, entre os homens, o espírito de disciplina, solidariedade e cooperação, por uma profunda obra social que ultrapassa largamente o quadro estreito dos interesses de classes. (DE AZEVEDO et. al, 1932, p. 40)

Ana Branco lembra que, por não concordarem com estas ideias, um grupo de professores propôs modificações no curso de Design da PUC-Rio. Estas mudanças propiciaram a discussão sobre a posição do aluno ao ingressar na universidade e sobre o aproveitamento da bagagem de informações e experiências que ele trazia consigo. Diz ainda essa professora que, no campo de projeto, por exemplo, era impossível não considerar a experiência que o aluno trazia, na medida em que,

no seu dia a dia, realizava uma série de atividades e ações através das quais podiam ser identificados passos de um processo de projeto. Estas atividades e ações, uma vez organizadas, configurariam um método de projeto. À academia ficava assim, reservado o papel de organizadora da experiência empírica, para que esta pudesse virar objeto de estudo e reflexão e fazer parte da vida acadêmica.
(COUTO, 2017, p.33)

Sob esta perspectiva, pode-se afirmar que o Design Social tem como prioridade a lógica do usuário e não a lógica dos meios de produção. O ato de projetar e de construir pouco a pouco, permitindo uma contínua participação dos indivíduos e a expressão de seus desejos, faz parte do modo de ver o objeto como fruto de um trabalho interativo entre o designer e o usuário, permitindo a sua não mitificação.
(COUTO, 2017, p.35)

Nossa herança colonial marcou-nos como meros consumidores de produtos acabados originários da metrópole. A dependência colonial e neocolonial faz-nos desconhecer o objeto como significante, como suporte material de ideias, como produto humano de uma dada cultura. Habituados a consumir o que é produzido como modelo "superior e universal", desprestigiamos o nosso fazer com as mãos, o nosso trabalho artesanal, discriminando-o como atividade menor e renunciando à nossa própria identidade. Desconhecendo que FAZER é dar forma a uma ideia, transformando-a em objeto, nossa tradição cultural não só inibiu esse fazer como enfatizou a "superioridade" de erudição e das profissões liberais. A introdução das escolas de Desenho Industrial veio resgatar a importância do risco* enquanto campo específico do fazer. Na PUC, o "design" foi integrado num Centro de Ciências Humanas e não no de tecnologia, já que ele implica na expressão da sensibilidade criadora e transformadora do homem em face do seu meio. Com isso, visamos enfatizar muito mais o PROCESSO DO FAZER do que o produto, evitando as práticas de pura e simples repetição impostas por um universo saturado de produtos já dados. Desse modo, acaba-se por descobrir uma TEMÁTICA NATIVA, isto é, as exigências de uma realidade muito mais próxima cujos desejos e necessidades implicam não apenas em soluções novas, mas em soluções ajustadas a essa realidade. Com isso, objetiva-se integrar o aluno no meio universitário sem fazer do saber técnico e do saber teórico uma doutrina, mas algo que ele incorpore à sua formação, adequando-o à realidade do contexto cultural e socioeconômico em que atuará. Assim sendo, o ensino universitário converge para a aproximação de áreas onde se amplia o saber do designer permitindo que sua habilidade se desenvolva no sentido de adequação à contemporaneidade. A noção de temática nativa remete à construção de uma identidade própria que caracterizará o nosso design, não só diferenciando-o dos demais por sua complexidade cultural, como integrando-o num universo transcultural.
(Trecho de documento que apresenta proposta de ensino do Departamento de Artes da PUC-Rio na 3ª Associação Latino-Americana de Desenho Industrial, ALADI, 1984 - mimeo).

Este pensamento que torna o desenho vivo e o ensino mais vivo ainda vem sendo compartilhado com os alunos deste curso desde que chegam à universidade até se formarem. São 6 semestres desta matéria

que é chamada por todos simplesmente de “Projeto”. A primeira que é oferecida aos alunos é o “Projeto Básico”. Vimos durante nossa pesquisa e desenvolvimento deste projeto de documentação que sua função didática voltada principalmente aos alunos do básico merecia atenção especial. É uma realidade o despreparo do aluno que chega à universidade para o exercício da descoberta do outro, do desejo de um grupo, de algo diferente de si próprio, do exercício de andar e não de apertar botões, de escrever e não de fazer cruzes em espaços determinados. O exercício da lógica ligada a uma realidade social e não ligada à própria lógica do analista. O grande exercício de se chegar vazio, sem preconceitos, num grupo social. Esta matéria propõe tudo isso acreditando que andando, escrevendo, desenhando sem preconceitos, porém com muito envolvimento, um projeto de fato se realizará. Porém é reconhecido por professores e alunos que esta postura precisa se valer, por muitas vezes ser novidade como prática, de todos os recursos possíveis para que seja esclarecida aos alunos que naturalmente sentem dificuldades em entendê-la.
(Handwritten text - Heliana Pacheco, Archive of the Arts and Design Department at PUC-Rio, 1990)

