



Strategic Design, Role-Playing Game and Teacher Education: Prototyping Attitudes for Sustainable Innovation

Design Estratégico, Role-Playing Game e Formação de Professores: Prototipando Atitudes para a Inovação Sustentável

Diseño Estratégico, Role-Playing Game y Formación Docente: Prototipando Actitudes para la Innovación Sostenible

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Abstract: This article examines the role of the Innovation Articulator Teacher (Professor Articulador de Inovação – PAI, hereafter IAT) in the Municipal Education Network of Porto Alegre, addressing the mismatch between its institutionally defined strategic function and the predominantly technical orientation of existing teacher training models. Grounded in Strategic Design and in the understanding of educational innovation as a sociotechnical process oriented toward sustainability, the study analyzes how innovation is mediated in public education contexts marked by infrastructural fragility, inequality, and institutional instability. Methodologically, the research adopts a qualitative participatory action research approach, structured through triangulation involving document analysis, reflexive field records, questionnaires, Futures Wheel activities,

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and Role-Playing Game (RPG) sessions as a sociotechnical prototyping device. Reflexive thematic analysis identifies four interconnected themes: ambiguous professional identity, strategic translation of technology, institutional political agency, and ontological security supported by peer networks. The study develops a situated theoretical–practical framework of eleven Strategic Design attitudes. It contributes by framing educational innovation as sociotechnical mediation and by offering an analytical and formative instrument to support the development of collaborative and context-sensitive educational ecosystems within broader transitions toward systemic sustainability.

Keywords: strategic design; innovation; education; role-playing game; teacher education.

Resumo: Este artigo examina a atuação do Professor Articulador de Inovação (PAI) na Rede Municipal de Educação de Porto Alegre, abordando o descompasso entre a função estratégica institucionalmente atribuída a esse papel e a orientação predominantemente técnico-instrumental dos modelos de formação docente existentes. Ancorado no Design Estratégico e na compreensão da inovação educacional como um processo sociotécnico orientado à sustentabilidade, o estudo analisa como a inovação é mediada em contextos de educação pública marcados por fragilidade infraestrutural, desigualdade e instabilidade institucional. Metodologicamente, a pesquisa adota uma abordagem qualitativa de pesquisa-ação participativa, estruturada por triangulação envolvendo análise documental, registros reflexivos de campo, questionários, atividades de Futures Wheel e sessões de Role-Playing Game (RPG) como dispositivo de prototipagem sociotécnica. A análise temática reflexiva identifica quatro temas interconectados: identidade profissional ambígua, tradução estratégica da tecnologia, agência político-institucional e segurança ontológica sustentada por redes de pares. O estudo resultou em um framework teórico-prático situado de onze atitudes de Design Estratégico. Contribui ao enquadrar a inovação educacional como mediação sociotécnica e ao oferecer um instrumento analítico e formativo para apoiar o desenvolvimento de ecossistemas educacionais colaborativos e sensíveis ao contexto, no âmbito de transições mais amplas rumo à sustentabilidade sistêmica.

Palavras-chave: design estratégico; inovação; educação; role-playing game; formação docente.

Resumen: Este artículo examina el papel del Profesor Articulador de Innovación (PAI) en la Red Municipal de Educación de Porto Alegre, abordando la brecha entre la función estratégica atribuida institucionalmente a este rol y la orientación predominantemente técnico-instrumental de los modelos de for-

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mación docente existentes. Sustentado en el Diseño Estratégico y en la comprensión de la innovación educativa como un proceso sociotécnico orientado a la sostenibilidad, el estudio analiza cómo se media la innovación en contextos de educación pública marcados por fragilidad infraestructural, desigualdad e inestabilidad institucional. Metodológicamente, la investigación adopta un enfoque cualitativo de investigación-acción participativa, estructurado mediante triangulación que integra análisis documental, registros reflexivos de campo, cuestionarios, actividades de Futures Wheel y sesiones de Role-Playing Game (RPG) como dispositivo de prototipado sociotécnico. El análisis temático reflexivo identifica cuatro temas interconectados: identidad profesional ambigua, traducción estratégica de la tecnología, agencia político-institucional y seguridad ontológica sostenida por redes de pares. El estudio deriva un marco teórico-práctico situado de once actitudes de Diseño Estratégico. Contribuye al encuadrar la innovación educativa como mediación sociotécnica y al ofrecer un instrumento analítico y formativo para apoyar el desarrollo de ecosistemas educativos colaborativos y sensibles al contexto, en el marco de transiciones más amplias hacia la sostenibilidad sistémica.

Palabras clave: diseño estratégico; innovación; educación; juego de rol; formación docente.

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1 INTRODUCTION

Education in the twenty-first century faces tensions between pressures for technological innovation and the need to respond to socio-environmental crises associated with the Anthropocene, a concept popularized by Paul J. Crutzen and Eugene F. Stoermer (2000) to describe increasing human interference in planetary systems. Beyond its origins in Earth sciences, the concept has informed debates on the ecological limits of development and the need to rethink knowledge production, social organization, and human–planet relations (Danowski; Castro, 2014).

