

Since the beginning of the third millennium, the rapid changes that contemporary societies are facing are radically transforming the perception and the structures of our cities. New topics seem to dictate the political agenda, suggesting alternative options to manage the emerging urban mutations.

An increasingly "data driven society" is forcing the migration into an almost immaterial world, prompting Information and Communication Technology together with the Smart City.

The crisis of the traditional real estate industry, propelled by the global finance system, is contributing to re-evaluate the theme of Public Space as a "space of encounter, sharing, experience and inclusivity", mapping the everyday life to discover unexpected Urbanities, through the application of innovative strategies and tools.

As an immediate consequence, new "forms" of cities are strongly brought to our attention: the "city of sharing", the "city of temporariness", the "city of Life between buildings", giving an unexpected impulse to incremental Urbanism of evolving cities.

In such a way, the very idea of the city is radically under discussion. We are then required to answer these numerous questions in order to define the scientific coordinates for the City of the 21st century.

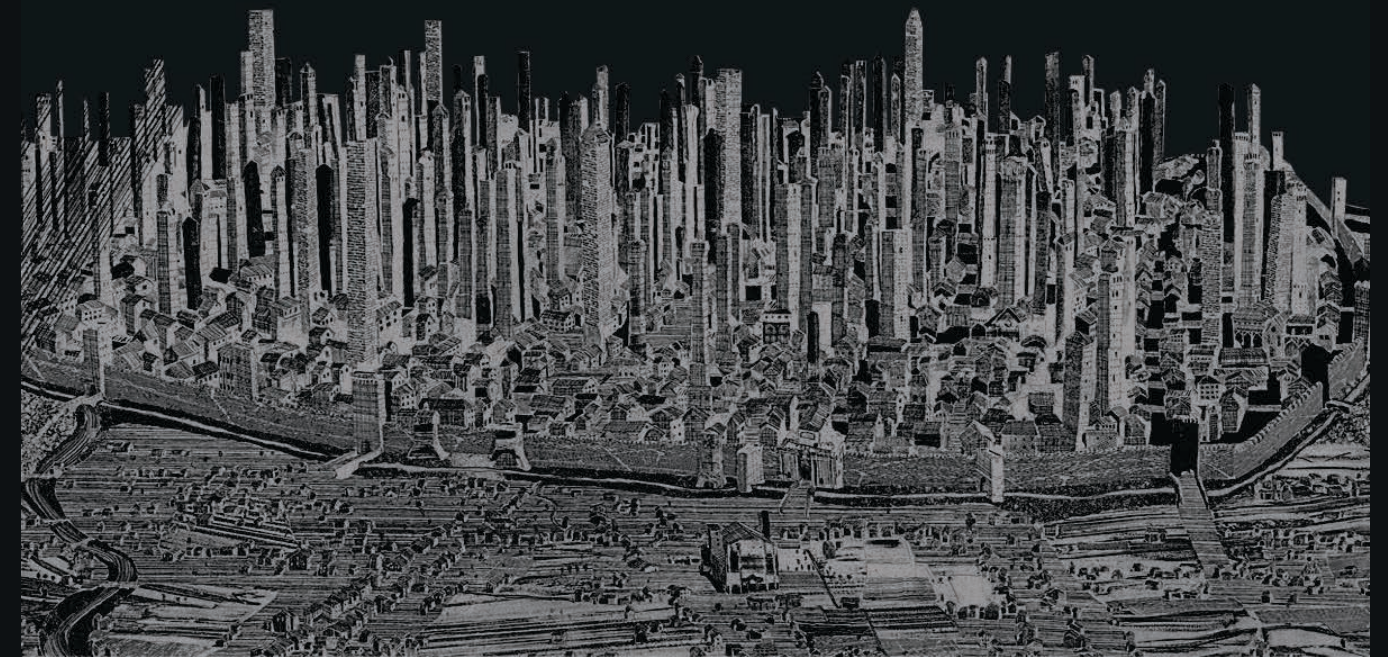
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Marco Maretto, Nicola Marzot, Annarita Ferrante



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MORPHOLOGY AND URBAN DESIGN

new strategies for a changing society

PROCEEDINGS

edited by

Marco Maretto, Nicola Marzot, Annarita Ferrante

with the collaboration of

Silvia Tagliazucchi, Francesco Scattino, Greta Pitanti

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The School as the City: Rewriting and Collaging an Urban Morphology. Vimercate Campus' Design

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Abstract. *In recent years, the debate around the innovation and rethinking of school buildings has restarted at an international level, driven by contemporary pedagogy and ICT technologies offering new active learning modalities and by the advocated role of school buildings as civic centres. Yet, Italian school buildings present an endemic lack of renewal and active integration in urban regeneration concepts. While schools should be seen as the pivot of districts' fabric and community life, little theoretical efforts and no guidelines have been developed so far for school types as "Urban Architectures", that is, essential units in regenerative processes and "Learning Architectures" rather than specialised functional types and indistinct learning environments. The paper presents research by design on the High Schools Campus of Vimercate (Italy) funded by the Provincial Government, which constitutes a morphological area as wide as the town's medieval centre. Dilapidated large school campuses represent a higher challenge, as demolition is neither possible nor sustainable. In a "regenerative architecture" approach and under the conceptual instrumentation of "rewriting" on the pre-existing order, the design explored the School in Form of the City, probing remorphologisation strategies, collage procedures and design of new active space-places (Pezzetti 2019) to stimulate active learning together with an aesthetic experience of architectural space.*

The Italian Status Quo

In recent years, the debate around rethinking and innovation of school spaces has become a hot topic at a both national and international level.

