Systemic Design: A teaching-learning action

Design Sistêmico: uma ação de ensinagem

Diseño Sistémico: una acción de enseñanza-aprendizaje

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Abstract: This article presents the teaching-learning experience developed in the Systemic Design course within the Graphic Design program at the Federal University of Paraná. Its aim is to showcase the course's methodological construction and foster reflections on training designers capable of collaborating with governance models that overcome the unsustainability of the status quo. Co-authored with students who participated in this process, the text also seeks to evaluate the course's dialogical structure, the breadth of concepts addressed, and the effectiveness of learning through active methodologies in partnership with governmental agents. The methodological approach combined the use of Gigamapping for complex system mapping, technical visits to public institutions, and the collective construction of a glossary aimed at mediating exogenous interdisciplinary technical terms. This was complemented by thematic seminars conducted by the students themselves, focusing on conceptual deepening and the critical application of the content covered throughout the course.

Keywords: Systemic Design; Systemic Thinking; Wicked Problems, Teaching Learning; Graphic Design.

Resumo: O presente artigo traz a experiência de ensinagem desenvolvida na disciplina de Design Sistêmico do curso de Design Gráfico da Universidade Federal do Paraná, com o objetivo de expor sua construção metodológica e promover reflexões sobre a formação de designers capazes de colaborar com formas de governança que superem a insustentabilidade do status quo. Escrito em coautoria com discentes que vivenciaram esse processo, o texto também busca avaliar a estrutura dialógica da disciplina, a amplitude dos conceitos abordados e a efetividade da aprendizagem por meio de metodologias ativas em parceria com agentes governamentais. A abordagem metodológica combinou o uso do *GIGA-map* para mapeamento de sistemas complexos, visitas técnicas a instituições públicas e a construção coletiva de um glossário voltado à mediação de termos técnicos exógenos interdisciplinares, complementada por seminários temáticos conduzidos pelos próprios estudantes, com foco no aprofundamento conceitual e na aplicação crítica dos conteúdos trabalhados ao longo da disciplina.
Palavras-chave: Design Sistêmico; Pensamento Sistêmico; Wicked Problems; Ensinagem; Design Gráfico.

Resumen: El presente artículo presenta la experiencia de enseñanza-aprendizaje desarrollada en la asignatura de Diseño Sistémico de la carrera de Diseño Gráfico de la Universidade Federal do Paraná, con el objetivo de exponer su construcción metodológica y promover reflexiones sobre la formación de diseñadores capaces de colaborar con formas de gobernanza que superen la insostenibilidad del status quo. Escrito en coautoría con discentes que vivenciaron este proceso, el texto también busca evaluar la estructura dialógica de la asignatura, la amplitud de los conceptos abordados y la efectividad del aprendizaje por medio de metodologías activas en colaboración con agentes gubernamentales. El enfoque metodológico combinó el uso del gigamapping para el mapeo de sistemas complejos, visitas técnicas a instituciones públicas y la construcción colectiva de un glosario orientado a la mediación de términos técnicos exógenos interdisciplinarios, complementada por seminarios temáticos conducidos por los propios estudiantes, con enfoque en el desarrollo conceptual y en la aplicación crítica de los contenidos trabajados a lo largo de la asignatura.

Palabras clave: Diseño Sistémico; Pensamiento Sistémico; Wicked Problems; Enseñanza; Diseño Gráfico.

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1 INTRODUCTION

Assertive public policies rely heavily on the active participation of all social actors collaborating to address the complex, interconnected challenges that hinder sustainable development. In this landscape, Systemic Design emerges as an integrative discipline that synthesizes systems thinking principles with design theory and practice (Sevaldson, 2011) to address the complex, ill-defined social challenges known as wicked problems (Rittel; Webber, 1973). Unlike traditional reductionist design methodologies that fragment problems into isolated variables, Systemic Design seeks to comprehend problems holistically, mapping the dense connections, flows, boundaries, and feedback loops among system components.

This approach acknowledges that contemporary systemic crises—such as climate change, social inequality, food insecurity, and institutional inefficiencies in public management—cannot be resolved through linear, siloed, or sector-specific solutions. Instead, Systemic Design leverages collaborative, transdisciplinary methods (Jones, 2014) along with iterative frameworks for visualizing and analyzing complexity. These practices allow design teams to map dynamic systems and adapt interventions as the collective understanding of the system evolves (Sevaldson, 2011).

Beyond serving as a project-based practice, this approach embodies an ethical and political stance, demanding that practitioners evaluate long-term consequences across environmental, social, economic, and cultural dimensions. It redefines the designer's role from an isolated problem solver to a facilitator of collective processes, a mediator among diverse stakeholders, and an active agent of social transformation (Manzini, 2015). Consequently, preparing future designers to operate within these systemic domains is an escalating institutional demand that must be integrated into higher education curricula.

Accordingly, this article outlines the teaching-learning process implemented in the Systemic Design course within the Graphic Design program at the Federal University of Paraná. The objective is to present its methodological construction and stimulate dialogue regarding the necessity of equipping future designers to collaborate with governance structures that challenge the unsustainability of the status quo, thereby fostering inclusive, participatory, and resilient public policies. Co-authored with students who experienced this process, this paper evaluates the course's dialogical structure, the breadth of systemic concepts introduced, and the validity of active learning and field-based practices executed in partnership with municipal government agents.