Critical digital literacy plays a key role in this scenario, as the integration of digital technologies in education has often been framed as a technical issue related to tools and teacher training. However, studies indicate that innovation depends less on the technologies themselves than on the institutional capacity to mediate their use in relation to pedagogical intentions and collaborative practices (UNESCO, 2021). In contexts marked by inequality and infrastructural limitations, such mediation becomes particularly complex, as technologies may both expand access and reproduce asymmetries when adopted through technocentric approaches or disconnected from practice (Castells, 2009; Faustino; Lippold, 2023).

Technological, social and environmental transformations are interdependent, requiring approaches that understand education as part of complex sociotechnical systems (Morin, 2015). In this context, public schools emerge as strategic spaces for knowledge production, community articulation, and civic formation. The mediation of technology in school practices, therefore becomes a pedagogical, social, and political issue, directly related to the construction of more resilient and sustainable educational ecosystems (Escobar, 2016; Haraway, 2016). In the Municipal Education Network of Porto Alegre (RME-POA), this context led to the creation of the Innovation Articulator Teacher (IAT) (Professor Articulador de Inovação – PAI), in 2022. These professionals support innovation processes by translating institutional guidelines into situated practices, articulating pedagogical initiatives, and fostering experimentation in teaching and learning.

However, the consolidation of this role occurs within a context in which teacher training related to educational technologies remains predominantly technical and instrumental. This contrasts with the systemic nature of the role described in institutional documents, which generates a gap between strategic expectations and available training models. Understanding this gap is key to strengthening the sustainability of educational innovation in public schools.

Despite growing attention to digital transformation, limited attention has been given to how sociotechnical mediation is developed in teacher education, particularly in contexts where professionals must translate institutional policies into situated practices. In this context, Strategic Design offers an analytical lens for understanding educational innovation as a process of transformation within sociotechnical systems, emphasizing interpretation, mediation, and experimentation (Zurlo, 2010; Manzini, 2015; Paz; Campelo; Borba, 2023).

From this perspective, this article analyzes the work of Innovation Articulator Teachers in the Municipal Education Network of Porto Alegre through a participatory action research process that develops a situated framework of Strategic Design attitudes. It contributes to reframing educational innovation as sociotechnical mediation and to supporting the education and practice for innovation cultures of professionals operating in complex institutional contexts.

2 STRATEGIC DESIGN, EDUCATIONAL INNOVATION AND SUSTAINABILITY

This section articulates Strategic Design, educational innovation, and sustainability as interconnected dimensions for understanding transformation processes in complex sociotechnical systems.

2.1 Strategic Design, Design Attitude and Innovation in 21st Century Education

Strategic Design can be understood as a lens for guiding innovation in complex sociotechnical contexts (Zurlo, 2010), emphasizing the reinterpretation of meanings through which practices, artifacts, and relationships are re-signified (Verganti, 2009). This perspective is particularly relevant in contexts characterized by wicked problems, which resist linear solutions and require mediating practices capable of integrating diverse perspectives (Rittel; Webber, 1973).

In the Anthropocene context of intersecting socio-environmental and technological crises, educational innovation extends beyond the introduction of tools, involving the reconfiguration of roles, resources, and organizational processes under conditions of uncertainty (UNESCO, 2021). Here, the notion of design attitude is presented as the operational dimension of this perspective, supporting action in contexts marked by ambiguity and instability (Michlewski, 2015). PAZ, CAMPELO e BORBA (2023) identifies seven Strategic Design attitudes that enable situated innovation processes, here understood as a practical configuration through which actors, resources, and intentions are articulated in response to complex educational challenges.

Educational innovation, therefore, involves reinterpreting pedagogical practices, redefining roles, and reconfiguring technologies as pedagogical artifacts. This becomes particularly evident in contexts affected by climate-related disruptions, such as the floods that impacted schools in the Municipal Education Network of Porto Alegre in May 2024, where continuity depended on reorganizing practices and mobilizing networks under conditions of infrastructural breakdown.

In this context, the findings indicate that Innovation Articulator Teachers (IAT) operate as a strategic mediator, articulating pedagogical processes and collective responses to situated challenges. Initiatives such as CriaRenda (Cima, 2025), focused on transforming waste into community-based practices, illustrate how innovation emerges through the dialogue among different actors, meaning-making and the reconfiguration of local resources.

2.2 Educational Innovation and Institutional Complexity

Educational innovation requires shifting the focus from technologies to the processes through which they are appropriated, negotiated, and institutionalized. It emerges as a sociotechnical process shaped by the interaction between pedagogical practices, institutional norms, infrastructure, public policies, and school cultures.

Technologies reorganize information flows and power relations within institutions (Castells, 2009),

and their educational use depends on how they are interpreted in specific contexts. Sustainable change depends less on technological artifacts than on their articulation with meaningful educational projects, collaborative cultures, and context-sensitive practices (Morin, 2015; UNESCO, 2023).