Specifically Italian school buildings are in a serious state of backwardness and decay.

According to the recent data presented by the Italian Ministry of Education (MIUR), the Italian school building stock comprises 58,842 buildings. Out of those, 3,800 were built before the 1920s, about 23,800 between 1946 and 1975, and about 21,000 after 1976. Besides, 23% of the total are buildings adapted from other functions (MIUR, 2020).¹With few exceptions, most modern buildings are prefabricated “containers” organised by a rigid classrooms-corridors system with insufficient communal spaces and no architectural quality. As classrooms are small and mostly overcrowded, they have proved vulnerable to the pandemic threat when exceeding the number of twenty-one students (Pezzetti & Khanamiryan, 2020).

Moreover, many Italian schools built between the 1950s and 1970s have weak relationships with the city, due to their location in areas of new expansion and development as autonomous objects enclosed in fenced green areas.

Moreover, the standards set by legislation in 1975 (MIUR, 1975) are still in force, since “The New Guidelines for School Buildings” issued by MIUR in 2013 only introduced some generic concepts for updating learning spaces that did not replace the outdated standards. Recently, MIUR issued new Guidelines in the framework of PNRR Next Generation EU (MIUR, 2022) resulting in ten general performance principles for building the country’s new “schools for tomorrow”.

As far as this paper is concerned, some aspects should be pointed out.

Both Guidelines fail to frame clear strategies and tools for planning and design to supersede the 1975 DM’s standards, and merely express generic declarations. There are no specific indications about innovation and the regeneration of existing buildings. This is a major challenge, as they cannot be all demolished and substituted (demolition is not sustainable and teaching cannot be interrupted), while, on the other hand, the correct location of schools in the boroughs is of primary importance. The major issue is not building a limited number of new schools, but how to innovate and regenerate substantially the huge number of existing schools.

One positive aspect is that both documents stress the concept of the school as a no longer autonomous object and functionally self-contained institution but as a part of the city open to the local community. This concept should provide a clear stimulus to widen pedagogical approaches, currently too focussed on innovative furniture and technological innovation and therefore only affecting the interior realm (Pezzetti & Khanamiryan, 2022).

A second aspect stressed by the latter Guidelines is the need to combine pedagogy with a high architectural quality and outdoor education. While various disciplines have already contributed to innovate educational strategies, the physical dimension of educational buildings as architectures still needs to be explored and defined.

Finally, both documents still concentrate on the school as an individual building and not as a part of the city fabric, and fail to discuss its insertion in wider urban regeneration strategies and relationships with different kinds of urban contexts up to the unsolved dialectic between the need of a managed boundary and the requirement of openness.

The School and the City: School Buildings as Key Units in Regenerative Processes

If the school starts to be perceived as a Civic Centre, school buildings should address more than the mere functional dimension and rather embrace the new paradigm of Regenerative

¹Based on the data obtained from MIUR (Open data: “Use of origin and date of construction of buildings”).

Architecture involving the relation between the school and the city, that is, the school as a part of the city and specifically a catalyst for residential districts.

In this perspective, educational institutions should provide additional facilities (such as auditorium, library, gym, and recreational services) that are meaningful not only to community use but also to urban design. Therefore, we should start to consider the design of school buildings as closely related to community development, revitalisation, and regeneration (Haar, 2003).

The crucial role of school buildings in the design of the city and development of urban districts has been acknowledged by architects since the 1920s, although in relation to the urban challenges of the time. In his idea of the Rush City, Neutra (1927) early assumed the school building as a key component of urban design, although under the influence of the Modernist open city and hygiene approach that fenced it within a green belt². Twenty years later, claiming that schools were isolated from the life of districts, Sert suggested planning schools as parts of neighbourhood units, interconnected with public spaces and community centres (Sert, 1944). Significantly, this approach was reaffirmed by Roth (1966)³ in response to the vision of the school building largely reduced to the mere fulfilment of functional requirements and neglecting its role as a living part of the neighbourhood (Roth, 1966). When Quaroni designed the school in Canton Vesco (1955), then assumed as a reference at the XII Triennale Exhibition (1960), the pavilion type was turned into a pavilion system shaping the fulcrum of the neighbourhood and creating a dialectical relationship with the rows of the Rationalist linear fabric. The design also featured a fresh degree of integration into the urban fabric by including some district-level commercial functions (Tafuri, 1964).