2 SYSTEMIC DESIGN AS A COURSE: CHALLENGES AND OPPORTUNITIES

Teaching Systemic Design at the undergraduate level presents a significant pedagogical challenge, as it requires breaking away from traditional educational formats centered on linear problem-solving and compartmentalized content. Systemic training requires students to develop relational, holistic thinking, an acute sensitivity to complexity, and an openness to interdisciplinary dialogue.

Indeed, as Ryan (2014) argues, designers must cultivate a new mindset aligned with the values and habits (Table 1) that a systemic designer must bring to a challenge to guide their judgment during methodology application and method selection. In the author's view, values are desirable concepts that guide social actions, whereas habits are routines and behaviors acquired through repeated mental experiences. Together, values and habits dictate an individual's or a system's readiness for or resistance to change, as well as the speed at which transformation occurs (ibid., p. 5).

Table 1 – Mindset of the Systemic Designer

Characteristic	Value	Habits
Inquiring	Learning	Curiosity; attentiveness; asking questions instead of assuming.
Open	Growth	Avoids pre-judgment; seeks different experiences and perspectives; willing to change their mind.
Integrative	Accommodation	Avoids binary trade-offs; looks for 'win-win' relationships; creatively explores tension between worldviews.
Collaborative	Teamwork	Listens actively; builds on others' ideas; increases social cohesion; builds shared ownership and responsibility.
Centered	Mindset	Reflective self-awareness; sees challenges in a broader context; mediates tensions between extremes.

Source: Adapted from Ryan (2014).

The characteristics, values, and habits presented in Table 1 are considered by Ryan (2014) to be highly desirable for systemic designers. While not mandatory, they should be cultivated early in professional training, as they encourage practitioners to seek diverse perspectives and integrate them harmoniously into research and action. They are also invaluable for identifying and managing conflicts and tensions, both within project teams and with external stakeholders.

With this in mind, integrating Systemic Design into the curriculum implies, according to Sevaldson (2011), creating learning environments that foster experimentation, collaboration, and the collective construction of knowledge. This approach prioritizes active methodologies such as problem-based learning, participatory design, and interdisciplinary projects with external agents to immerse students in real, complex contexts. Although active methodologies form the backbone of design education in Brazil, operating at the level of complexity required by Systemic Design remains challenging in undergraduate programs, as the discipline is still under construction and lacks widespread dissemination and experimentation nationally.

Embracing this challenge, however, provides students with a safe environment to engage with high-complexity issues, enabling qualitative leaps in their education. This prepares them to act as mediators of the social transformations essential to overcoming contemporary unsustainability. To contribute to this educational shift, the next section details the integration of Systemic Design as a mandatory course within the revised Pedagogical Project (PPC) of the Graphic Design Undergraduate Program at the Federal University of Paraná.

3 SYSTEMIC DESIGN: A NEW MANDATORY COURSE IN THE GRAPHIC DESIGN UNDERGRADUATE PROGRAM AT THE FEDERAL UNIVERSITY OF PARANÁ

The Systemic Design course was included in the mandatory curriculum of the Graphic Design (DG) program at the Federal University of Paraná (UFPR) during the revision of the Course Pedagogical Project (PPC), with the new curriculum implemented in 2020. Structured as an interdisciplinary experience aimed at expanding students' understanding of the complex contexts surrounding contemporary design practice, the proposal arose from the need to integrate a systemic approach into the repertoire of future designers, promoting a critical, strategic, and sensitive outlook on current problems, and enabling them to work alongside multiple stakeholders and governance structures in formulating sustainable public policies.

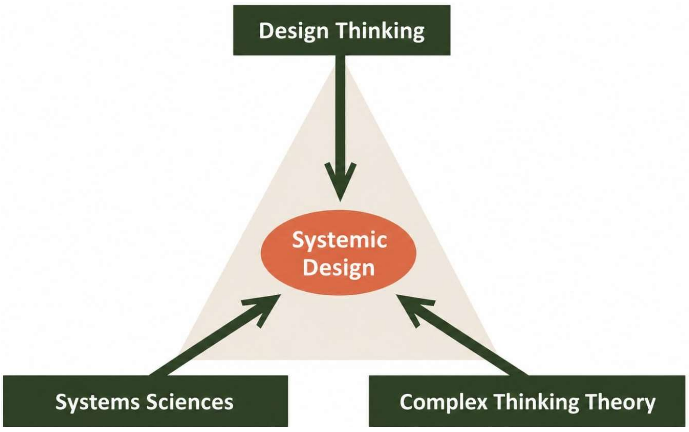
According to its syllabus, the UFPR Systemic Design course aims to address the definitions, competencies, typologies, and applications of this field, as well as the relationships between integrative thinking and systems thinking. To achieve this, it covers concepts of complex problems, emergence, boundaries, and the interrelations between system components and actors. Component of the Systems and Strategies Axis, the course seeks to provide a systemic and complex view of modern societies, fostering the skills necessary to confront wicked problems and create public policies, among other challenges. This is supported by a theoretical scope that grounds a holistic understanding of reality, alongside methodologies and tools that allow designers to act without becoming paralyzed by complexity (Jones, 2014). Offered over an academic semester with a total workload of 30 hours (2 hours per week), the course is taught to fourth-period students and utilizes basic and complementary bibliographies, featuring main authors such as VanPatter, De Namli, Peter Jones, Richard Buchanan, Nigel Cross, William M. Fox, Bigger Sevaldson, and Luigi Bistagnino.