From a complexity perspective, educational systems involve interacting dimensions—curricular, administrative, pedagogical, technological, and community-based—that influence one another unpredictably (Morin, 2015). Institutional articulation therefore requires actors capable of operating across multiple scales and mediating between different logics and expectations. Critical pedagogy further highlights the relational and political dimensions of these processes (Freire, 2018).

2.3 Sustainability as Projectual Dimension and Analytical Horizon

Sustainability is here understood as a multidimensional horizon encompassing environmental, social, economic, and cognitive dimensions (Manzini, 2015; Santos, 2010). Within Strategic Design, it operates as a projectual orientation guiding the translation of public policies into situated practices, articulating strategic intentions and local contexts through processes of mediation and meaning-making (Zurlo, 2010; Manzini, 2015).

This orientation unfolds across three articulated dimensions: (a) technological sovereignty—the capacity to reappropriate technologies pedagogically; (b) multi-actor network articulation—activating collaborative networks and sustaining infrastructures for collective action (Manzini, 2015); and (c) policy translation—the reinterpretation of institutional guidelines into practices responsive to territorial specificities (Verganti, 2009).

3 RESEARCH CONTEXT

This study was conducted in the Municipal Education Network of Porto Alegre (RME-POA), a public school system that has developed policies aimed at integrating digital technologies, pedagogical practices, and teacher development, aligned with national guidelines for digital education. At the municipal level, these orientations were formalized in the Innovation Plan of the Municipal Secretariat of Education (PORTO ALEGRE, 2021-2024), which emphasized infrastructure renewal, cloud-based systems, and technically oriented teacher training. While this plan structured part of the institutional context in which the role analyzed in this study emerged, it also reveals tensions between the strategic expectations attributed to innovation and the predominantly technical orientation of training policies.

Within this context, the Innovation Articulator Teacher (IAT) (Professor Articulador de Inovação – PAI) supports the integration of technologies with pedagogical practices and collaborative teacher development. Positioned between schools and central administration, the IAT mediates between institutional guidelines and situated practices, articulating innovation projects and fostering experimentation. This role aligns with the perspective of Educating Cities, which conceives the city as an expanded educational environment (AICE, 2020).

The researcher's position as an insider—first as an IAT and later in a pedagogical advisory role within the Municipal Secretariat of Education, in the Educational Programs Unit (Unidade de Programas Educacionais), at the Innovation and Technology Program; as well as in collaborative initiatives such as the Porto Alegre Educating City project, where the community of practice later discussed in this study was initially articulated—enabled a situated understanding of practices and institutional dynamics, while requiring continuous reflexivity to avoid naturalizing the field. This positioning is treated as a methodological condition that supports the production of situated knowledge within participatory action research (Haraway, 1988).

Porto Alegre is approached as a critical case for examining educational innovation under conditions of systemic stress, particularly following the May 2024 floods, which affected schools and the continuity of educational processes. In this study, the climate crisis is treated as a project condition shaping the possibilities and limits of pedagogical and technological mediation. This article advances a shift from a previously explored critical-speculative approach to an analytical-empirical examination of how educational innovation is mediated and sustained in public school contexts. It should therefore be read as an empirical unfolding of a broader research agenda.

4 METHODOLOGY

The study adopts a qualitative participatory action research approach, suitable for investigating the work of Innovation Articulator Teachers (IATs), which involves mediation, negotiation, and experimentation within complex sociotechnical contexts. This approach aligns with Strategic Design, understood as a practice of interpretation, mediation, and experimentation (Zurlo, 2010; Manzini, 2015), and with a reflexive epistemology in which knowledge emerges through the interaction between situated action and collective meaning-making (Freire, 2018; Braun; Clarke, 2022).

4.1 Research Design

The research involved 17 IATs from the Municipal Education Network of Porto Alegre and was structured according to ZURLO (2010) three levels of knowledge-Seeing, Foreseeing, and Making-See-articulating contextual analysis, projection, and situated experimentation.

At the Seeing level, data were produced through document analysis, literature review, and a reflexive field diary, enabling the identification of institutional framings and tensions between policy and practice.