The School as a Community Centre

Between the 1960s and the 1980s, the relation between the school and the city clearly evolved towards the role of the school as Civic Centre that addressed the need of representative urban centralities in new suburban areas. In Italy, this coincided with the research on typology, morphology and Urban Architecture, both in universities⁴ and in the practice of the Italian Masters (Pezzetti, 2012). The school was explored at the same time as *Architettura Urbana* and "*Architettura Educatrice*" (Rogers, 1947), also inducing the typological inventio from behaviours (Canella, 1965). One protagonist was undoubtedly Canella, whose projects "condensed" urban and school activities together and brought urban life within the "school walls", converting the building into a catalyst of collective functions, as in the Incis Village (1968-82) and the Pieve Emanuele (1971) designs. Aymonino, in turn, suggested practising simultaneously different scales of architecture and urban design by creating an Urban Architecture as a recognisable "part of the city" and integral part of the urban system and territorial equipment for citizens. The School Campus in Pesaro holds the complexity of the city in itself, concentrating various educational and civic services addressed to both students and citizens (Aymonino, 1977).

²In the words of R. Neutra, "if we give the right value to Schools, they will appear as one of the most effective means of renovation [...]. The increasing importance of these schools as centres that also serve the community, fully confirms the validity of the proposal; large part of adult education [...] takes place in elementary schools integrating functions. The determination of areas for elementary school in the city is of the highest importance" (Eng. transl. by the authors). R. Neutra (1936) 'Il problema delle nuove scuole elementari', 17-19.

³In 1966, in the book entitled "The New Schoolhouse", A. Roth referred to J.L. Sert's famous statement, "There is no space for schools!" and reaffirmed the importance of the integration of the school buildings within the districts.

⁴Those themes found wide resonance in the Faculty of Architecture of the Politecnico di Milano, starting with the course on the typology of the Primary School directed by E.N. Rogers. "It is a question of activating the concept of utopia: of thinking concretely about a better society [...]. Nor is there a better place than school to tackle such topics [...]" . E. N. Rogers (1962) 'Utopia della realtà', 1.

The school building itself became the definer of an urban part, reproducing morphological complexity, typological experimentations, integration of functions and pedagogical sequences, with an approach that refused to address the school as a specialized type to be designed following the mainstream handbook approach. The school, a key element in the culture of a society, as a public building is also an instrument for constructing the city, that is, building the city through "pieces of architectures" (Pezzetti, 2012).

These antecedents testify concisely that some modern architects kept on exploring the special urban role of the school for over a century.

Today, dilapidated and outdated existing structures represent a major challenge, as demolition is neither always possible nor even sustainable. Thousands of buildings must be renewed, modified, and retrofitted without interrupting their use and modifying their location.

Innovation challenges become more complex when generic concepts of innovation face the constraints of a pre-existing structure and a real context. The relationship between the school and the peculiarities of the context becomes crucial. This calls for a learning architecture intended as research by design that reopens questions of meaning in architectural forms.

The paper presents the research by design project funded by the Provincial Government of Monza and Brianza, Italy, critically facing the challenges of innovation and renewal by exploring jointly the concepts of regenerative architecture and learning architecture.

Within the framework of a comprehensive concept of regenerative architecture the isolated campus-like School Complex of Vimercate has been investigated and redesigned "in form of the city" and reincorporated into the civic life through the implementation of "architectural rewriting" in relation to the pre-existing order.

Within this urban-like strategy as an inventive adaptation to existing conditions, the grafting of a variety of learning space-places (Pezzetti, 2019) interprets innovation issues under the concept of learning architecture.

The Case Study: the Vimercate High School Campus

The case study is the Vimercate Omnicomprensivo, a mega school-campus representing a typical reality of the 1970s-1980s, when large or various schools were grouped in large sites necessarily located in suburban areas, on the edge of the peripheral neighbourhoods.

The mega-school campus concept defined an "anti-city" isolated from the urban reality, while defining a morphological region as large as the historic town's medieval centre, although deprived of its architectural quality and variety.

Located among farmlands, the Campus formed a self-contained island cut out of infrastructures and separated from the town due to the presence of the North-East PANE Local Park (PLIS), on one side, and of the farmlands opening the view towards the Prealps on the other.

Its self-referential layout contradicted the ancient rural structure inherited from the Roman centuriation. Moreover, the layout interrupted an ancient route that linked Vimercate's historic nucleus to the village of Bellusco. This route still exists today outside the School Complex enclosure and holds a special interest for our design.

Besides, the Campus was originally designed in 1974-1975 for two schools and 1,500 students. Later, it gathered four establishments ranging from high schools to technical institutes for about 4,500 students. As a result, classrooms are now fragmented among various buildings, while shared spaces and facilities are critically undersized.

The Campus is today a paradigm of the large stock of Italian school buildings built in the 1970s-1980s and suffering from major problems of overcrowding, inadequacy and dilapidation of spatial quality, lack of facilities, security issues, energy consumption, and seismic vulnerability.

The original project (arch. D. Malvezzi, 1974) featured a clearer layout compared to the final one (1975), built in 1978, with the most interesting elements either altered or erased altogether. The addition of further buildings at a later stage only made the poor layout even worse: two provisional containers for classrooms (1982), still in use today; a new classroom block occupying what was left of the central lawn and the hemicycle canopy at the entrance (2001-2005), resulting in a problematic bottleneck and uninviting barrier.

