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ADAPTING EXISTING SCHOOL BUILDINGS TO NEW PEDAGOGICAL APPROACHES

ADAPTAR LOS EDIFICIOS ESCOLARES EXISTENTES A LAS NUEVAS PEDAGOGÍAS

ADAPTAÇÃO DOS EDIFÍCIOS ESCOLARES EXISTENTES ÀS NOVAS PEDAGOGIAS



Figure 0. Dorte Mandrup Architects, Munkegaards school renovation in Copenhagen, Denmark, 2007. Photographs of the interior of the classroom. Source: Preparation by the authors..

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RESUMEN

Los cambios en los modos de enseñanza que se están debatiendo actualmente, tanto en Uruguay, América Latina, Europa o Estados Unidos, demandan un nuevo paradigma espacial, diferenciado respecto a la concepción tradicional de la escuela. Frente a este panorama parece necesario ofrecer nuevos modelos de intervención en los edificios existentes que respeten las restricciones económicas y de sostenibilidad, que además den respuesta a los cambios de esa nueva agenda pedagógica, que faciliten y promuevan la implementación de esas innovaciones educativas que muchas veces, se pueden ver limitadas por los escenarios escolares. Este artículo pretende identificar y analizar modos de intervención en edificios escolares existentes a partir de la manipulación del espacio interior como estrategia, en el que interactúa el diseño y la arquitectura. El énfasis se coloca en la sistematización de las estrategias de proyecto arquitectónico, como herramientas necesarias para la intervención del arquitecto en sus interacciones con las comunidades educativas y equipos de proyecto en cada caso. Se han identificado tres aproximaciones básicas: manipulación de los límites; inserción de macro-objeto (s) y la reprogramación basada en la forma y arreglo del mobiliario.

Palabras clave: diseño arquitectónico, interiorismo, mobiliario, montaje, refuncionalización

ABSTRACT

The changes in teaching methods currently being discussed, whether in Uruguay, Latin America, Europe, or the United States, demand a new spatial paradigm different from the traditional conception of a school. Faced with this scenario, it seems necessary to offer intervention models for existing buildings that respect economic and sustainability restrictions and respond to the changes of this new pedagogical agenda, facilitating and promoting the implementation of these educational innovations that school scenarios can often limit. This article aims to identify and analyze modes of intervention in existing school buildings based on manipulating the interior space as a strategy where design and architecture interact. In each case, the emphasis is placed on the systematization of architectural project strategies as tools needed for the architect's intervention in their interactions with the educational communities and project teams. Three basic approaches have been identified: manipulation of boundaries, insertion of macro-object(s), and reorganization based on the shape and arrangement of furniture.

Keywords: architectural design, interior design, furniture, assembly, refuncionalization.

RESUMO

As mudanças nos métodos de ensino que estão sendo debatidas atualmente no Uruguai, na América Latina, na Europa e nos Estados Unidos exigem um novo paradigma espacial, diferente da concepção tradicional da escola. Diante desse panorama, parece necessário oferecer novos modelos de intervenção em edifícios existentes que respeitem as restrições econômicas e de sustentabilidade, que também respondam às mudanças dessa nova agenda pedagógica, que facilitem e promovam a implementação dessas inovações educacionais que muitas vezes podem ser limitadas pelos cenários escolares. Este artigo tem como objetivo identificar e analisar modos de intervenção em edifícios escolares existentes a partir da manipulação do espaço interior como estratégia de interação entre design e arquitetura. A ênfase é colocada na sistematização das estratégias de projeto arquitetônico como ferramentas necessárias para a intervenção do arquiteto em suas interações com as comunidades educacionais e as equipes de projeto em cada caso. Foram identificadas três abordagens básicas: manipulação de limites; inserção de macro-objeto(s) e reprogramação com base na forma e na disposição do mobiliário.

Palavras-chave: projeto arquitetônico, design de interiores, mobiliário, montagem, refuncionalização

INTRODUCTION

The changes in teaching methods currently under debate in Uruguay, Latin America, Europe, and the United States seem to demand a spatial paradigm for a school's layout and furniture that differentiates from the school's traditional conception (Partnership for Schools, 2008), where a class is taught from the board. In this sense, experiences have been implemented in the last 20 years in diverse fields (academia, foundations, public programs), mainly European and North American ones, that challenge conventional ways of organizing the school building, radically changing its system of relationships and with this, its spatial structure (Nedel & Buzzar, 2020). The aim is to focus on student-centered education with varied and fluid classrooms. These proposals are usually based on a project of buildings with a new floorplan, where it is possible to fully express current pedagogical demands, with old buildings either replaced or extensively modified. At the same time, the criteria to meet these demands and make these transformations are diverse, with a multiplicity of relevant actors and divergent proposals that, at times, can be contradictory.