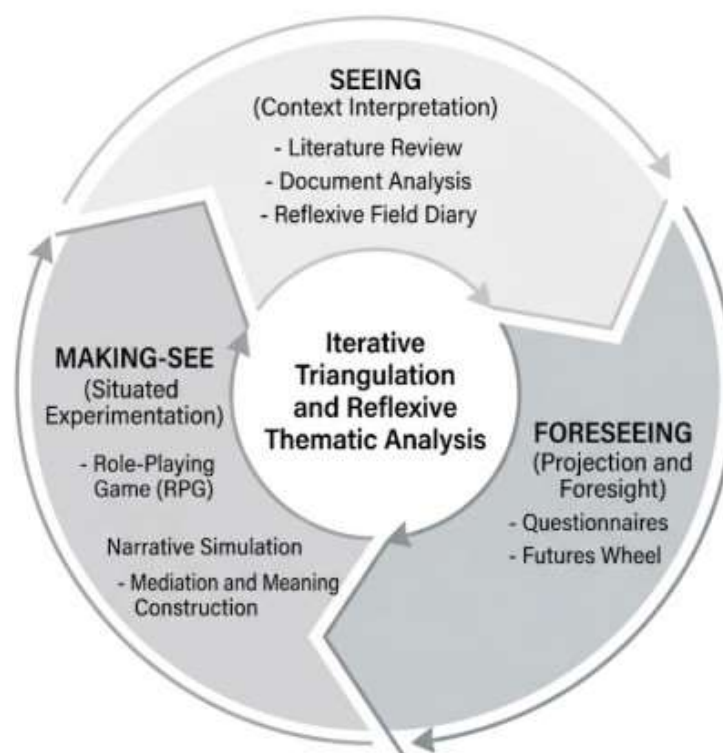
At the Foreseeing level, data were generated through a structured questionnaire distributed to the IAT community and through a virtual workshop conducted after approval by two Research Ethics Committees. Seventeen participants engaged in activities that included the construction of avatars, discussion of design attitudes and innovation-related vocabulary, and the use of the Futures Wheel to explore possible developments and implications of educational innovation. These activities were designed to elicit participants' perceptions, challenges, and projections, enabling the articulation of individual experiences with collective

reflection. The resulting materials informed the development of personas and challenge-scenarios, which were subsequently translated into a set of praxis cards used to structure the RPG sessions in the Making-See level.

At the Making-See level, Role-Playing Game (RPG) sessions were used as a sociotechnical prototyping device to stage professional dilemmas and mediation processes. The triangulated corpus—comprising documents, narratives, and simulated practices—supported iterative analysis across stages.

Figure 1 illustrates the articulation between the three levels of knowledge (Seeing, Foreseeing, and Making-See) and the iterative nature of the analytical process.

Figura 1 – Multi-level knowledge articulation in iterative analysis



Source: prepared by the authors.

4.2 Role-Playing Game as a Sociotechnical Prototyping Device

RPG was employed as a methodological environment to explore the mediation of educational innovation under conditions of uncertainty and institutional tension. Beyond simulation, it functioned as a sociotechnical prototyping device through which participants collectively tested actions, negotiated meanings, and explored alternative responses, as exercises to develop competences such as collaboration, negotiation and learning.

This approach draws on the understanding of play as a space for symbolic and experiential learning (Huizinga, 2020; Gee, 2003; Kolb, 1984). In this sense, the RPG operates as a protected third space in which participants can experiment with sociotechnical mediation under conditions of reduced risk, enabling the

exploration of alternative actions without the immediate constraints of institutional consequences (Huizinga, 2020; Kolb, 1984; Manzini, 2015).

Sessions were structured around scenarios derived from previous research stages, enabling the observation of how participants interpret and respond to tensions involving pedagogy, technology, and institutional dynamics. The RPG thus provided a low-risk environment for experimenting with situated forms of mediation.

4.3 Data Analysis

Data were analyzed through triangulation and reflexive thematic analysis (Braun; Clarke, 2022), placing documents, field records, questionnaires, Futures Wheel outputs, and RPG sessions into analytical dialogue. Coding followed an interpretive approach (Saldaña, 2015), guided by patterns of meaning relevant to the research problem. The design attitudes identified in the literature (Paz; Campelo; Borba, 2023) functioned as sensitizing concepts rather than fixed categories (Manzini, 2015). Empirical analysis revealed dimensions that extended the initial framework, leading to its refinement.

This process resulted in four themes and the development of a situated framework of eleven Strategic Design attitudes, which structures the analytical contribution of the study.

5 DEVELOPMENT OF THE DESIGN ATTITUDES FRAMEWORK

The framework was developed based on the seven Strategic Design attitudes proposed by Paz, Campelo and Borba (2023), mobilized as sensitizing concepts throughout the analysis (Braun; Clarke, 2022). This choice is grounded in the understanding of Strategic Design as an approach oriented toward innovation in complex sociotechnical contexts (Manzini, 2015), as well as in the absence of explicit references to innovation in the institutional documents that define the role and training of Innovation Articulator Teachers (IATs) within the Municipal Education Network of Porto Alegre (RME-POA)—a gap that the framework sought to address.

The initial set comprised: embracing uncertainty and ambiguity; engaging through deep empathy; embracing the power of the five senses; passion for bringing ideas to life; creating new meanings from complexity; collective construction; and metaprojectual vision (Paz; Campelo; Borba, 2023). These attitudes position Strategic Design as a practice oriented toward contextual sensitivity, relational engagement, and meaning-making in complex systems (Zurlo, 2010; Manzini, 2015), including the mobilization of sensory and experiential registers in the interpretation of pedagogical practices and mediation situations reported by participants. The first five were originally proposed by MICHLEWSKI (2015), while PAZ, CAMPELO e BORBA (2023) expanded the model toward collective and systemic dimensions. As the empirical investigation progressed, this set proved insufficient to account for the specificities of IAT praxis, resulting in two iterative and situated processes of expansion, analytically organized according to ZURLO (2010) levels of knowledge, without implying a linear progression.