The fragmentation of classrooms weakened the identity of each school, while the uncontrolled circulation and unmanaged entrance undermines the sense of security.

The poor architectural and maintenance quality of prefabricated structures, the loss of original shared facilities (library, canteen, meeting rooms, ateliers) caused by the increased number of schools and classrooms, the usage of hallways and patios for mere circulation, the neglect of outdoor spaces inaccessible to students, discourage any sense of belonging and social interaction. Besides, the gym and auditorium are nested inside the Campus and cannot be opened to the town with the necessary functional autonomy.

Students and teachers have no spaces other than those of the classroom: there are no spaces for study, informal or association activities, no organised and accessible spaces for outdoor activities, no adequate libraries, reference and reading rooms, no meeting spaces other than the rigid structure of the auditorium.

Design Methodology: a Rewriting Technique

As the role of school buildings should be no more confined to the educational function and as a secluded self-contained institution, the Campus should be regenerated and innovated as an urban and landscape catalyst.

In order to give the current mono-functional building and dull morphology the richness and diversity of a public place open to the community, the architecture of the school Campus itself is seen as a collage of urban activity in miniature, that is, a small town rewritten by the assemblage of spatial fragments borrowed from the city and inserted into the present layout.

Dealing with an existent structure, the methodology entailed two levels:

1. the strategy to include the morphological fragment of the anti-city within the system of urban-landscape relations;
2. the redesign of the layout order as an Urban Architecture through the techniques of rewriting on the existent text and related assemblage procedures.

Establishing urban and landscape relations

For a school complex to be part of the city, it must be included in a system of urban-landscape relations. The reading of the settlement's structure revealed some underlying topographical signs and urban facts that could be assumed to turn the condition of isolation into a potential. The Campus has been reconsidered in its potential as a cultural pole, strategically located at the intersection between a "historical urban circuit", formed by the ancient Roman axes and Medieval tracing, and a potential "landscape circuit", reinforced by the presence of the PANE Territorial Agricultural Park and the agricultural structure still shaped by the patterns of the Centuriation. The diachronic and synchronic mapping revealed the historical evolution of both town and countryside, up to the settlement of the campus that may constitute a possible hinge between these two realities.

The Campus design recovered some old "lines of forces" and re-established their continuity with the old routes through the PANE Park, suggesting cycle-pedestrian routes that would connect the educational-cultural pole to the town of Vimercate and its territory.

Rewriting and assemblage procedures

The regenerative architecture approach stresses the resilience potential of the already built morphology by making use of circumscribed demolitions in favour of a “rewriting” technique practised in relation to the pre-existing built text and order.

Rewriting, rather than making a tabula rasa and reconstructing, is the way we continue to write onto an already-written text, which in this case takes the form of a “re-morphologisation” strategy.

Rewriting, therefore, is defined as a new inscription and stratification of signs connected by formal and semantic relationships based on the reading and interpretation of the structures inherited from the previous text (Pezzetti, 2020). The aim is to reshape the School Campus as a place of relationships, richly articulated, culturally vibrant and endowed of thematic and equipped space-places to be discovered. The new morphology is obtained through operations of collaging, grafting, inserting and partially erasing, which altogether form the rewriting technique.

Thinking of rewriting on the already-existent, the theory of the city as an assemblage, deeply rooted into the design culture, became relevant. Various articulated as city of composite (Kolhoff), collage city (Rowe and Koetter, 1978), and montage (“Roma interrotta”, Analogue City), the concept of assemblage has been largely implemented to make sense of existing morphological chaos and to incorporate contingent facts. In the early 1980s, the modern city already appeared as “a vivid set of pieces and fragments, of types and counter-types, a juxtaposition of contradictions, and a more dialectical than linear process” (Ungers, 1979).

The structuring intentionality of the assemblage of parts and layers introduced by our design led, therefore, to the evolution of traditional Urban Architecture design tools, suggesting the procedures for providing a new formal order and meaning to the in situ elements within a concept of co-evolutionary development and resilience of built facts (Pezzetti, 2020b). Thus, the layering produced by rewriting and collaging becomes a reading tool and design technique at the same time, which became part of the assemblage in its own right.

The School in Form of the City: Rewriting and Innovating the Vimercate High Schools Campus

Continuing Aymonino’s “thinking of the building in form of the city”, the design applied to the existent layout various techniques of rewriting and assemblage thinking, rearticulating the complex through the insertion of some constitutive elements of the city composing the richness of the urban system. The School Campus was re-shaped in analogy with the places of the city: its neighbourhoods (or the clusters of individual schools); its squares, courtyards, and gardens (or the patios at different scales and hierarchies); its “urban interiors” (or the collective and informal spaces); and the private spaces (or the classrooms-households) stimulating the sense of relationship and belonging. The reshaping of the rigid morphology revealed unprecedented spatial potential, capable of co-evolving with the learning community.

The design, therefore, postulated a Learning Architecture envisioning spatial innovation by exploring school as the city, that is, stimulating active learning by the character of a plurality of space-places, each one responsible for proposing centres of attention and an aesthetic experience of the architectural space.