La Escuela de Arquitectura y Diseño de la PUCV (desde ahora solo la llamaremos Escuela), propone un planteamiento original acerca de la concepción de la poesía y del arte con los oficios, esta manera ha creado una pedagogía particular desde su fundación hasta el día de hoy.

Esta trayectoria de más de sesenta años parte desde lo colectivo. Cuando nos referimos a los inicios de esta nueva Escuela de Arquitectura UCV, unas décadas después de la fundación de la carrera de Arquitectura preexistente, hay un elemento clave que se gesta al contratar a un grupo de ocho profesores que llega desde Santiago a prestar servicios en el año 1952. Este grupo llega constituido, era un colectivo que en Santiago se reunían a discutir sobre temas arquitectónicos y problemas de la ciudad. (PÉREZ, 2018, p.30)

Nosotros pensamos que la arquitectura es fijar en algún momento la intimidad de vida vista a través del rostro, de sus manifestaciones del espacio, siempre constituyendo obras que tracen, que señalen, que constituyan el tiempo presente. Estas co-ordenadas nosotros las hemos querido dar en la Universidad. Hemos querido poner en contacto a los alumnos con el vivir, con la intimidad. Los hemos querido en contacto con el espacio y los hemos querido poner en contacto con lo presente. Entonces, todos nuestros esfuerzos son ésos. Toda nuestra labor es absolutamente ésa.
(CRUZ C., 1959, p.1 apud PÉREZ, 2018, p.40).

¿Cómo se conoce la vida? Nosotros pensamos que como la vemos a través del espacio, saliendo a la ciudad a recorrerla. No se la conoce adentro de las aulas. No se la conoce por los testimonios de otros. Se la conoce saliendo a la ciudad a recorrerla. Nuestra ciudad es un puerto sobre cerros a la orilla del mar. Es un espacio tridimensional.
(CRUZ C., 1959, p.2 apud PÉREZ, 2018, p.40)

En lo fundamental, lo que nosotros trasmitíamos y enseñábamos era el reflejo de nuestra propia aventura creativa, que se fundaba e iluminaba

en dos afirmaciones: una: que el hombre por su naturaleza misma es de condición poética, lo que lo lleva incesantemente a reinventar, cada vez, la figura del mundo; y la segunda afirmación: que la obra de arquitectura se origina a partir de la observación o elogio de la realidad cotidiana, por medio del dibujo y la palabra.
(ESCUELA DE ARQUITECTURA Y DISEÑO PUCV, 2003 apud PÉREZ, 2018, p.40).

<<Oggi, colpiti dalla crisi e disprezzati dalla superbia del Primo Mondo, ci sentiamo dire che "la storia è morta", e che la rigidità del sistema mondiale ammette un solo "ordine" profondamente ingiusto e disordinato. Noi Latinoamericani, però, siamo coscienti che nell'agonia delle ideologie muoiono le idee. Abbiamo constatato che le nostre carenze si trasformano in maggiore creatività, che i nostri valori di solidarietà e azione comune sono più forti dell'egoismo individualista, del trionfalismo consumistico e dei vani modelli illuministi. Siamo coscienti dei grandi limiti che abbiamo, ma anche delle nostre enormi possibilità. Per noi le utopie non sono morte: abbiamo fiducia in un mondo migliore e lavoriamo per ottenerlo. In altre parole, siamo in grado di continuare a costruire utopie che, a differenza di quelle originarie, hanno un luogo concreto: la nostra America. Ciò è possibile perché noi non cerchiamo la nostra strada: noi siamo certi di averla trovata>>.
(Historic Archive José Vial PUCV apud BRIGHENTI, 2018, p.25)