In the context of the Southern Cone, in particular, Uruguay, with a very extensive and high-quality building stock, mostly built at the start of the 20th century under the criteria of a teacher-centered pedagogy (Barrán Casas, 2020), these types of replacement strategies or high-impact interventions do not seem to be a viable alternative from an economic or sustainable point of view. The demolition or large-scale transformation of these buildings would require efforts and investments that are probably unavailable in the context of scarcity. At the same time, some socially and culturally valued constructions would be lost. Demolition also implies substantial waste and the loss of existing, installed, and consolidated infrastructure, making these operations unsustainable (Cabrera Recoba, 2021; Lacaton, Vassal, & Walker, 2022). Although there is abundant literature on the reuse of buildings of different types (Lanz & Pendlebury, 2022), considering the renovation of existing school layouts from the point of view of their interior space is lacking.

Given this scenario, it seems necessary to offer new intervention models for existing buildings that respect economic and sustainable restrictions and can respond to changes in the new pedagogical agenda, where educational innovations, which sometimes may be limited by school layouts, are facilitated and promoted. This article aims to identify and analyze three modes of intervention: the manipulation of boundaries, the insertion of macro-object(s), and reorganization based on the furniture's shape and arrangement, under the argument that it is possible to adapt these buildings by adjusting the interior space, where design and architecture interact.

Architecture and design objects, particularly furniture, are part of the school's material culture. They collaborate in a relevant way in structuring the school space and the social relations there (Kozlovsky, 2016). They can be understood as interfaces (Bonsiepe, 2005) between activities, people, and their environment in a given socio-cultural context, mainly through their relational nature. In this way, the organization of space at building and furniture levels should be aligned to include the virtues of the teaching activities.

Operating from the interior space through actions that combine architecture and furniture would allow a project development under the aforementioned restrictions, offering new meanings to the architecture and its spaces by redefining its system of relationships (Giardiello, 2019). This implies a reading of pre-existence, its organization, and materiality, among other qualities, an interpretation that identifies the elements that can be preserved and those that can be modified (Postiglione, 2018; Giardiello, 2017), putting into play the relational value of architecture and objects. This approach is not always considered, and operations that renounce interior modification are more commonplace, opting to include an extension or restore the buildings, maintaining their original layout (Mirchandani & Wright, 2019; Heitor, 2011). Thus, emphasis is placed on systematizing architectural project strategies as tools for the architect's intervention in their interactions with educational communities and project teams.

For this study, 18 interventions in school buildings at an international level were reviewed. These interventions adapt the preexisting, teacher-centered interior space to the needs of current, student-focused pedagogies. These interventions should comply with having project quality endorsed by critics and academia so that they are disseminated in specialized publications or that their authors stand out in the field. This review's observations allowed the identification of three recurring basic approaches: the manipulation of boundaries, the insertion of macro-object(s), and reorganization based on the furniture's shape and arrangement. These approaches characterize the interactions of furniture and architecture by acting directly on the space's organization, encouraging or not different appropriations, links, and uses depending on the new requirements. The analysis is based on a selection of four of the eighteen cases, representative of the approaches, which have enough information for their analysis and the study. To conduct the research, the cases analyzed with identical criteria were redrawn using the available documentation to facilitate their comparison and recognition.

THEORETICAL FRAMEWORK

METHODOLOGY

In this way, the debate on the new school scenarios in which architecture and pedagogy are related is presented first before addressing the modes of intervention and closing with a discussion of the contributions made.

DEVELOPMENT

New pedagogy, new school architecture

Most school buildings built in the first half of the 20th century in Latin America, Europe, and the United States follow a traditional conception of education. The classrooms, understood as one efficient and massive “*school machine*” (Pinau, Dussel, & Caruso, 2001), adopted proportions that facilitate the teacher-centered lesson, as an auditorium equipped with desks where students are expected to be quiet and still. The broad windows complement the room's height but do not allow going directly outside or contemplating it when sitting. The differentiation and segregation between the teaching area in the classroom and the rest of the spaces, designed for specific activities, such as people's movement in the corridors, is clear for the entire building.