Re-centring, re-connecting, re-morphologising

Rewriting worked first on the texture of the existing space, making it articulated and selectively porous to the outside. The campus thus absorbs energy from the outside – the town, and from the inside – the school community.

Its regenerative architecture interprets the potential of the existing layout with respect to the place and its founding rules, while identifying new “epicentres”, lines of force, grafting or thinning points.

To respond to the cruxes and main thematic areas of intervention, the design concept started from the existing text and three founding principles:

1. Re-centring the layout – the Green Ring

The Green Ring is a neo-type. Paying a tribute to the original project, it identified a new centrality common to all the four clusters reorganising the schools into well-identified systems, while maintaining this centre as a green void. All the Campus’ relationships and energies unfold from this elliptical epicentre, the actual representative place and beating heart of schools’ life.

2. Reconnecting and identifying the parts – the “Lines of Force”

The Green Ring radiates a field of relationships involving all the parts of the complex. Through the design rewriting, they acquire a strong identity, while participating in the new cohesion of the whole complex.

The “lines of force” are formed by the main outdoor spaces extending the routes coming from the town and Park into the Campus and leading to the major hybrid spaces shared with the community (gyms, auditorium, classrooms for associations, cafeteria). A system of partitions integrated in the Ring’s architecture allows adjusting the degrees of the Campus’ porosity according to schedules and activities. The main line of force is the diagonal line introduced by the design, which continues the historical route interrupted by the construction of the Campus, while dynamising the Campus’ rigid layout.

3. The patio system as spinal column – the Axis of Ateliers

The compositional principle of excavation, represented by the existing patios, is the theme echoed by the Axis of Ateliers, or the new spinal column of the entire complex. Tangent to the centre, the Axis structures a system of patios suited for outdoor education, overlooked by old and new classrooms. Through its interior route and exterior system of patios, the Axis connects all the four schools, while redesigning the gym’s façade and expanding its entrance.

Spaces shared with the community and Rewriting strategies

Integrating the need to oversee the entrance to the Campus with the need to give an identity to each school, the design resolved the current fragmentation by proposing the reorganisation of the four schools’ spaces into clusters, all equally connected to the Green Ring, to the Axis of Ateliers and to the system of the hybrid sharing spaces.

The rewriting defined and reshaped an area inside the Campus around which both old and new hybrid spaces shared with the community would gravitate. The “lines of force”, in fact, identified two preferential access paths from via Adda: one, corresponding to the present main axis, leads to the existing auditorium and gyms; the other, shaped by a new “line of force”, leads to the new Green Ring, Cafeteria, Classroom-Library and, again, to the Gyms. This shared area is designed to either communicate easily with the rest of the complex, or be secluded, depending on the case.

The first axis of the hybrid sharing spaces corresponds to the Green Ring. Here, all connecting paths converge, the connection with the Axis of Ateliers begins, and two of the new buildings overlook the Ring, while giving access to its walkable roof and the special “Classroom-Library”. The Green Ring, moreover, offers a cafeteria connected to the auditorium and various rooms with movable partition walls that can be shaped according to the required activities and capacity. Both the Schools and civic associations, whose presence would guard the site while extending the life of the campus beyond school hours, are going to share these spaces.

As regards to the second axis, the requirement for each school to have an atrium and welcoming space, guarding the entrances and acting as an interface between the schools and the town, intersected with the need to expand the Banfi and Vanoni Schools. In order to define this interface, a linear building was designed as the head of these schools, projecting the two existing axes in its elevation by the transparent entrance halls, each topped by an overhanging volume. As in the new multilevel classroom building overlooking the Green Ring, the theme of the pitched roof reinterpreted as a shell encasing a perforated screen signifies the schools' collective spaces and refers to the farmstead's figure, while raising beyond the one-floor complex to project onto the landscape.

Set back from via Adda, this building overlooks a new raised public space, which exploits the sloping ground to cover a semi-underground parking. This terracing provides an intermediate meeting space facing the Park, endowed with a green area and a shading curved canopy, open to the whole community and distributing the flow of students safely towards the entrance halls.

Both the raised terrace and the Green Ring axis are designed to be always open to public use. Beyond class time, gyms, auditorium, Green Ring and Axis of Ateliers will be open to the community and provide spaces for sports, meeting, associations and classrooms-laboratories for lifelong learning, so that the Campus becomes a vibrant cultural centre, integrated by civic association and leisure activities.

The aforementioned three principles of regenerative design (re-centring the layout; reconnecting the parts; the patio system as a spinal column) have been developed according to ten design strategies that include some techniques of urban rewriting applied to the whole layout composition (centralisation, interconnection, addition, fitting) and architectural rewriting (grafting, overlapping, infill); the enhancement of indoor and outdoor formal and informal learning spaces; and finally the redesign and retrofitting of facades.

After developing the design proposal for the Vimercate Campus, the research translated the ten design strategies into conceptual diagrams in order to set a first benchmark in school redevelopment, helping the public administration to visualise these strategies in forms of operational principles, although the details of architectural solutions should remain site-specific. The rewriting and collaging operations were identified as follows: 1. Centralisation of the layout; 2. Interconnection of buildings; 3. School-city connection; 4. Addition of buildings; 5. Grafting of solids; 6. Overlapping and infilling; 7. Internal insertions; 8. Activation of outdoor spaces; 9. Façade Rewriting and envelope retrofitting; 10. Façade rewriting by diaphragms and shadings.