3.1 A Teaching-Learning Action and Systemic Design

This report details the teaching-learning process implemented during the second semester of 2024, which involved 35 Graphic Design undergraduate students at UFPR. The course was organized to bridge theoretical content with empirical applications through a diverse mix of pedagogical strategies, including dialogic lectures, seminars, a collaborative glossary, a flipped classroom model, guest lectures, technical visits, and an applied project. This methodological diversity fostered a rich, participatory environment that valued knowledge exchange and collective learning.

At the beginning of the course, it was necessary to introduce a set of concepts and terminology exogenous to traditional design to align the students' foundational understanding. Many terms used in systemic design lack direct or straightforward translations, as they originate from other fields of knowledge, requiring careful pedagogical mediation to integrate them into the design lexicon. To mitigate epistemological unfamiliarity, the course structure was anchored in the theoretical triad of Systemic Design: Design Thinking, Systems Sciences, and Complex Thinking Theory (2005), as illustrated in Figure 1.

Figure 1 - The Triad of Systemic Design.



Source: Authors.

Grounded in Systems Theory—the framework upon which the entire approach is built—the syllabus encompassed Systemic Design's project spaces, its theoretical framework, fundamental definitions, and core concepts such as systems (including typologies, components, properties, and orders), complex problems (wicked problems), and systemic/complex thinking. Planning the course required balancing the syllabus requirements with the depth achievable within the 30-hour workload, which was distributed across a 15-week academic calendar as follows:

Table 2 - Program for the 15-week academic calendar.

Date	Content
Week 1	Teacher-student-course introduction.
Week 2	Design – contemporary domains of operation. Systemic Design – definition, approaches, and minimum shared theoretical triad: design thinking, complex problems (wicked problems), Complex Thinking.
Week 3	System – definitions, typologies, components, properties, and orders.
Week 4	Methodologies and tools of Systemic Design.

Week 5	Design Process: Phase 1 – Inquire.
Week 6	Design Process: Phase 1 – Inquire.
Week 7	Design Process: Phase 2 – Frame.
Week 8	Design Process: Phase 3 – Formulate.
Week 9	Design Process: Phase 3 – Formulate.
Week 10	Design Process: Phase 4 – Generate.
Week 11	Design Process: Phase 4 – Generate.
Week 12	Design Process: Phase 5 – Facilitate.
Week 13	Design Process: Phase 6 – Reflect.
Week 14	Final submission.
Week 15	Final exam.

Source: Authors.

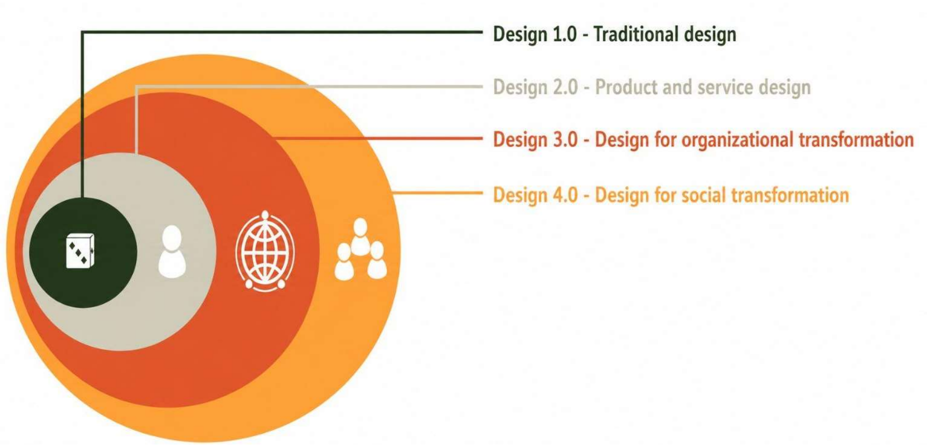
As shown in Table 2, the fifteen weeks balanced sensitization to new design domains, the theoretical framework described above, and the execution of a practical project.

3.2 Theoretical Contents Addressed: The Project Spaces

To contextualize Systemic Design within contemporary practice and illustrate the expansion of design domains into highly complex epistemological fields, the course operates on the premise that design is no longer confined to the form or function of isolated artifacts. Instead, it spans multiple layers of systemic complexity, where projects act as mediators of relationships, flows, and transformations. Rather than rigid compartments, these spaces function as interdependent layers that help visualize the breadth and depth of design impacts on real-world systems.

Lepre (2024a) proposes an interpretation of Systemic Design project spaces organized by levels of complexity, extending from the artifact (the most tangible and material level) to complex systems and ecosystems (the most abstract, strategic, and interconnected levels). This framework integrates the hierarchy of design activities proposed by Buchanan (1992) with the operational levels defined by Jones and VanPatter (2011). Adapted to a systemic context, it allows designers to navigate multiple operational scales, understanding both individual system units and their emergent properties. Consequently, it supports critical thinking and deliberate action when tackling highly complex problems.

Figure 2 - Representation of project spaces.



Source: Authors adapted from Lepre (2024).