There is currently awareness of the redefined role of knowledge in contemporary societies thanks to the emergence of information and communication technologies. However, the role of schools as places to acquire skills and knowledge for an increasingly uncertain future has been questioned (Hartley, 2003). In this context, there is a high dispersion of the proposals (Marina, 2017), but there is a relative consensus on focusing education on students and reformulating the thinking of the new school. An example is the dissemination of “*project-based learning*” (Scott, 2015), where the student's autonomy and creativity are hierarchized, often relying on technological tools (Ripani & Muñoz, 2020). An interdisciplinary and diverse approach to knowledge is recognized (Dussel, 2020), which dismisses pedagogical dogmatism for another that offers different ways of being and learning at school (Opertti, 2019). This outlook seems to question the previous scenarios and calls for differentiated solutions. The proposals for new school architecture revolve around bringing the educational community together, expanding the classroom towards the outside and other areas of the school, and deinstitutionalizing the school environment.

The approach of ecological and environmental development (Bronfenbrenner, 1987) is taken on by contemporary architects or public institutions dedicated to educational research (Eslava Cabanellas & Fernández Angosto, 2020; Lippman, 2023; Chipa & Orlandini, 2019). This perspective considers the different relationship scales, from the micro (classroom) to the macro (neighborhood-city), emphasizing an educational community's construction. To do this, generous spaces are projected for formal and informal

meetings, understanding the school as a city, where the circulation areas are thought of as streets or squares and the classrooms are grouped as if they were a neighborhood (Mayoral-Campa & Pozo-Bernal, 2017), which emphasizes the intermediate areas of relationship. In this sense, the outdoor areas are privileged spaces for extending the classroom and the school, also acquiring a teaching role (Fontana & Mayorga Cárdenas, 2017).

This extension of the pedagogical area is assumed in other cases in a more literal way, where the experiences of the open space schools are reviewed, organizing the school scenario considering the furniture (Gislason, 2015), in large classroom spaces or common rooms. In these scenarios, students can find their preferred places and ways of interacting and learning or present a structured activity pattern (Nedel & Buzzar, 2020).

The consensus towards deinstitutionalization of the school scenario is evident (Preston, 2023), introducing environmental characteristics typical of other areas, such as the house or the cafeteria, that induce relationships of greater informality and comfort, with the hope that this will also produce greater commitment and enthusiasm in students and teachers (Lippman & Mathews, 2018), attempting to include them in the design processes. The relevance of the architecture and design of interior spaces (Acaso, 2018) is thus underlined, in clear contrast to the traditional building, in the creation of a stimulating atmosphere and the redefinition of the system of school relationships to review its limits, links, and the activities that they induce and suggest.

Intervention methods

Adaptation based on the manipulation of spatial boundaries

In school buildings designed for traditional pedagogy, the distribution of space based on a cellular layout of more private areas (classrooms) and other more public ones (corridors) gives the boundary a central role in the constitution of the school space. The boundary, built from various enclosures, gives shape to the space and contains it; it can communicate, differentiate, and segregate spatial cells. Thus, manipulating the boundaries, their geometry, and porosity would allow the reconfiguration of spatial and social relations within the school, expanding the pedagogical areas and the possibilities of using the different premises.

An example of this mode of operation is the case by architect Prakash Nair and architect Randall Fielding, who intervened in Forrest Avenue Elementary School in Middletown, Rhode Island, United States, in 2008 (Figure 1), where the central corridor was expanded to two naves with classrooms grouped in parallel lines (Nair, Fielding & Lackney, 2020). Light partitions were removed from some classrooms, and the corridor was extended to accommodate a new and spacious study and