5.1 First Empirical Iteration: 7 → 9 Attitudes

The first expansion emerged at the Seeing level, through the articulation of document analysis, literature review, and a reflexive field diary (2023–2025). The confrontation between normative frameworks—BNCC, the Digital Teaching Competence Framework, and the SMED Innovation Plan—and field records revealed recurrent tensions related to infrastructural fragility, time scarcity, and instability in working conditions.

These tensions were consistently corroborated by questionnaire Q1 responses, in which participants repeatedly reported lack of time for planning, insufficient access to training, and the need for continuous updating of knowledge, often expressed through statements such as “always seeking new learning” and “lack of continuous in-service training”. Such recurrence indicates not merely a gap in technical preparation, but the presence of a sustained investigative disposition required to navigate unstable and evolving conditions. This justified the incorporation of the attitude Curiosity and Continuous Learning.

A second set of recurring patterns concerned the inhibition of experimentation. Across multiple responses, participants described a context marked by resistance to innovation, fear of error, and pressure to adhere to validated practices—expressed in statements such as “a culture averse to risk,” “search for certainty limits innovation,” and reports of colleagues resisting new methodologies or avoiding engagement altogether. Field diary records reinforced that experimental initiatives were often abandoned due to symbolic and institutional risks, including overload and lack of recognition. These patterns indicate that the challenge is not simply implementing ideas, but creating conditions in which experimentation becomes viable. This justified the incorporation of the attitude Prototyping and Experimentation, understood as a disposition toward iterative testing, adjustment, and learning under constraint.

This first iteration resulted in Framework 4, used as a dialogical artifact in subsequent workshops—what MANZINI (2015) describes as a “third thing”: an intermediary object that enables the articulation between theoretical constructs and situated experiences.

5.2 Second Empirical Iteration: 9 → 11 Attitudes

The second expansion emerged at the Foreseeing and Making-See levels, through triangulation between questionnaire Q1, Futures Wheel activities, and RPG sessions conducted with the 17 participating IATs. While the Seeing level was strongly informed by the researcher’s reflexive positioning, these stages incorporated participants’ projections and interactions, enabling a more relational understanding of the conditions that sustain innovation.

The data revealed a consistent pattern of relational vulnerability. Participants frequently reported resistance from peers and management, fear of adopting new practices, and emotional strain associated with their role. Statements such as “many are still afraid to change their practice,” “resistance from colleagues and management,” and the need to “gradually build a culture of trust” appeared recurrently across responses. Additionally, accounts highlighted exhaustion linked to overload and the difficulty of sustaining proactive engagement in relationally demanding environments. These patterns indicate that innovation depends not only on technical or strategic capacity, but on the existence of relational conditions that enable action under

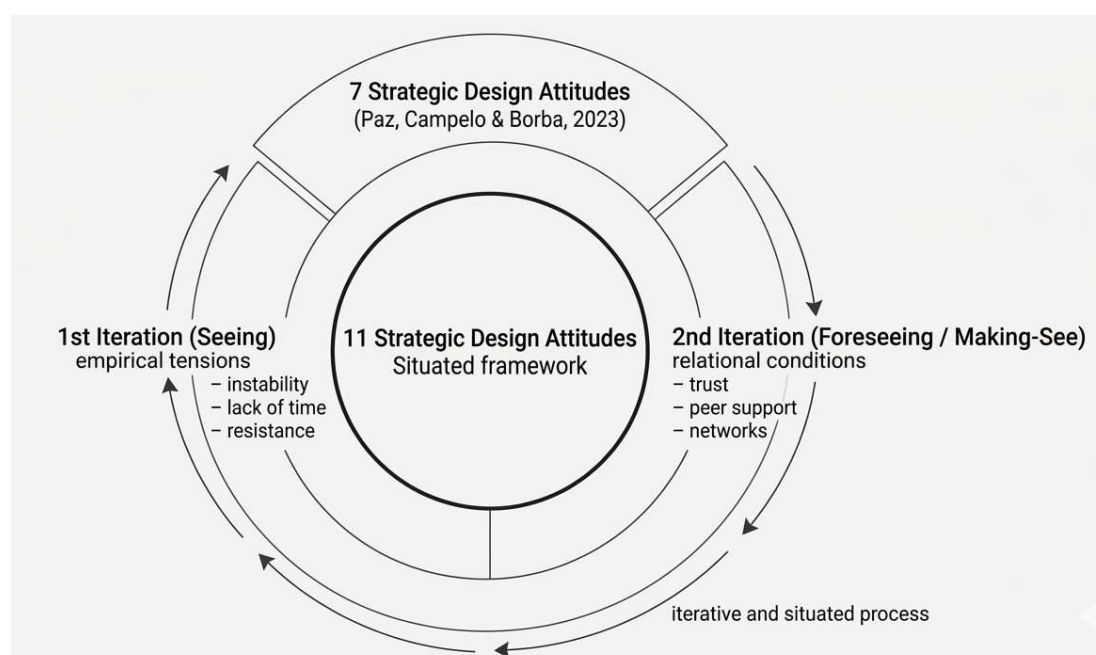
uncertainty. This justified the incorporation of Ontological Security, understood as a relationally constructed attitude that sustains the activation of other attitudes by enabling trust, recognition, and continuity of action.