As illustrated in Figure 2, Design organizes its project fields into four levels, described as follows:

> Design 4.0→ Design for social transformation: Projects of a political and social nature, aimed at the community.
>
> Design 3.0→ Design for organizational transformation: Projects focused on work practices, business, and organizations.
>
> Design 2.0→ Product and service design: Adds value to either a product or a service through innovation and/or user experience optimization.
>
> Design 1.0→ Traditional design: Physical or digital artifacts and communication.

Thus, prior to introducing advanced systemic concepts, the course exposed students to these introductory design models to contextualize their varying operational scales. From this foundation, students explored design activity tiers delineated by complexity and project spaces, as proposed by Jones and VanPatter (2011) (FIGURE 2). Drawing from Jones (2014, p. 9), Lepre (2024) emphasizes that these levels are complementary rather than hierarchical. Designing at any single level requires considering all others, as an artifact-level decision can trigger cascading effects across an entire ecosystem, and vice-versa. Systemic Design thus prompts practitioners to seamlessly navigate these scales with an acute awareness of their interdependencies.

3.3 First Round of Seminars: Deepening the Concept of a System

Following the contextualization of project spaces, the course introduced core systems concepts through the collaborative development of a Glossary of Systemic Terms. A glossary serves as a structured educational resource to compile and define technical terminology within a field of study. In educational settings, building a glossary collaboratively encourages active student participation, anchors vocabulary acquisition, and sustains engagement, as noted by Krause and Bain (2016).

Because many foundational Systemic Design concepts originate from fields like biology, physics, sociology, and systems engineering, their terminology is often highly abstract or lacks precise Portuguese translations. The shared glossary addressed this by defining entries such as System, Unit, Boundary, Organization, Emergence, Interrelations, Properties, and Autopoiesis (Table 3).

Table 3 - Summary of concepts addressed in student seminars.

Term	Conceptual Content	Authors
1. System	A complex of elements in ordered, non-random interaction. An interrelation of elements that constitutes a global entity or unity distinct from its environment.	Bertalanffy Morin
2. Open system	In thermodynamics: Systems allowing energy and material exchange with their environment. Dynamic living systems that adapt to maintain continuity. Their resilience relies on constant environmental exchanges regulated by their boundaries.	Bertalanffy Misoczky Tarride Vieira
3. Closed system	In thermodynamics: Macroscopic systems with a constant number of internal units (particles) and constant energy, remaining in thermal equilibrium. Internal changes result from external perturbations; when excited, the system performs work to regain equilibrium, dissipating energy via entropy. Boundaries are porous but regulated.	Cattani Bassalo Bertalanffy Uhlmann Vieira
4. Isolated system	Regarded as an ontological impossibility. Systems completely cut off from environmental exchanges by an absolute physical boundary. Isolation does not preclude internal work, which continues until equilibrium is reached. Final state entropy is never lower than initial entropy.	Vieira Cattani; Bassalo
5. Entropy	Proposed by Rudolf Clausius, it denotes energy dissipated during a transformation process. This lost energy cannot be reused to fuel system operations. Entropy increases continuously, driving systems from order toward degradation, disorder, and eventual extinction.	Capra Cattani; Bassalo Grecio
6. Emergent properties	Large-scale patterns or behaviors resulting from the localized interactions of system components. They cannot be understood or predicted by analyzing components in isolation.	Boccara
7. System hierarchy	System: an autonomous unit exhibiting emergence relative to its exterior. Subsystem: a subordinate system acting as a component of a larger system. Supra-system: a system controlling other systems without integrating into them. Ecosystem: a systemic complex whose interactions form the environment for its embedded systems. Metasystem: a system emerging from the mutually transformative interaction of previously independent systems.	Morin
8. Feedback loop	The process where the outputs of a structural cycle are returned to the system as input data, steering subsequent operations.	Capra Maturana Varela Morin
9.Homeostasis	Self-regulation to maintain internal stability, achieved via feedback loops that	Misoczky

	trigger corrective actions whenever deviations from established systemic parameters occur.	
10. Order	The dynamic arrangement through which system elements organize, interact, and generate predictable structural patterns.	Capra; Luisi; Donella; Escobar
11. Emergence	A property of complex systems where novel structural patterns, properties, and behaviors manifest entirely from the interactions among individual elements.	Capra; Luisi
12. Co-emergence	The interrelational nature of systems where elements only manifest in relation to one another; their existence is contingent upon the broader configuration.	Escobar
13. Wicked problems	Highly intricate social challenges rooted in an entangled web of economic, political, and environmental factors. They lack binary definitions, clear stopping points, or objective formulas for design resolution.	Rittel Webber
14. Complex systems	Dynamic systems where non-linear element interactions generate novel behaviors and structural changes. They require holistic analysis, as feedback loops ensure the system continuously co-produces its own parameters.	Capra
15. Complex Thinking	A framework emphasizing the necessity of building interdisciplinary knowledge to interpret real-world phenomena by mapping element interrelations and mutual dependencies.	Morin
16. Autopoiesis	Formulated by Maturana, Varela, and Luhmann, this theory asserts that living systems are structurally closed units that maintain highly restricted environmental interactions solely to preserve their living architecture. Living systems are organized in circular causal loops, characterizing units capable of autonomous self-creation.	Misoczki Maturana; Varela

Source: Lepre (2024b).