Conclusions

This research by design no longer considered school buildings as a specialised functional type only addressing pedagogical and functional issues, but rather as an Urban Architecture and an essential unit in regenerative processes.

In a Regenerative Architecture approach, the redesign of the Vimercate High School Campus investigated the problems and potentials of the existing structure and rewrote its syntactic and constitutive principles in relation to the urban-landscape structure while re-morphologising it by detecting lines of force, new epicentres, grafting and thinning points. Aiming to set a benchmark for existing school redevelopment, the design explored and defined a set of rewriting techniques, space-places and assemblage procedures to reconstitute an innovative morphological text and Learning Architecture. Postulating the concept of the School in Form of the City, the research shifted from learning environment to Learning Architecture, envisioning spatial innovation and stimulating active learning by a plurality of space-places, each one

responsible for proposing centres of attention and an aesthetic experience of the architectural space.

Finally, opening school spaces to the community by matching different degrees of porosity and partition to the layout, the new Omnicomprensivo becomes an urban catalyst providing the scenarios of a constant dialogue and interaction within the framework of city-community-school relationships.

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Illustrations

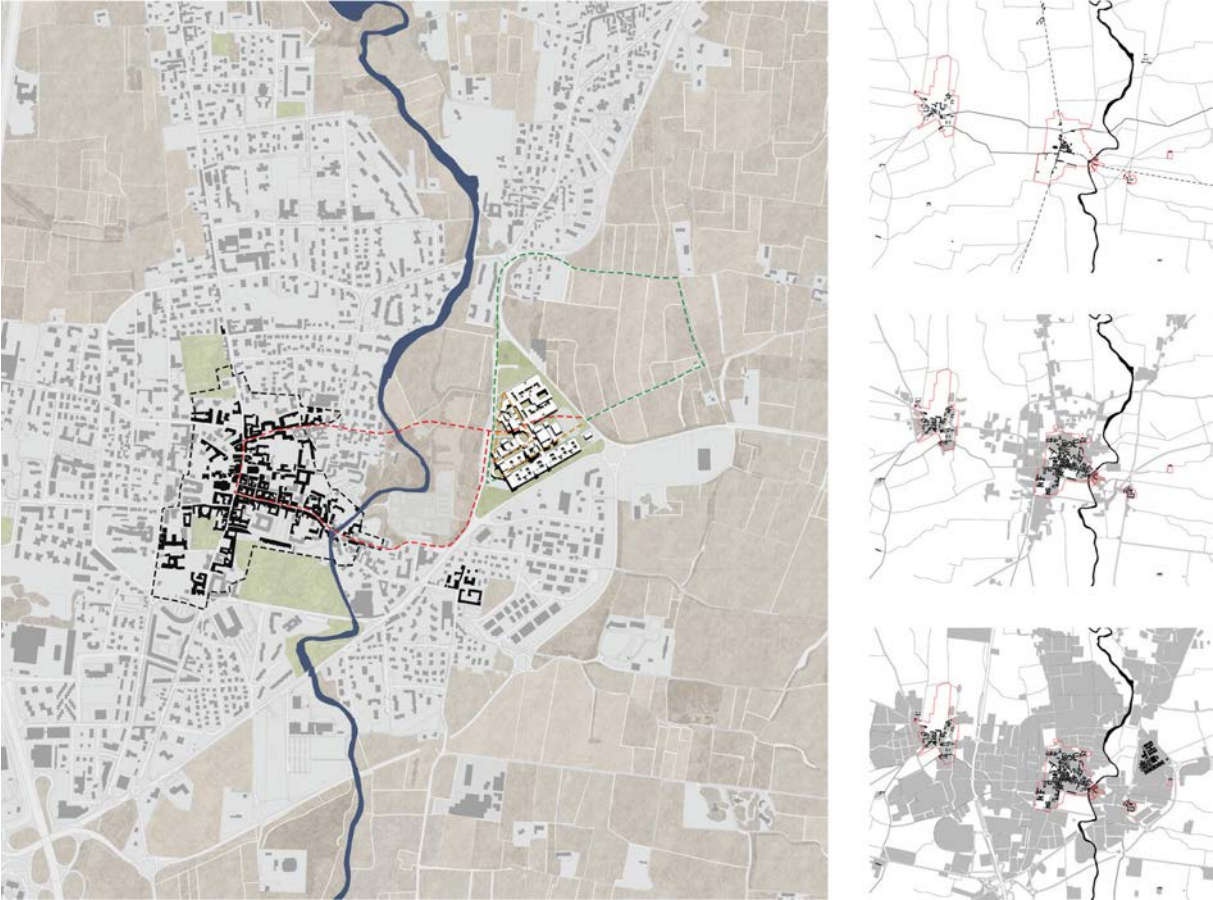


Figure 1. The Vimercate Campus as a cultural pole at the intersection between the “historical urban circuit” and the “landscape circuit”; historic sections in: 1722, Teresian Cadastre; 1954, Orthophoto; 2020, Orthophoto (mapping by the authors)