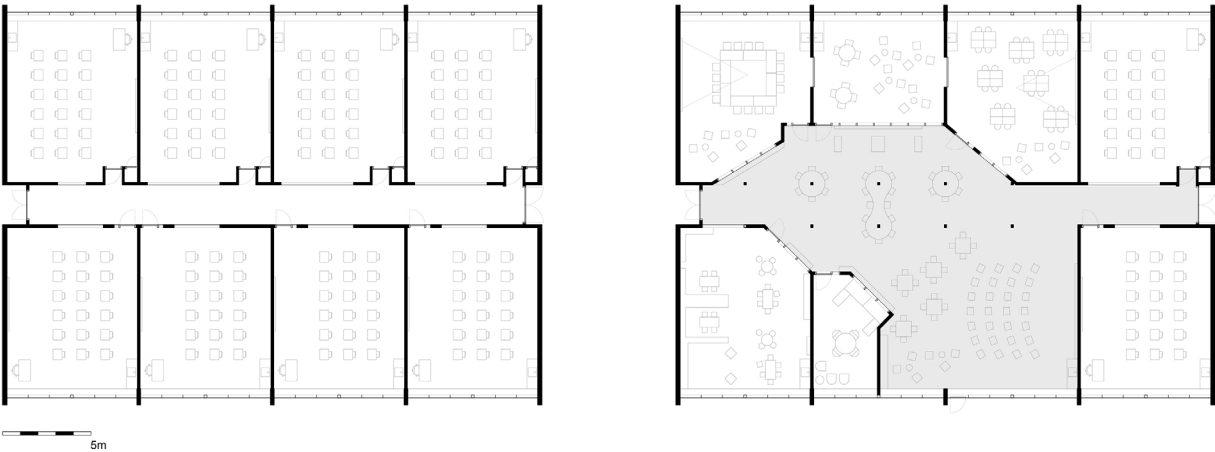


Figure 1. Prakash Nair and Randall Fielding. Forrest Avenue School sector in Middletown, Rhode Island, United States, 2008. Original floor plan (left) and reform (right). Source: Prepared by the authors based on Nair, Fielding, and Lackney (2020).

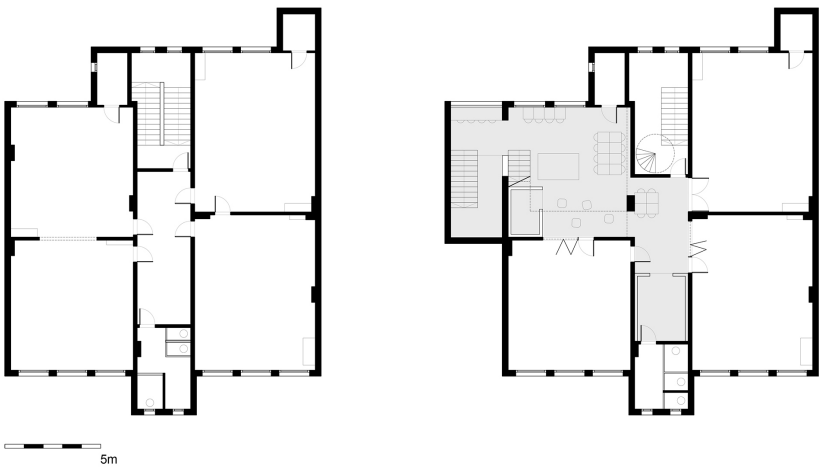


Figure 2. Reform of the architect Herman Hertzberger, Der Jordaan School in Amsterdam, the Netherlands, 2006. Original floor plan (left) and reform (right). Source: Prepared by the authors based on Hertzberger and de Swaan (2009).

informal meeting space at the heart of the floor plan, which was equipped with differentiated furniture. This new space breaks from the traditional classroom organization by emphasizing common areas as learning areas, complementary to the classroom system, and maintaining a variety of options in the building. In fact, the created space is perceived by contrast with the existing classrooms, feeding off each other.

On the other hand, the architect Herman Hertzberger, when adapting the old Der Jordaan school building in Amsterdam in the Netherlands (Hertzberger & de Swaan, 2009), a compact school with several floors and a central corridor, decided to transform one of the classrooms to expand the circulation space and generate a common space for meetings and informal activities (Figure 2). Unlike Prakash Nair and Randall Fielding, the doors of the remaining classrooms are widened, with transparent sections, to maximize the link with this new space, establishing continuities and common activities. It is an intervention where it is possible to imagine linking classrooms with each other, with or without mobile enclosures, for work in larger groups, or for students to wander according to their interests. In this case, the

school's general layout is largely maintained; the elements that generate links are used in a limited way, where the door that unites them is the boundary between the classroom and the corridor.

