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Educational architecture and social transformation: Learning spaces in vulnerable urban contexts

Arquitectura educativa y transformación social: Espacios de aprendizaje en contextos urbanos vulnerables

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ABSTRACT

This article explores the role of educational architecture in social and territorial transformation in vulnerable urban contexts in Latin America. Using a qualitative and interdisciplinary approach that articulates sociology, pedagogy, and spatial design, two case studies are analyzed: a public school in Comuna 13 of Medellín, Colombia, and a self-managed community education center in Greater Buenos Aires, Argentina. Through interviews, participant observation, and documentary analysis, the article examines how architectural design can foster innovative pedagogical practices, strengthen community ownership of space, and redefine stigmatized territories. The findings show that educational spaces, when conceived from a contextual, participatory, and open perspective, function as social devices that enable new ways of learning, living, and building citizenship. It is concluded that every architectural intervention in the educational field also constitutes a political and cultural intervention, and that design must be understood as a strategic tool for social and spatial justice.

Keywords: Educational Architecture; Spatial Justice; Pedagogical Innovation; Territory; Community Participation.

RESUMEN

Este artículo explora el papel de la arquitectura educativa en la transformación social y territorial en contextos urbanos vulnerables de América Latina. Desde un enfoque cualitativo e interdisciplinario que articula sociología, pedagogía y diseño espacial, se analizan dos estudios de caso: una escuela pública intervenida en la Comuna 13 de Medellín, Colombia, y un centro comunitario educativo autogestionado en el conurbano bonaerense, Argentina. A través de entrevistas, observación participante y análisis documental, se examina cómo el diseño arquitectónico puede potenciar prácticas pedagógicas innovadoras, fortalecer la apropiación comunitaria del espacio y resignificar territorios estigmatizados. Los hallazgos muestran que los espacios educativos, cuando son concebidos desde una lógica contextual, participativa y abierta, funcionan como dispositivos sociales que habilitan nuevas formas de aprender, habitar y construir ciudadanía. Se concluye que toda intervención arquitectónica en el ámbito educativo constituye también una intervención política y cultural, y que el diseño debe ser entendido como una herramienta estratégica para la justicia social y espacial.

Palabras clave: Arquitectura Educativa; Justicia Espacial; Innovación Pedagógica; Territorio; Participación Comunitaria.

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INTRODUCTION

In recent decades, the growing concern for educational equity has coincided with a renewed interest in the built environment's role in learning and social transformation. Several studies have shown that the design of educational spaces not only affects the physical well-being of their users but also significantly influences pedagogical practices, the dynamics of inclusion, and the social appropriation of the territory.[1,2,3,4] In vulnerable urban contexts, where material precariousness is often accompanied by social exclusion and spatial fragmentation, school architecture acquires a strategic value: it can consolidate existing inequalities or, on the contrary, act as a catalyst for educational innovation, community cohesion, and urban regeneration.[5,6]

From an interdisciplinary approach that articulates sociology, architecture, and pedagogy, this article aims to analyze the transformative potential of educational spaces designed with contextually sensitive criteria.[7,8] In particular, it investigates how specific architectural interventions in schools and community centers in disadvantaged urban areas have promoted processes of territorial reconfiguration and social empowerment. The interest lies not only in infrastructural improvement but also in the capacity of these spaces to enable new ways of living, teaching, and learning.[9,10,11,12]

The hypothesis guiding this work argues that educational space, conceived beyond its instrumental function, can be a social device capable of influencing pedagogical relations and citizen practices.[13,14] This perspective implies recognizing that any architectural intervention in the educational sphere is also a political and cultural intervention, especially when it is inserted in territories crossed by marginality, violence, or structural inequality.

Based on the qualitative analysis of two case studies in Latin America - a transformed school in Medellín and an educational community center in the Buenos Aires conurbation - the article seeks to contribute to an urgent debate on the role of spatial design in the construction of social and educational justice. Ultimately, it proposes a critical reflection on how architecture can and should be integrated into educational projects oriented toward sustainable human and territorial development.

Theoretical Framework

Space is not a mere neutral container of social life but an active dimension in the configuration of relationships, practices, and subjectivities. In critical sociology, authors such as Henri Lefebvre[15] have argued that space is a social production structured by power relations and symbolic meanings. In education, this perspective implies recognizing that architectural forms, spatial arrangements, and physical boundaries shape not only school routines but also authority relations, possibilities of agency, and ways of learning.

Michel Foucault[16] warned about the disciplinary character of specific institutional spaces, including school spaces, designed to organize bodies, times, and behaviors. However, a more recent current of thought proposes re-signifying these spaces as platforms for emancipation and pedagogical creativity. In this sense, the approach of critical and contextually situated pedagogies, represented by authors such as Paulo Freire[17] or Boaventura de Sousa Santos[18], offers keys to think of the educational environment as an area of symbolic dispute and social transformation, especially in historically excluded territories.