To deepen comprehension and foster active learning, students formed pairs to research, synthesize, and present a selected glossary term. This strategy promoted peer-to-peer knowledge exchange, refined communication skills, and expanded the cohort's collective vocabulary. Furthermore, it explicitly linked abstract theory to the practical execution of Systemic Design.

The seminars adhered to strict guidelines: teams logged their topic choices on a shared spreadsheet accessible to the entire class. Presentations were limited to five minutes in a rigorous pitch format to incentivize conciseness. Students were encouraged to use visual media, original video elements, or safe classroom experiments, focusing heavily on practical examples.

The primary reading assignment was an unpublished paper by Lepre (2024) titled "Systemic Design: the principles of the Turin approach and its exogenous theoretical concepts" (accepted for publication at the XV P&D conference). Supporting readings were distributed via Google Classroom. The use of generative artificial intelligence was permitted, provided students declared the tool used, its purpose, and demonstrated a comprehensive grasp of the synthesized material.

3.4 Lectures

Lectures were structured to present the theoretical foundations underpinning the discipline of Systemic Design, serving as a guide for students to understand core concepts and their practical applications. Conducted synchronously and in person, these classes were supported by the Google Classroom platform, which was used for schedule organization, material sharing, and distributing reference texts and articles.

The course developed through synchronous in-person meetings and asynchronous blocks, including pre-arranged technical field visits for direct observation and empirical data collection. The primary instructional methods adopted were dialogic lectures and the flipped classroom, both grounded in a constructivist approach centered on the collaborative construction of knowledge. The Flipped Classroom (Mattar, 2017), by making relevant content available through texts, videos, podcasts, websites, and blogs for access outside the classroom, fostered an autonomous and preliminary engagement with the subject matter.

This model ensured that synchronous classroom time was better utilized for critical discussions, conceptual deepening, troubleshooting questions, collective reflections, and group activities. This dynamic was essential for articulating the foundations of Systemic Design within food systems, guiding students toward the final project of the course: the development of systems supporting an urban garden. During the academic period following the project launch, at least 9 meetings were dedicated to providing guidance to teams regarding their final coursework.

Regarding its organization and supporting resources, the course utilized a diversified communication and educational support system, including:

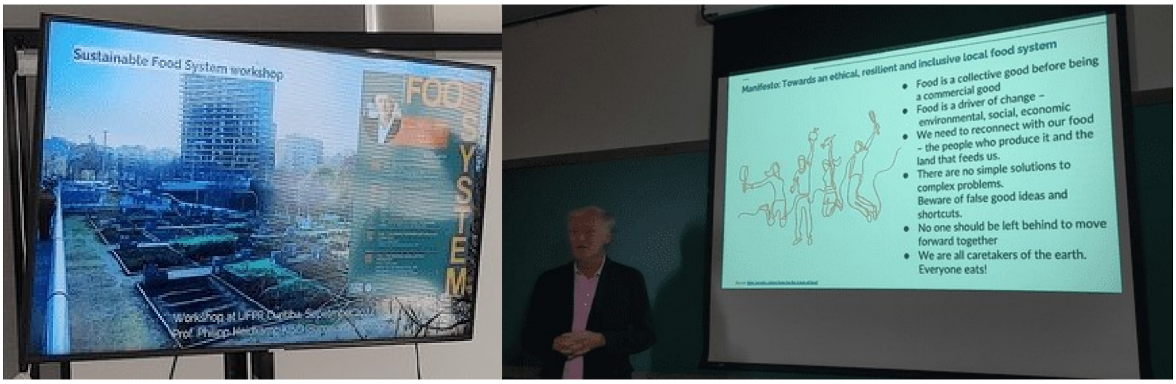
- Weekly synchronous in-person sessions (2h);
- Asynchronous periods, providing texts, lecture slides, videos, films, and podcasts via Google Drive and Google Classroom;
- A discussion group on Microsoft Teams;
- A thematic Instagram profile: @food.design_world.

In terms of teaching materials and infrastructure, the resources utilized included: texts and articles in PDF format, book excerpts, audiovisual media, podcasts, field materials (fairs, supermarkets, restaurants), internet and computer access for platform participation and task execution, and expressive materials such as paper, pens, markers, magazines, and post-its. The course evaluation model comprised three main criteria: active participation in classes and the experimental laboratory, submission of requested partial activities, and submission of the agreed final project (problem-based final project). Attendance was monitored weekly, and the total course load was 30 hours, combining synchronous and asynchronous instances according to the planned schedule.

3.5 Guest Lectures: Building Academic Networks

To enrich the theoretical scope and bridge classroom concepts with international practice, the program hosted Professor Philipp Heidkamp from the Köln International School of Design (KISD) in Cologne, Germany, in coordination with UFPR's Sustainable Design Center. Co-facilitated by Professor Priscilla Lepre, the lecture focused on Food Systems Design.

Figure 3 - Food Systems - Professor Philipp Heidkamp - KISD



Source: Personal Archive.

Professor Heidkamp shared academic case studies and professional projects, exploring how design acts as a mediator across social, ecological, and structural issues within food value chains. This presentation established an active dialogue regarding systemic frameworks and their implementation in complex design scenarios. By interacting directly with the students, Heidkamp clarified core systemic concepts, expanding the cohort's understanding of global food system complexities and reinforcing the value of interdisciplinary design interventions.