Similarly, it is possible to work on the windows of the classrooms' external enclosures, removing their parapets and changing them for doors-windows (Nair, 2014). This would allow the classrooms to communicate directly with the external courtyards without crossing the rest of the building, encouraging outdoor pedagogical activities and the continuity of the interior with the exterior.

However, the boundary can be more than a line on a plane expressed on a wall; it can also have "thickness." In this way, the boundary can contain a space that links the areas it separates, understanding it as an *intermediate* one (Van Eyck, 2021). Thus, it is possible to modify the geometry of the wall between the classroom and corridor or classroom and playground to generate access or exit thresholds to include furniture and windows in the walls (Hertzberger & de Swaan, 2009; Lippman, 2010).

Thus, the removals and additions subtly work inside the architectural container, transforming the school space with few resources. This way, the available space is expanded without necessarily creating new square meters, which allows working on the possible relationships that this solution creates.

Adaptation based on the insertion of macro-object(s)

As its name suggests, a macro-object is a large design object that provokes and contains space, encouraging activities inside and outside, which dialogue with the mural container of the premises where it is placed. Its role is usually as a living space and articulator of a relatively isotropic and continuous space, contrasting the envelope that contains it. A macro-object can be seen as a graft on the pre-existing building, a radical intervention in its system of relationships, which brings new uses and meanings. A design object that plays with scale, halfway between architecture and design, as a small construction within a larger one. This type of operation takes up the experiments of the late 1960s and early 1970s of the designer Victor Papanek or the artist and designer Bruno Munari, among others, who explored the nomadic colonization of inhabited space, exercising a critique of contemporary developments in architecture (Eslava-Cabanellas, 2017), which this type of objects made possible from their deployment and possibility of displacement. (Flora & Iarruso, 2017; Giardiello, 2019).

In 2009, Dorte Mandrup used macro-objects to intervene in the Munkegaard School, built in 1957 by the architect and designer Arne Jacobsen (1902-1971) on the outskirts of Copenhagen, Denmark, to adapt the building to new uses without making significant modifications (Figure 3 and Figure 4), given its heritage protection as a canonical work of

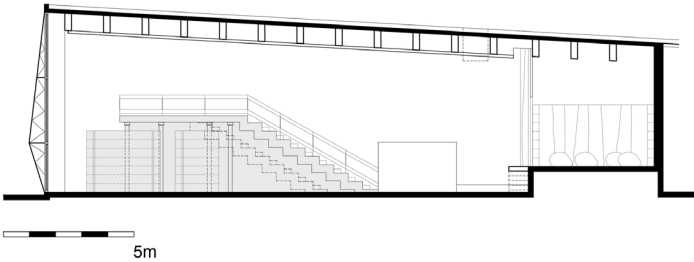
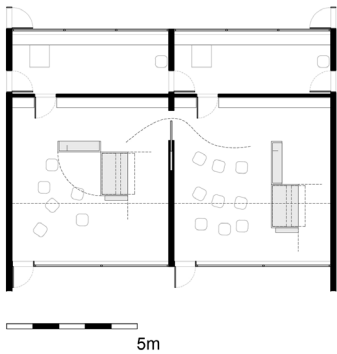


Figure 3. Dorte Mandrup Architects, Munkegaard School renovation in Copenhagen, Denmark, from 2009. Floor plan of a pair of classrooms and a section of the assembly hall with macro-object interventions. Source: Prepared by the authors based on GENTOFTE KOMMUNE (2013).

Figure 4. Dorte Mandrup Architects, renovation of Munkegaard School in Copenhagen, Denmark, from 2007. Photographs from inside the classroom and the assembly hall. Source: Prepared by the authors.



modern school architecture (GENTOFTE KOMMUNE, 2013). Although the intervention stands out for a larger extension in the building's basement, the macro-objects inserted are of interest to this research. On the one hand, it transforms the assembly hall into a library, arranging a playful structure of mobile shelves in the center, with steps that allow you to climb to a mezzanine and watch a show or event on the hall's stage. In this way, an interior room (the library) and an exterior one (steps and mezzanine) are configured to radiate their particular activity, changing the meaning of the space without affecting its envelope.

On the other hand, some classrooms have folding furniture for the different activities they want (desk, screen, whiteboard, or screen) while collaborating in dynamically articulating the classroom space into areas with differentiated uses. The classroom is equipped in such a way that it ceases to be a single and homogeneous space and is articulated according to the pedagogical needs of each moment. Here, too, the object is central in contrast with the envelope, without materially affecting it, where the activities that give meaning to the space radiate, offering people opportunities to transform it.