Il costruire l'architettura nella Città Aperta diventa quindi giocare il gioco che come tale, si sa in partenza, possiede delle sue regole. Queste regole vengono fatte dai docenti assieme agli studenti attraverso esercizi come la tarea, il compito, e cambiano a seconda della "partita" che viene giocata imponendosi di volta in volta in maniera differente. È il professore che inventa le regole di volta in volta, diventando lui stesso partecipe di questo esercizio che possiede un alto potenziale creativo e lo pone in condizione di imparare e mettersi in discussione ogni volta. Il gioco induce all'invenzione. Non esistono né vinti né vincitori perché ciò che conta è solo giocare la partita, partecipare al gioco con il massimo dell'impegno e uscirne più ricchi e maturi. Lo studente molto spesso viene messo nella condizione di non capire nell'immediato ciò di cui ha parlato il professore, si trova davanti a un gioco che non sa veramente come affrontare, ma dal quale deve cercare di compiere un "atto di fede" e, sulla base di quello che fino a quel momento ha ricevuto dal docente, provare a giocare la partita.
(BRIGHENTI, 2018, p.40)

Freinet acredita que o interesse dos alunos estava mais voltado para o que ocorria fora do que dentro da escola. Dessa forma, o autor utilizava como uma de suas técnicas pedagógica a "aula-passeio" que tem o objetivo de buscar motivações extra escolares no processo de ensino-aprendizagem. Durante essas "aulas-passeio" os alunos podiam se expressar livremente, utilizar o tatear experimental para realizarem descobertas, colocar em prática o seu senso de cooperação e refletir sobre suas atividades individuais e coletivas. Tal liberdade irá facilitar o processo de ascensão intelectual dos alunos, além de possibilitar que eles se tornem homens livres, autônomos, mais responsáveis e que tenham condições de contribuir na transformação da sociedade.
(COSTA, 2006, p.27)

Formación: por medio de el diseño, implementación y empaquetamiento de experiencias, destinadas a las y los miembros de liceos EMTP (Educación Media Técnico-Profesional) en materias de género, STEAM y "Design Thinking" (pensamiento de diseño), el cual incorpora el uso del FabLab móvil (PUCV-Aconcagua FabLab) e instancias en la Escuela de Arquitectura y Diseño PUCV, como un medio de introducción a la fabricación digital y dominio del uso de tecnologías para el desarrollo de capacidades científico-tecnológicas y artísticas.

Sensibilización: mediante estrategias comunicacionales y de difusión, en adición al desarrollo de eventos que promuevan la matrícula a liceos técnicos de la comuna de Villa Alemana, a mujeres y miembros de la comunidad LGBTIQ+, promoviendo el uso de nuevas tecnologías para el conocimiento STEM/STEAM a través de participación en pasantías y charlas de lideresas.

Acompañamiento: para instituciones EMTP, creando estrategias que ayuden a identificar y abordar aquellas barreras que obstaculizan las trayectorias educativas de mujeres y miembros de la comunidad LGBTIQ+, técnicas que deben estar incorporadas en este modelo integral de acompañamiento para las y los estudiantes de EMTP.
(JELDES et. al, 2023)

El cuerpo del valor aumenta en la medida que se mantienen integradas tres dimensiones mientras cada una de estas es más consistente.
(JELDES, 2017, p.22)

La sigla STEM fue acuñada durante la década del 90 por la National Science Foundation de Estados Unidos para referirse al conjunto de disciplinas de ciencia, tecnología, ingeniería y matemáticas (Science, Technology, Engineering y Mathematics). El significado literal de la palabra en inglés es tallo y resultaba aplicable a la noción que, desde estas cuatro disciplinas, podían emerger nuevas soluciones que impulsaran la competitividad del país como líder mundial en innovación y desarrollo.
(JELDES et al., apud BYBEE, 2013)

La Fabricación Digital es el proceso y serie de operaciones para la materialización de un objeto. A través de software CAD (Computer Aided Design) se produce el diseño y las geometrías de una pieza que luego se transfieren a un programa CAM (Computer Aided Manufacturing) que define operaciones que luego una máquina de fabricación lee para producir dicho producto. Dependiendo del objeto que se requiera fabricar es que se determinará el tipo de fabricación para lograr de mejor manera su forma y finalidad; estas tecnologías se dividen en fabricación aditiva y fabricación sustractiva, que a grosso modo se refiere al modo en que operan las máquinas, ya sea añadiendo el material capa por capa, o al contrario, en un proceso de mecanizado el material se va eliminando gradualmente.
(JELDES et al.,2023)