LEGEND

A. Entrances to the four Schools
 B. Entrance to the Green Ring and to the hybrid sharing space with the facilities for the community

1. Public Terrace
2. New entrance to the Banfi building
3. New entrance to the Vanoni building
4. "Green Ring"
5. New Banfi building and Classroom-Library
6. Fiorani extension
7. Axis of Ateliers and thematic patios
8. Einstein extension
9. Insertions for the laboratories of Vanoni
10. Gymnasium and the new small gymnasium

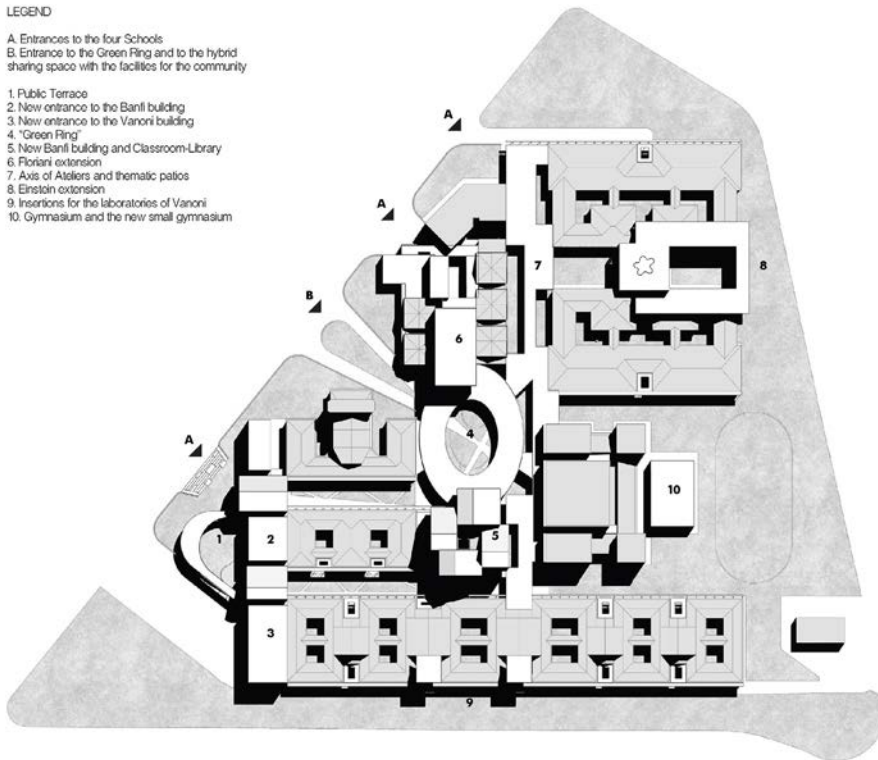


Figure 2. Rewriting design for the Vimercate Campus, site plan (by the authors)