3.6 Wicked Problems and Double Diamond Integration in the Final Project

The final project responded to a demand from the City Hall of Curitiba: how to engage young adults in the city's urban agriculture system? This issue represents a wicked problem—that is, a complex, ill-defined problem interconnected with multiple social, cultural, environmental, and economic variables, for which there are no ready-made or universal solutions (Rittel; Webber, 1973, p. 161-167).

In this sense, the final project aimed to stimulate students to propose strategies for engaging youth at the Urban Farm of Curitiba (Fazenda Urbana de Curitiba), focusing particularly on generating employment and income for this demographic through a Systemic Design approach, specifically the one developed by the

Politecnico di Torino (PoliTO, Italy) for food contexts. This approach, its methodological stages, principles, and primary tools were presented to students in a dialogic lecture supported by scientific articles and case studies developed at that institution.

According to the local government, the low participation of youth in the urban agricultural space, despite its educational and community potential, reveals a multifaceted issue involving aspects of belonging, intergenerational communication, urban infrastructure, cultural values, and regional interests—all defining traits of wicked problems. To address this complexity and follow the guidelines of the Turin approach, the Double Diamond model proposed by the Design Council (2005) was also adopted as a guide. This model organizes the design process into four phases: a) discover, b) define, c) develop, and d) deliver, divided into two major moments of divergence and convergence.

The first stage allowed the student groups to frame the problem through seminars and explore the context of the Urban Farm in depth, particularly through a technical visit and initial systemic mapping (gigamapping), identifying needs, audiences, and opportunities. Subsequently, the definition stage guided students in formulating more specific and viable scopes for intervention.

The final phases, development and delivery, involved generating creative solutions aimed at building bridges between young people and the urban garden proposal. A key criterion for the presented solutions was the inclusion of a systemic mapping. By employing these two approaches—the understanding of wicked problems and the Double Diamond structure—students were encouraged to recognize the complexity of the proposed challenge and structure their responses in a systemic, critical, and collaborative manner.

3.7 Second Round of Seminars: Framing the Problem

Following the project launch, a new set of seminars was conducted to frame the problem. The class was divided into groups of up to three people, tasked with structuring responses in the form of texts, charts, or figures to answer reference questions related to fields exogenous to Design that intersect with the project's problem space, such as agronomy and urban planning (specifically public policies for food, entrepreneurship, and urban agriculture).

The questions were divided into three blocks: the first focused on knowledge from Agronomy; the second addressed current public policies regarding agriculture in the city of Curitiba; and the third related to Design as a tool for working with agriculture. Responses were sourced from books, scientific articles, official websites, theses, dissertations, technical reports, and other academic publications. Furthermore, references and citations were required to adhere to Brazilian Association of Technical Standards (ABNT).

3.8 Visita Técnica: Fazenda Urbana de Curitiba

As part of the course's pedagogical framework, students participated in a technical visit to the Urban Farm of Curitiba (Fazenda Urbana de Curitiba) on October 18, 2024. The primary objective of the activity was to provide a practical experience allowing direct observation of a functioning socio-environmental system, connecting the theoretical concepts discussed in class with the empirical reality of an urban collective cultivation space.

The Urban Farm is a core component of Curitiba's municipal projects aimed at community integration through sustainable agriculture. The space operates as a collective garden and educational center, promoting accessible and sustainable cultivation practices (Curitiba, 2024). During the visit, it was noted that the audience most engaged in the activities consists predominantly of older adults, who find the garden an opportunity to occupy their time, collaborate with the urban environment, and generate income through vegetable production and training courses.

Figure 4 - Technical Visit to the Curitiba Urban Farm.

Source: Personal Archive.

The visit enabled students to understand the structural, social, and logistical operations of the Farm, while allowing them to clarify questions directly with local coordinators. This immersion was essential for the development of the final course projects, as the project brief emerged from a partnership with the City Hall and the Urban Farm coordination. The challenge presented to the students was to collaborate on strategies to engage a new audience: youth. The goal was to rebalance the current demographic profile, which is predominantly composed of adults and the elderly, thereby expanding the social impact of the project.

Immediately following the visit, students completed their first gigamapping activity in the classroom. This exercise was essential for systematizing and recording the information gathered during the visit, mapping the flows, actors, structures, and relationships of the Urban Farm in all its complexity. This visual mapping served as the starting point for group work, guiding the subsequent stages of the course based on real data and lived experiences.

Figure 5 - Gigamapping

Fonte: Personal Archive.

This first collaborative gigamapping aimed to record, through keywords and illustrations, the primary dynamics of the system observed at the Urban Farm. The activity was conducted right after the technical visit, while impressions and information were fresh in the students' memories, utilizing available stakeholders to clarify doubts and deepen understanding.

Figure 6 - Garden Space.

Fonte: Personal Archive.

The visit allowed learners to understand that all garden spaces are managed under a crop rotation strategy to provide a wider range of vegetables throughout the year, which also benefits soil health. It was also observed through dialogue with local agents that the public involved in Curitiba's urban garden systems is predominantly retired, highlighting the municipality's interest in creating systems and strategies that foster young adult engagement, focusing on income generation for this population. In this light, the professor proposed the final project of the course, described in the next section.