A second pattern concerned the centrality of peer interaction as a condition for practice. Participants consistently described strategies such as mentorship among colleagues, co-creation of projects, dialogue and active listening, and the use of informal networks—such as messaging groups—to share resources and solve problems. These dynamics were further reinforced in questionnaire Q2, where participants highlighted the importance of exchange, collaboration, and collective reflection, noting that “the exchange of ideas was quite meaningful” and that shared experiences supported the development of new strategies. Such recurrence indicates that innovation is sustained through distributed relational infrastructures rather than individual action. This justified the incorporation of Peer and Network Mediation, distinct from Collective Construction (attitude 6), which refers to collaboration within specific projects, whereas Peer and Network Mediation concerns the sustained activation of networks across contexts over time.

RPG sessions provided additional evidence by functioning as protected experimental environments in which participants could simulate decision-making, test responses, and explore consequences without immediate institutional risk. Participants explicitly recognized the value of these environments for “testing solutions in complex contexts” and for supporting reflection and adaptation. This reinforces the interpretation of RPG as a sociotechnical mediation device that reveals both the possibilities and limits of innovation under real conditions. The patterns were consistently observed across multiple data sources, including Q1, Q2, Futures Wheel activities, and RPG sessions, reinforcing their analytical relevance.

As seen in Figure 2, from the examined data, the initial set of attitudes by PAZ, CAMPELO e BORBA (2023) was developed from seven to nine and from nine to eleven attitudes. While the first iteration was driven by tensions between theory and institutional context, the second revealed the relational and infrastructural conditions required to sustain innovation over time.

Figura 2 – Iterative and Situated Development of the Strategic Design Attitudes Framework



Source: prepared by the authors.

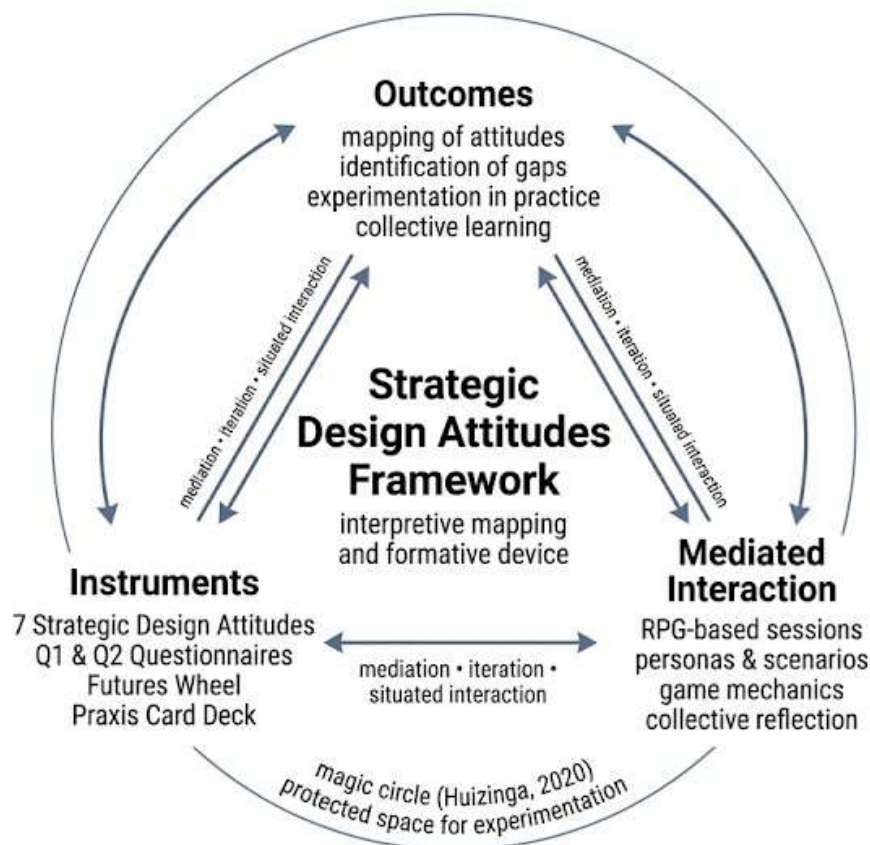
5.3 Final Theoretical–Practical Framework

The framework developed in this study operates not only as an analytical construct but as a structured set of instruments and mediated interactions designed to both reveal and activate Strategic Design attitudes in practice. It is composed of an initial conceptual core—based on the seven Strategic Design attitudes proposed by PAZ, CAMPELO e BORBA (2023)—articulated with a sequence of empirical and projective devices, including semi-structured questionnaires (Q1 and Q2), the Futures Wheel, and an RPG-based praxis system. It is understood both as a configuration of attitudes and as a sociotechnical device through which these attitudes are revealed and activated.