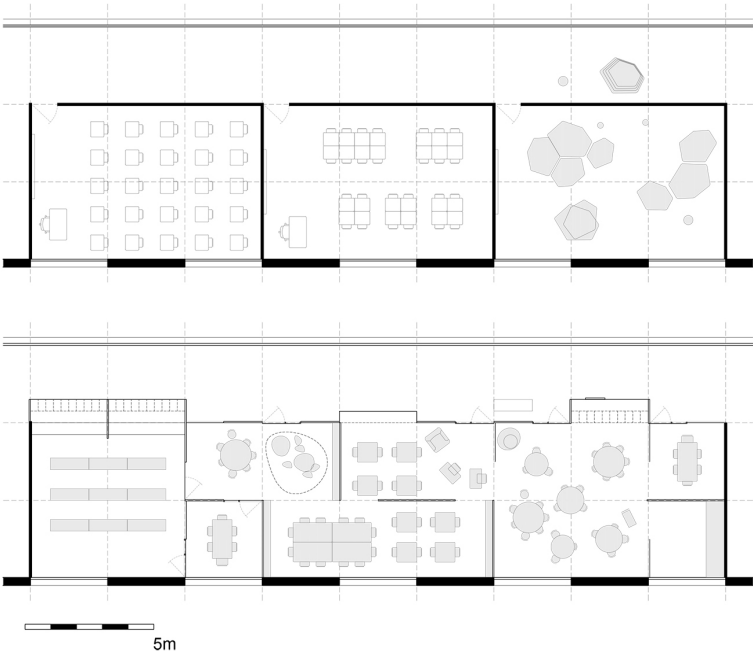
From these examples, it is also possible to imagine the placement of macro-objects that delimit and communicate spaces and activities, which provide thickness and cavity to the walls, integrating two modes of action. Remarkably, the entire school space could be structured based on the arrangement of these large objects, articulators of continuous and fluid school space, as imagined by Cristiano Toraldo di Francia (2015) with the **"Parete Integrato System"** in 1973, perhaps achieving the dissolution of the classroom.

Adaptation based on the shape and arrangement of the furniture

School furniture can be associated as a means and expression of pedagogy to induce a specific type of social relationship and contain the body of people. The two-seater fixed bench of the traditional school has been put up against the Scholanoivist collective table in the debate for transforming the school environment during the last century (Castro, 2007) based on the behaviors that make its specific form and arrangement possible. The occupation of space by these objects seems to be a tool for interpreting architecture and changing the interpersonal relationships that occur inside without affecting building elements. Thus, the architecture of the traditional school would remain as a background, relatively neutral, compared to the figure of the furniture.

There is evidence of a kind of flexibility in the use of school space independent of the transformation of the building or the incorporation of large objects based on people's actions when interpreting and appropriating the pre-existing layout (Till & Schneider, 2005). Given its relative degree of neutrality, its traditional division into cells is an advantage insofar as it would allow a re-reading through different kinds of furniture.

Figure 5. Clara Eslava and Miguel Tejada. Hextable from 2019 and proposal on a linear classroom layout with a corridor on the facade. Floor plan with traditional organization and Hextables (above). Floor plan with organization according to the furniture (below). Source: Prepared by the authors based on Eslava Cabanellas (2023).



The architects Clara Eslava and Miguel Tejada designed tables that promoted teamwork and a playful appropriation of space, which accompanied the process of creating a new school, the Arbizuko Herri Eskola in Navarra, Spain, which had a traditional structure (Eslava Cabanellas, 2023). Faced with the dissatisfaction that the educational community had with the school furniture available on the market and with the available classroom format, the architects designed irregular hexagonal wooden tables for the various ages of the students who would study in each classroom and the collaborative activities that the pedagogy adopted by the teachers provided (Figure 5). Students could share the same table and look at each other, restructuring the traditional directionality of the space towards the teacher while functioning as a playroom for the children placed under them.

This operation can be understood as an intervention that subverts the space's planned organization, proposing other modes of interpersonal relationship based on the furniture's shape and arrangement. Even the architects propose going further and abandoning the uniform organization of the classrooms for their differentiated occupation by the furniture, conceived by unstructured places of appropriation.