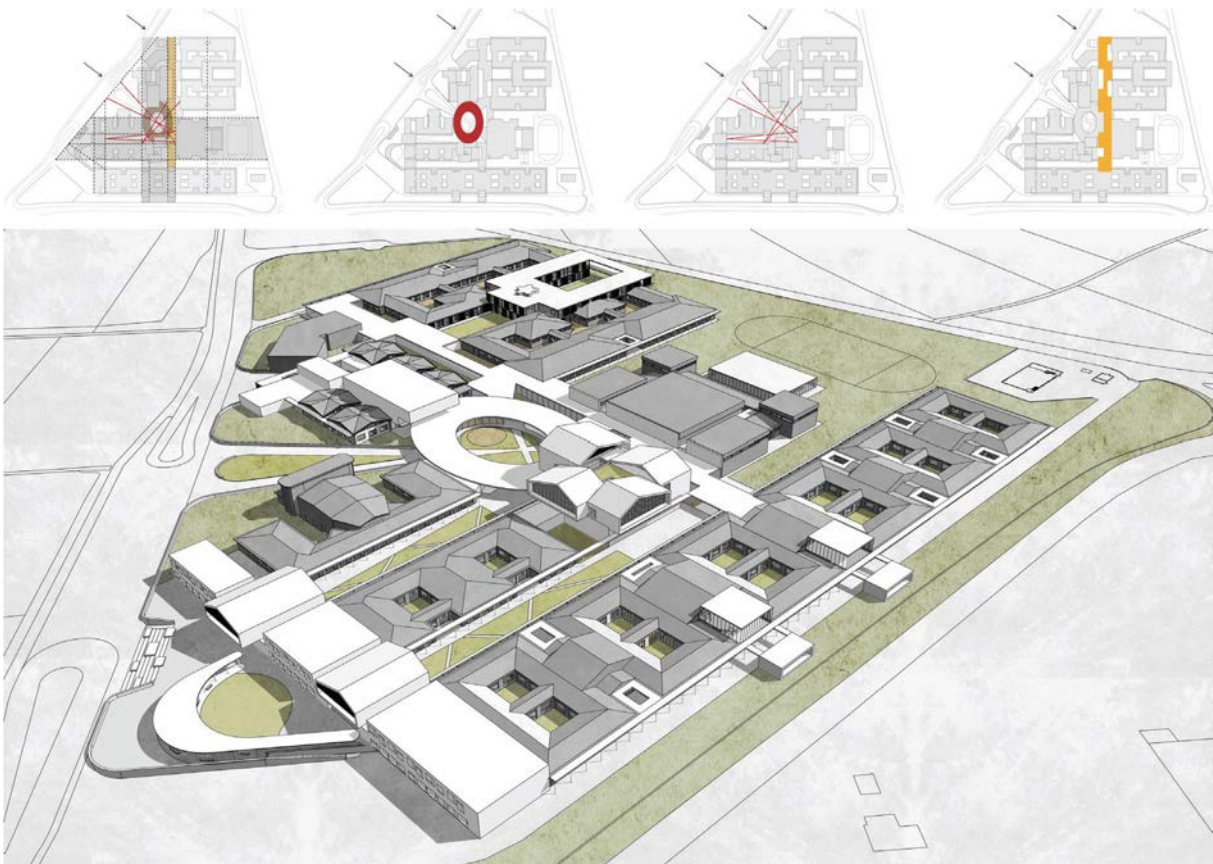


Figure 3. Aerial view of the Campus' redevelopment and design's diagram: re-centring; reconnecting; re-structuring (by the authors)



Figure 4. Design of the main entrance raised on a public terrace; the main “historic” axis leading to the auditorium, the Green Ring and the gym (by the authors)



Figure 5. The Green Ring and jutting Classroom-Library; the secondary “historic” axis; the patio between the Green Ring, the Gymnasium and the Axis of the Ateliers (by the authors)

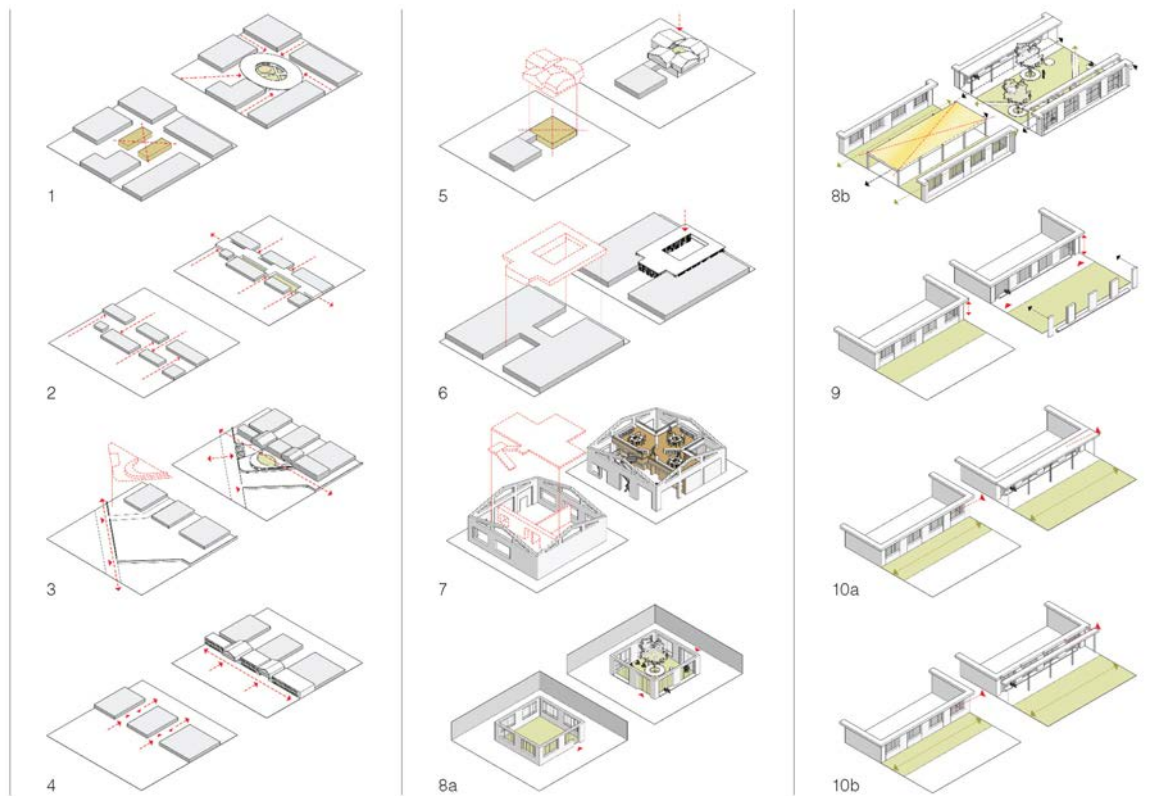


Figure 6. Diagrams of the ten Rewriting Strategies 1. Centralisation of the layout; 2. Interconnection of buildings; 3. School and city connection; 4. Addition of buildings; 5. Grafting of solids; 6. Overlaps; 7. Insertion; 8a. Reactivation of patios; 8b. Reactivation of outdoor spaces; 9. Redevelopment and retrofitting of the façade; 10a, 10b. Diaphragms and shading devices (by the authors)