This system integrates a deck of praxis cards derived from personas, scenarios, and challenges identified by participants and interpreted through reflexive thematic analysis, combined with game mechanics that structure interaction, decision-making, and feedback. Together, these elements configure a mediated environment in which participants engage with situated representations of their own practice. When applied, the framework enables the mapping of attitudes mobilized by participants, as well as the identification of gaps related to innovation practices. At the same time, it creates conditions for collective reflection and experimentation within what can be understood as a “magic circle” (Huizinga, 2020): a protected space of interaction in which participants can explore possibilities, test responses, and confront tensions without the immediate constraints of institutional consequences.

In this sense, the framework operates simultaneously as a mapping and formative device. It makes visible the dispositions that sustain or hinder innovation, while also fostering the development of attitudes through situated action, peer interaction, and iterative experimentation. Its value lies precisely in this dual function: not only interpreting practice, but actively supporting the emergence of more reflexive, collaborative, and context-sensitive approaches to educational innovation.

To further clarify the operational configuration of the framework, Figure 3 presents it as an integrated system of instruments, mediated interaction, and outcomes. Rather than focusing on its development, the diagram highlights how different components—conceptual references, empirical devices, and game-based dynamics—are articulated to support both the interpretation of practice and the activation of Strategic Design attitudes. In this configuration, the RPG functions as a protected space for experimentation, enabling participants to engage with situated challenges and collectively explore possibilities for action. While Figure 2 synthesizes the iterative development of the framework, Figure 3 presents its operational configuration.

Figura 3 – Framework operational structure

Source: prepared by the authors.

6 RESULTS

The analysis identified four interconnected themes that characterize the praxis of Innovation Articulator Teachers (IATs) in sociotechnical educational contexts marked by socioenvironmental constraints and uncertainty. Together, they show that innovation emerges through processes of interpretation and negotiation among strategic intentions, institutional constraints, and relational conditions.

6.1 Ambiguous Identity of the Innovation Articulator

The findings indicate that the role of the IAT is structured by a persistent condition of ambiguity. While institutional frameworks position the IAT as a strategic agent, everyday practices reconfigure the role toward technical and operational demands, making this tension constitutive rather than incidental.

IATs operate between expectations to foster innovation and ongoing demands related to technical maintenance and school functioning. Their professional identity is therefore continuously negotiated, requiring the capacity to interpret and act within complex sociotechnical conditions.

6.2 Strategic Translation of Technology

The second theme indicates that the work of IATs is structured around the strategic translation of technology. Technologies are treated as situated sociotechnical elements requiring reinterpretation in relation to pedagogical intentions and institutional conditions. In practice, IATs translate innovation guidelines into viable arrangements within contexts marked by infrastructural fragility and unequal access.

Technology is not neutral but gains value through pedagogical reconfiguration. The IAT mediates between institutional expectations and situated practices, transforming technical possibilities into actionable strategies under uncertainty, in a process through which meaning is constructed.

6.3 Institutional Political Agency

The analysis shows that the role of the IAT includes a political and institutional dimension. Positioned between teachers, school leadership, and policies, IATs interpret guidelines, negotiate priorities, and sustain innovation initiatives within organizational environments shaped by competing interests.

As strategic mediators, they construct the conditions under which innovation can emerge and persist, managing tensions between immediate demands and long-term objectives. In this sense, innovation involves enabling the circulation, legitimacy, and continuity of practices within institutional contexts.

6.4 Ontological Security and Peer Support

The fourth theme highlights the role of relational conditions in sustaining innovation. Acting in complex public education contexts requires not only technical and strategic competencies but also conditions of ontological security—understood as relationally constructed environments that enable action under uncertainty. Participant narratives reveal experiences of vulnerability and instability, within which peer networks become fundamental.

These networks enable exchange, collective problem-solving, and learning, constituting conditions for the continuity of innovation and relating directly to the identified attitudes. Among them, a community of practice among IATs—informally referred to as a “clandestine” group—emerges as particularly relevant. Created in 2022 within the Porto Alegre Educating City network, it operates through distributed coordination.

Field diary records indicate that the group facilitates shared curation and knowledge construction, enabling access to resources while maintaining sensitive exchanges through private channels. This dynamic produces a form of distributed institutional intelligence, understood as a situated expression of collective intelligence (Lévy, 1999). More than support, the community functions as an infrastructure for innovation (Manzini, 2015), linked to ontological security, peer mediation, prototyping, and continuous learning.

7 DISCUSSION

This section interprets the findings through Strategic Design and debates on educational innovation and sustainability, framing the IAT as a key actor in mediating innovation as a situated sociotechnical process under conditions of instability and inequality.