This contrasts with the contemporary prescriptions of complex classrooms, structured based on different seasons with well-defined activities and colorful furniture, exacerbating their iconic condition (Nedel & Buzzar, 2020). The experience of Eslava and Tejada appeals to people's autonomy, spontaneity, and imagination, making suggestions with the shape and materials of the designed objects.

On the other hand, it is interesting to consider the classrooms differentiated from each other, filling them with diverse furniture. Students working on projects can choose the necessary study room throughout their development, advised by teachers. Thus, the space and time of use of the available educational architecture are transformed (Wells, 2016) by intentionally appropriating the existing distribution with the objects.

This research highlights that fully using and transforming the existing is understood as an ethical premise in the context of limited resources and the need for a more sustainable approach to building the physical environment, which positions interior architecture and its instruments at the forefront. Rather than extending the building's physical floor plans, it is proposed to adjust its layout, focusing on the adaptive use of the existing one, which seeks to contribute to the debate and practice of contemporary school architecture.

The methods presented should not be interpreted as watertight or exhaustive. These should be accompanied by studying surfaces, materials, colors, and lighting, which help shape the atmosphere of the rooms. These variables can highlight, by contrast, the intervention and the relationships sought, which manipulate the tactile and visual quality of objects and architecture.

The complementary condition of the modes analyzed has been observed from their scalar sequence, from the spatial container to the objects that colonize it, obtaining mixed approximations. Thus, where removing boundaries opens up the space, it can be articulated with macro-objects or colonized by furniture, depending on the activities sought. Similarly, including a macro-object may imply overcoming existing boundaries, inserting itself into a wall between the classroom and corridor, or organizing and defining the furniture that complements it.

Manipulating the boundaries within the school implies finding an existing space and establishing other relationships that use and rely on what has been built. It is about cutting, folding, opening, and maybe "gluing" the school's walls like a child's creation. In the same sense, the connection and colonization by design objects act from a spatial and temporal procedure of placing one project inside another. On the one hand, relationships are opened and established by removing and adding elements. On the other hand, are the objects that, in form, scale, and arrangement, induce behaviors and articulate spaces, interfering with the existing layout.

Although the contrast between the intervention and the existing structure is traditional with built heritage (Fernández, 2007), the collage proposed by the modes of approach from the inside offers interesting qualities for the school space, as it multiplies the options available to students and teachers, by integrating novelties into pre-existing structures.

CONCLUSION

Architecture and furniture collaborate to shape the space, confirming they are relevant tools to transform traditional school settings, encouraging new senses with few elements. This implies a critical acknowledgment of the existing school space and time, differentiating between what can be adjusted and what is worth keeping (Giardiello, 2017).

Low-scale interventions would allow a progressive intervention, sometimes supported in actions by fragments, which incorporate the temporal variable (Lanz & Pendlebury, 2022), that keeps pace with the needs and possibilities of the educational community and its teaching practices, adapting to different school contexts. This implies thinking about school time in terms of implementing modifications, such as reforming the choreography of school activities and using concrete means of intervention.

The challenges of introducing variants to traditional environments, such as classrooms, are recognized, as users often admit their resistance or inertia in the face of change, as some post-occupation studies suggest (Lourenço, Alegre & Heitor, 2023). The management of modifications and adaptation to change are a fascinating chapter of school renovation that deserves particular attention on a case-by-case basis, depending on the different educational policies and the history of each school (Blanc, Cattaneo & Serra, 2023). In this way, it would be possible to use how the approaches are analyzed. However, they would have to be critically adapted in their application, integrating the educational community into the process. The substitution of uses, replacing a classroom with an open place for meetings and informal study, as happens in Nair and Fielding (Nair, Fielding & Lackney, 2020) or in Hertzberg (Hertzberger & de Swaan, 2009), the transformation of the classroom to combine activities of different groups, through the arrangement of a macro-object, by Mandrup (GENTOFTE KOMMUNE, 2013), or the introduction of new furniture to promote different interpersonal relationships, as Eslava and Tejada do (Eslava Cabanellas, 2023), are more than a physical modification, but also induce changes in social practices. Thus, these interventions are understood as pedagogical actions in themselves, with the ability to affect the character of the entire school by offering diverse possibilities that go beyond the initial requirements.

CONTRIBUTION
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