3.9 Projeto Final e Estratégias de Avaliação

In view of the context outlined in the previous section, the final project of the Systemic Design course aimed to propose solutions for engaging young adults in the urban agriculture system of Curitiba, particularly concerning employment and income generation for this demographic. Developed over 9 academic weeks, the project was executed using the methodology prescribed by the Turin school of Systemic Design, divided into three macro-phases: 1) problem framing; 2) designing the systemic solution; and 3) implementation. These macro-phases are mapped onto the Double Diamond and feature four steps:

Diamond 1
- Step 1 – divergent → Inquire: understanding complexity
- Step 2 – convergent → Frame: confronting challenges

Diamond 2
- Step 3 – divergent → Designing the system
- Step 4 – convergent → Evaluating the system

The method was presented in a lecture, and the specifics of its application to systemic projects were supported by an article by Lu et al. (2023). Each phase was associated with potential tools for field data collection (interviews, questionnaires, technical visits, etc.) and analysis strategies. Issues regarding research ethics, data collection, and processing were addressed, and weekly deliverables were established as follows:

Table 4 - Project Activities

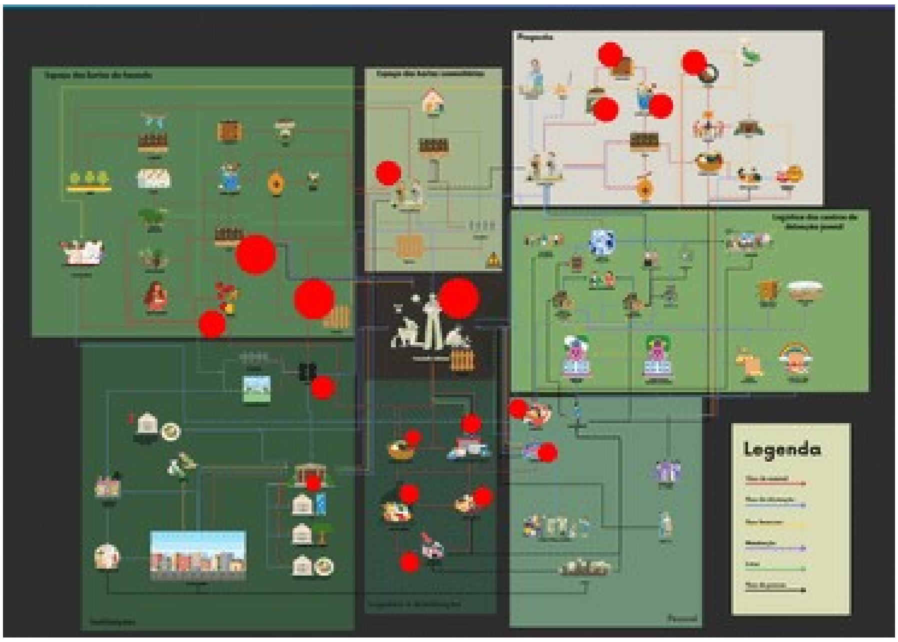
Phase 1 – Inquire → Field data collection: actors and relationships.
Phase 1 – Inquire → Field data collection: actors and relationships.
Phase 2 – Frame → Definition of the problem to be addressed in the new system.
Phase 3 – Formulate → Proposition of the new system: *gigamapping* 1.
Phase 3 – Formulate → Proposition of the new system: *gigamapping* 2.
Phase 4 – Generate →Proposition of the new system → final GIGA-map.
Phase 4 – Generate →Proposition of the new system → final GIGA-map.
Phase 5 – Facilitate → Presentation of the new system to the stakeholders.
Phase 6 – Reflect → Paper generation.
Final Delivery → Final submission.

Source: Authors.

The strategy employed to monitor and guide the evolution of each project consisted of weekly team tutorials, linking grades to each milestone submission. In fact, course evaluation was tied to three components: a) active participation in classes (13 points); b) submission of requested partial activities (70 points); and c) delivery of the agreed final activity (17 points). Thus, in each of the phases listed above, teams presented their completed tasks, discussed findings and ideas, responded to feedback, and received guidance for executing the subsequent design stages.

Due to the limited time available to develop and implement a systemic project, the final deliverable was designated as an academic paper containing the following textual elements: introduction, rationale, general objective, specific objectives, method, literature review, field data collection and analysis, the concept of the new system, and its final digital GIGA-map representation, following instructions by Lu et al. (2023).

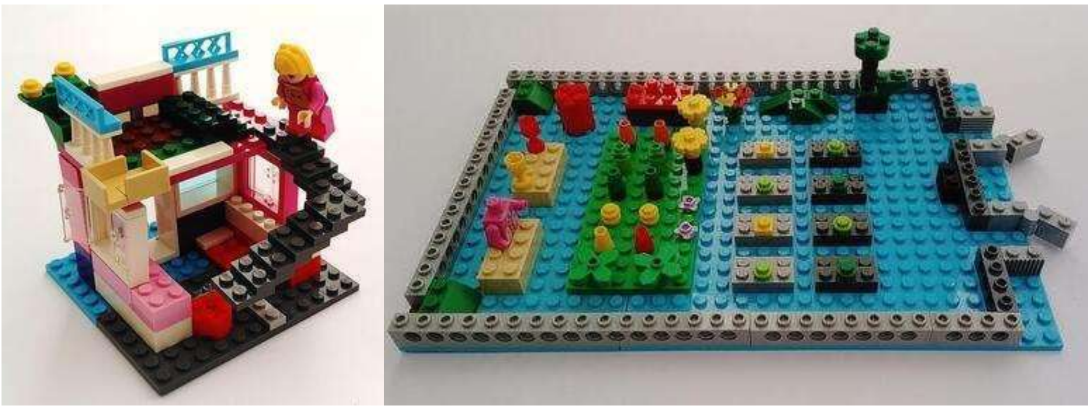
Figure 7 - Bidimensional Results Examples. - final gigamap



Fonte: Personal Archive.