In parallel, architectural thought has begun to incorporate social and cultural criteria in the design of educational infrastructures. Architects such as Giancarlo Mazzanti in Colombia have promoted proposals that consider architecture as a tool for social inclusion, generating environments that promote community participation and the dignification of public space. This line is related to a 'pedagogical architecture',[19] where form and function are integrated to support meaningful and transformative teaching-learning processes.

From the perspective of educational innovation, several international studies have pointed to the influence of the physical environment on aspects such as motivation, student collaboration, and methodological flexibility.[2,3,6,20] Versatile, accessible, and emotionally safe spaces favor active, student-centered pedagogies and promote more democratic ways of organizing knowledge.

Finally, the territorial approach becomes key to understanding the expanded dimension of educational space. Schools and community centers should be considered functional facilities and nodes within social, urban, and affective networks. In the context of vulnerability, their design can contribute to weaving links, recovering local identities, and transforming collective imaginaries about the future of the neighborhood or community.[21,22]

This theoretical framework allows case studies to be approached from a technical or educational perspective and as complex phenomena where architecture, subjectivities, and territory converge. This opens the possibility of thinking about new ways of designing and inhabiting learning spaces as scenarios of spatial justice and collective agency.

METHOD

This study adopts a qualitative, interpretative approach to understanding how architectural interventions in educational spaces affect social and pedagogical processes in vulnerable urban contexts. This approach responds to the need to capture the complexity of the relationships between space, culture, and education, prioritizing the actors' perspective and the specific territorial dynamics in which they are inscribed.

Research design

A multiple case study design was chosen, which allows us to explore particular phenomena in depth in their real context and compare different experiences to identify common patterns and singularities. This strategy is particularly relevant when investigating the interaction between architecture, social practices, and the territorial environment, as it allows us to analyse how design intentions are materialised in specific contexts.

Case selection

The cases were selected through theoretical-intentional sampling, seeking to maximize analytical relevance in relation to the study's objectives. Three main selection criteria were established:

1. Location in vulnerable urban contexts, characterized by high socio-economic exclusion levels and public infrastructure deficits.
2. Presence of a recent or significant architectural intervention in the educational or community sphere, with explicit objectives of social transformation or pedagogical innovation.
3. Availability of information and access to key actors to carry out fieldwork and documentary analysis.

The selected cases were:

- Case 1: A public school intervened by architect Giancarlo Mazzanti in Comuna 13 in Medellín, Colombia, was recognized for its approach to social architecture and community participation.
- Case 2: A self-managed educational community center in a suburb of Buenos Aires (Argentina), the result of articulation between social organizations, popular educators, and volunteer architects.

Data collection techniques

Various qualitative techniques were used, depending on the contextual possibilities and the availability of sources:

- Documentary review: analysis of architectural plans, project memories, institutional reports, and photographic documentation.

Data analysis

The empirical material was analyzed by thematic coding using qualitative content analysis techniques. Emerging categories were identified around three analytical axes: (1) architectural design and its underlying principles, (2) pedagogical dynamics and forms of use of space, and (3) social appropriation and territorial effects. The triangulation of sources allowed us to validate findings and strengthen the reliability of the analysis.

RESULTS

Case 1: Public school in Comuna 13, Medellín, Colombia

Located in one of the most historically stigmatized areas of Medellín, this school is part of the urban interventions promoted by the 'Social Urbanism' program, promoted by the municipal government in the mid-2000s. Designed by architect Giancarlo Mazzanti, the school responded to an educational need and was conceived as a symbol of dignity, inclusion, and territorial transformation.

a) Architectural design

The building is on a steep slope, articulating different levels using squares, ramps, and platforms open to the neighborhood—the design strategy prioritized integrating the urban landscape and accessibility from various pedestrian routes. Local materials and passive ventilation and lighting solutions were used, reducing the environmental impact.

The school's architectural language, with strong geometric forms and sculptural presence, sought to break with the logic of containment typical of other traditional educational infrastructures. The school's visual and physical openness towards the community reconfigures it as a public space and urban icon.

b) Pedagogical dynamics

The layout of the spaces—open classrooms, multifunctional workshops, intermediate courtyards—favors participatory methodologies, teamwork, and integration between educational levels. Interviews with teachers and principals indicate that the design has encouraged a reevaluation of the teaching role and fostered pedagogical innovation.

In addition, the presence of community spaces (meeting rooms, library, courts) allows for shared management between school and neighborhood actors, expanding the educational function beyond the formal curriculum.

c) Social appropriation and territorial effects

Neighbors and neighborhood leaders agree that the school has contributed to transforming the territory's image, offering a future horizon to new generations. Far from being perceived as an imposed infrastructure, the school has become a space for meeting, pride, and collective memory. Active appropriation is reflected in the constant use of the space outside school hours and community participation in its maintenance and cultural programming.

Case 2: Educational community center in the conurbation conference, Argentina

In an informal neighborhood on the edge of a large metropolitan center, this community center emerged as a response to the absence of public secondary schools and basic social services. Its creation was driven by a network of social organizations, popular educators, and volunteer architects linked to popular housing movements.

a) Architectural design

The building was constructed in stages through participatory self-construction processes, incorporating accessible and recycled

materials. Its morphology responds to local needs: a multifunctional main hall, flexible spaces with movable partitions, a community dining room, and a terrace garden that acts as an open-air classroom.