7.1 The Innovation Articulator Teacher as a Strategic Mediator

The findings indicate that the IAT operates as a strategic mediator rather than a technical executor, positioned at the intersection of institutional policies, school practices, and technological infrastructures. The ambiguity of the role reflects its intermediary nature, requiring the continuous interpretation and negotiation of meanings across different domains.

From a Strategic Design perspective, this role extends beyond problem-solving to the articulation of heterogeneous elements—actors, resources, and institutional logics—within sociotechnical contexts (Zurlo, 2010; Manzini, 2015). The IAT connects dimensions that, in isolation, are insufficient to produce innovation, mobilizing systemic thinking and institutional legitimacy.

In contexts such as Porto Alegre—marked by infrastructural fragility and climate-related disruptions—this mediating function becomes critical, as innovation must be continuously reconfigured in response to unstable conditions.

7.2 Design Attitudes as Institutional Practice

The framework of eleven design attitudes enables the interpretation of the IAT's practice as a situated expression of design attitude rather than task execution. These attitudes operate as a repertoire for sustaining mediation, experimentation, and institutional negotiation in contexts marked by instability and resource constraints.

This perspective shifts design from a methodological toolkit to a professional stance, aligning with (Verganti, 2009) understanding of innovation as the reinterpretation of meanings. The work of the IAT involves re-signifying pedagogical roles, learning processes, and technologies as educational artifacts.

The framework also operationalizes sustainability, showing how it is enacted through practices that support technological sovereignty, collaboration, and trust. In this sense, sustainability emerges through everyday decisions linking pedagogical, institutional, and technological dimensions.

7.3 Educational Innovation as an Ecosystem

The findings support understanding educational innovation as a relational and systemic phenomenon, emerging from the interaction between networks, institutional conditions, and collective learning pro-

cesses. This aligns with complexity perspectives (Morin, 2015) and with the notion of wicked problems (Rittel; Webber, 1973), which require iterative and situated responses.

Innovation depends on the activation of collaborative ecosystems in which actors interpret, share, and experiment with practices. In this context, technologies are not drivers but elements within broader networks (Castells, 2009), whose meaning depends on local mediation. This perspective is particularly relevant in peripheral public-school contexts, where innovation involves fostering critical digital and media literacy. Technologies must be re-signified as instruments of authorship, participation, and social agency.

7.4 Systemic Sustainability and Sociotechnical Mediation in Education

By situating innovation within systemic sustainability, the findings shift the debate from technological adoption to sociotechnical mediation. Educational processes are shaped by inequality, infrastructural fragility, and socio-environmental challenges. In dialogue with Anthropocene debates (Crutzen; Stoermer, 2000), and perspectives such as (Escobar, 2016) and (Haraway, 2016), innovation is understood as a situated process involving territory, relationality, and collective action. The IAT contributes by articulating connections between schools, networks, and local contexts, enabling forms of social innovation.

Experiences such as the CriaRenda project (Cima, 2025) illustrate how local challenges can be re-signified through the articulation of school, community, and academic actors. In this context, Strategic Design provides a framework for understanding education as part of broader socio-ecological transitions. Sustainability thus emerges as a projectual condition enacted through pedagogical practice, institutional decision-making, and technological mediation, enabling context-sensitive and socially meaningful forms of innovation.

8 CONCLUSION

This study examined the role of the Innovation Articulator Teacher (IAT) within the Municipal Education Network of Porto Alegre, addressing the gap between its strategic definition and the predominantly technical orientation of existing training models. By articulating theoretical perspectives with empirical analysis, the research explored how Strategic Design attitudes support the mediation of educational innovation in complex sociotechnical contexts. The findings indicate that the IAT operates as a strategic mediator, interpreting institutional guidelines, translating technological possibilities into pedagogical practices, and sustaining conditions for experimentation and collaboration. In this sense, the study contributes to Strategic Design by demonstrating its relevance as both an analytical lens and a situated orientation for professional practice in public education.

The framework of eleven Strategic Design attitudes provides an interpretive tool for understanding how these interdependent orientations are mobilized in practice. It shows how innovation depends on the capacity to navigate uncertainty, articulate actors, and construct meaning within institutional constraints, shifting the focus from technological adoption to sociotechnical mediation. By connecting these findings

to systemic sustainability, the study positions educational innovation within broader sociotechnical transitions. In contexts marked by inequality and environmental challenges, the mediation performed by IATs contributes to the development of collaborative and context-sensitive educational ecosystems, reinforcing the role of schools as spaces for social innovation.

This study is limited by its situated scope, based on a specific public education network and a restricted group of participants. The proposed framework should therefore be understood as an analytical and formative instrument open to reinterpretation and adaptation. Future research may explore its application in other contexts and further examine the relationships between Strategic Design, educational innovation, and sustainability. Within these limits, the study indicates that educational innovation depends less on the introduction of technologies than on the capacity to mediate meanings, articulate relationships, and sustain conditions for collective action, positioning the IAT program as a potential key actor in this process.

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