The delivery of the final outcome was linked to a classroom presentation formatted in whatever manner best contributed to understanding the proposal. This open format aimed to sensitize students to the need to adapt their language and exhibition format to match the specifics of each stakeholder group involved in systemic projects. This sensitization strategy, which was employed on multiple occasions, led to outcomes where some teams voluntarily submitted three-dimensional mockups (Figure 8) of the created systems to make the system's comprehension more accessible to the target public, demonstrating the efficacy of the strategy.

Figura 8 - Tridimensional Results



Fonte: Personal Archive.

Additionally, textual grading and the appraisal of each system generated in the course were conducted in person, discussing errors, successes, and avenues for improvement or project derivation. At the end of the course, a feedback session was offered for students to evaluate the instructor, the process, and the results, as well as to point out weaknesses and opportunities for improvement in subsequent semesters. Some of the issues raised are discussed in the next section.

4 DISCUSSION AND COURSE ANALYSIS

During the execution of the Systemic Design course, several structural and pedagogical aspects emerged as key areas for improvement in future editions. One of the most apparent points was the credit hours: over the course of the semester, it became clear that the available time (30 total hours, at 2 hours per week) was insufficient given the theoretical density and practical complexity of the content. As the topics advanced, a need arose to deepen new concepts, requiring more time for reading, discussion, and assimilation by the students. Consequently, a departmental discussion took place, and starting in 2025, the Systemic Design course has been expanded to 45 class hours.

This change does not represent an ideal scenario; it could be strategic in a future PPC revision to split the course into two complementary modules: the first focused on introducing concepts and theoretical foundations, emphasizing seminars, guided readings, and exploratory activities; and the second dedicated to practical systemic design project work, focusing on applying knowledge to real-world situations and developing complex proposals. Another discussion underway within the Design Department Council involves reorganizing courses in the Systems and Strategies Axis, relocating Systemic Design to the 6th period, preceded by courses that prepare the students' systemic view and stance, such as Visual Thinking, Project Management, Strategic Design, and Service Design.

Another relevant point was enrollment size. With a cohort consisting of approximately 35 students, providing individualized guidance to groups became a challenge. Personalized tutorials, which are essential for project maturity, were compromised by classroom time limits and the sheer number of groups. Therefore, smaller class sizes are recommended to enable deeper mentoring sessions, better time utilization, and greater effectiveness in the teaching-learning process. The pedagogical space of the classroom was also scrutinized, as an amphitheater layout—where this iteration took place—does not support the collaborative format required for Systemic Design, both regarding group discussions and the need for permanent visual workspaces where findings and collective constructions can remain displayed.

Regarding the pedagogical strategies adopted, the effectiveness of collaborative seminars as a method for introducing and assimilating complex terms stood out. The proposal to divide concepts among pairs or trios for classroom presentation proved to be a valuable resource for fostering active student engagement and facilitating critical content appropriation. This format favored the collective construction of knowledge and stimulated peer-to-peer learning.

In light of these observations, a dialogue can be established with authors who discuss design education when confronting the challenges of complexity. The need for expanded credit hours and smaller cohorts aligns with what Irwin, Tonkinwise, and Kossoff (2020) propose in their pedagogical framework for Transition Design: a model that recognizes time as an essential factor for assimilating interdisciplinary concepts and developing projects within real systems. They argue that design education oriented toward transitions requires learning spaces that permit reflection, engagement with multiple stakeholders, and practical experimentation in highly complex contexts.

This perspective also aligns with the previously cited contributions of Manzini (2015), particularly in his work Design, When Everybody Designs, where the author emphasizes the importance of training designers capable of acting within social innovation processes. For Manzini, learning must be rooted in real, local contexts, favoring active student involvement with communities and collaborative networks, and stimulating a project-based mindset that blends aesthetic sensibility, ethical responsibility, and a systemic vision. Moreover, prioritizing strategies such as collaborative seminars echoes the proposals of Paulo Freire (1996), for whom learning is built through dialogue and listening, promoting a horizontal relationship between students and instructors. Thus, the experience provided by this course, despite its limitations, points toward paths consistent with contemporary approaches to design education.

In summary, despite the structural challenges faced, the course proved relevant and promising, reinforcing the importance of Systemic Design in training more critical, sensitive designers prepared to act within complex realities. It shows that working in partnership with public policy promoters and other system stakeholders grants students a unique, valuable practical experience, broadening their mindset and skills to operate in overcoming highly complex problems involving multiple actors from different areas with distinct needs and desires, in pursuit of solutions that promote the common good and sustainable futures.

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