The design was not oriented towards monumentality but rather towards adaptability and the generation of a sense of belonging. The colorful, open, organic aesthetics reflect the neighborhood's identity and strengthen its character as a 'lived place' rather than an 'architectural object.'

b) Pedagogical dynamics

Inspired by popular education and critical pedagogy, the center promotes horizontal learning contextualized and centered on community experience. The spaces are not hierarchical, allowing them to be reorganized according to the day's activities: classes, workshops, neighborhood assemblies, or cultural meetings.

The relationship between space and pedagogical practice is particularly close: spatial flexibility enables dynamic and collaborative methodologies and facilitates constant transit between the educational and the social.

c) Social appropriation and territorial effects

The collective construction of the center not only provided the neighborhood with an essential facility but also strengthened community ties and generated processes of local empowerment. The building is an articulating node for social, educational, and political networks. Its existence has impacted the improvement of basic urban infrastructures (such as roads and lighting) and contributed to consolidating a positive neighborhood identity in the face of external stigma.

DISCUSSION

The cases analyzed allow for a deeper understanding of the educational space as an active agent in social and territorial transformation processes. Beyond their contextual differences, both examples show how architectural design - sensitive to socio-territorial conditions - can enable new ways of living, learning, and community-building.

One of the most significant aspects to emerge from the analysis is the capacity of built space to reconfigure pedagogical and social relations. As Lefebvre[15] argues, space is both an outcome and a producer of social relations. The spatial design does not impose a rigid structure in the cases presented. However, it proposes an open, flexible grammar that dialogues with the users' needs and stimulates creative and effective forms of appropriation.

From a pedagogical perspective, both spaces evidence a departure from the disciplinary logic that Foucault[16] identified in traditional school institutions. Instead, we find spatial configurations that promote collaboration, autonomy, and participation. Open classrooms, integrated playgrounds, and multifunctional spaces accompany active methodologies and enable them to become didactic resources in themselves. This is in line with OECD[3] guidelines, which underline the need to design adaptive, inclusive, and student-centered learning environments.

Educational architecture takes on a symbolic and political dimension in social and territorial terms. Both the school in Medellín and the community center in Buenos Aires act as urban landmarks that reconfigure collective imaginaries, contributing to the positive re-signification of historically stigmatized territories. In both cases, the building is not reduced to its pedagogical function. However, it operates as an open social infrastructure that strengthens the community fabric generates support networks, and activates processes of identity appropriation of the space.

It is important to highlight the different intervention strategies. While the Colombian case represents a public policy with a high symbolic and technical impact, the Argentinean case embodies a form of territorial resistance based on self-management and popular pedagogy. Although different in scale and resources, both approaches coincide in understanding educational space as a platform for collective agency and not only as a functional solution to an infrastructural deficit.

This finding invites us to rethink public policies on educational infrastructure from a participatory, territorialised, and intersectoral logic. When integrated with grassroots social and pedagogical processes, architectural design can act as a tool for spatial justice[23,24,25] and educational inclusion. This requires moving beyond the standardised and technocratic approaches that often guide school facility planning, in favour of models that recognise the diversity of contexts and value the situated knowledge of communities.

In summary, the case studies show that there is no single formula for designing transformative educational spaces, but there are shared principles: flexibility, openness, participation, contextuality, and dignity. These elements, far from optional, should be at the core of any architectural intervention to strengthen the right to education and the city.

CONCLUSIONS

This article has addressed the role of architectural space in the configuration of educational experiences and processes of territorial transformation in vulnerable urban contexts. Based on the comparative analysis of two case studies - a public school in Medellín and a community center in the Buenos Aires conurbation - it has been shown that educational architecture, far from mere physical support, acts as a social, pedagogical, and symbolic device.

The results suggest that when articulated with principles of participation, contextuality, and dignity, spatial design can enhance educational innovation, strengthen community cohesion, and contribute to re-signifying historically excluded territories. In this sense, architecture is revealed as a strategic tool in constructing spatial justice and expanding the right to education, understood not only as access to content but also as an integral experience of belonging, agency, and transformation.

From an interdisciplinary perspective, the work contributes to the crossover between sociology, pedagogy, and architecture, showing that design decisions have concrete social effects and that educational processes are necessarily inscribed in spatial

frameworks that mediate and condition them. It also highlights the need to move towards educational planning and design models that are more sensitive to the territory, recognize the heterogeneity of contexts, and promote the collective construction of space.

As a future line, it is proposed to deepen research that incorporates the voices of children and young people as central actors in the co-construction of the educational environment. Exploring how these experiences can influence integrated public policies on infrastructure, education, and urban development would also be relevant.

Ultimately, this study reaffirms that transforming education also implies transforming space. Any educational architecture that aspires to be genuinely transformative must be part of a political, ethical, and cultural project committed to equity, inclusion, and the right to territory.

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CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

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