

Research for Development

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# Buildings for Education

A Multidisciplinary Overview  
of The Design of School Buildings

Fondazione  
Politecnico  
di Milano 

 Springer Open

# Research for Development

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Laura Daglio · Raffaella Neri  
Editors

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# Preface

This book belongs to a series, which aims at emphasizing the impact of the multidisciplinary approach practiced by ABC Department scientists to face timely challenges in the industry of the built environment. Following the concept that innovation happens as different researches stimulate each other, skills and integrated disciplines are brought together within the department, generating a diversity of theoretical and applied studies.

Therefore, the books present a structured vision of the many possible approaches—within the field of architecture and civil engineering—to the development of researches dealing with the processes of planning, design, construction, management, and transformation of the built environment. Each book contains a selection of essays reporting researches and projects, developed during the last six years within the ABC Department (Architecture, Built Environment, and Construction Engineering) of Politecnico di Milano, concerning a cutting-edge field in the international scenario of the construction sector. The design of schools has been recognized as one of the hottest topics in architectural research, also for the criticalities detected in the current conditions of Italian school buildings.

The papers have been chosen on the basis of their capability to describe the outputs and the potentialities of researches and projects, giving a report on experiences well rooted in the reality and at the same time introducing innovative perspectives for the future.

With the aim of exploring the evolutionary scenario of school design as an architectural topic, the collected papers were selected according to a comprehensive and multidisciplinary overview. Researches on typology and spatial organization are enriched through the contribution of a historical and social perspective to enlarge the focus on the urban role of the school buildings. Moreover, innovative approaches and tools have been highlighted both in the design process and in the education techniques. The presented experiences include best practices of

consistent and coordinated contributions of the several disciplines involved in the design of school buildings, also implementing digital tools. Finally, the issues related to the challenges of the existing built stock triggered the development of more technical and specialized, albeit multidisciplinary, investigations and case studies' reports.

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# Introduction

## Background

The design of educational spaces dedicated to school is a rather recent topic in Italy, since until the end of the nineteenth century and the unification of the country,<sup>1</sup> children were educated exclusively in private or ecclesiastical environments; and only later, the school education was recognized for its significant role in the teaching and learning processes (Pennisi 2012). The evolution of the architectural school typology and of the primary school in particular, can be analyzed as a complex combination of political, cultural, social and urban planning issues and as a reflection of the historical situation. Through the analysis of the educational buildings erected in the different periods, it is possible in fact to detect the evolution of the legislative framework, aimed at defining hygienic and comfort requirements, and of the organization of spaces required by the different pedagogical approaches. The study of the architecture of existing schools reveals a sequence of construction systems, both traditional and innovative, from masonry walls to reinforced concrete frames and to prefabricated solutions, which were employed to better respond to changing needs (in particular, low construction and maintenance cost and construction time reduction). Finally, and with a strict connection with the above considerations, the role of the school building in the city is remarkable at the urban level also, for its ability to promote the development of entire neighborhoods of a city or for the ability to revitalize an existing portion of a city in relation to other public services and open spaces.

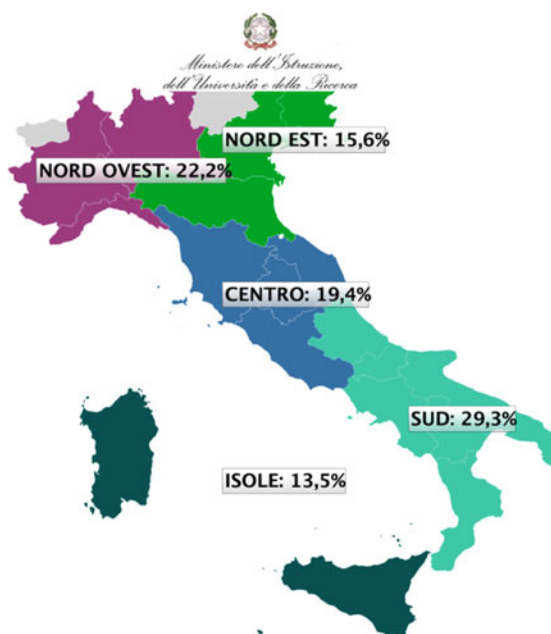
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<sup>1</sup>The compulsory education was introduced in Italy with the Casati Law, issued by the Minister of Public Education Gabrio Casati in 1860. This law entrusted the central government the obligation to enact laws in relation to school education and the management of public schools and gave private individuals the possibility of founding and managing institutions, but without the right to confer educational qualifications. In this period, elementary education became free, compulsory only for the first two out of four years (i.e., for pupils aged 6–7 years) but only present in cities with over 4000 inhabitants or in secondary education institutions (Laurenti and Dal Passo 2018).



## The Current Situation

The results of a more than a centenary process of school buildings' construction are significant from a quantitative point of view. The whole stock of educational buildings of all levels and dimensions amounts to 42,408 units, hosting 7,816,408 students in 370,597 classes (Miur 2017), distributed all over the national territory (see Fig. 1). However, this is an extremely heterogeneous heritage,<sup>2</sup> because of the aging, the functional and often physical obsolescence, which ultimately does not respond to the current demands in terms of teaching and learning methodologies, but also because of the low comfort and safety performances and of fruition and accessibility problems (lack of compliance with “Universal Design” goals).



**Fig. 1** Distribution of the educational buildings on the Italian territory (Source: MIUR—*Portale unico dei dati della scuola, Anagrafe scuola*)

<sup>2</sup> Thirty-two percent of the schools was built after 1976, 27% between 1961 and 1975, 12% between 1946 and 1960, 8% between 1921 and 1945, 4% between 1900 and 1920, 3% in the nineteenth century, and 1% before 1800. There is no information for the remaining 13% (Miur 2017).

In addition to the hydrogeological hazard that can affect some schools positioned in risk areas, one of the most urgent issues is related to the high seismic vulnerability characterizing most of the existing schools, which indeed were designed with respect to gravity loading only.

The identification of the seismic areas in Italy started at the beginning of the twentieth century, through the instrument of the royal decree, issued after the destructive earthquakes of Reggio Calabria and Messina on December 28, 1908. Since 1927, the areas hit by earthquakes have been divided into two categories, in relation to their degree of seismicity and their geological constitution. Therefore, the seismic map in Italy was nothing but the map of the territories affected by the strong earthquakes after 1908, while all the territories struck before that date (most of the seismic areas of Italy) were not classified as seismic and, consequently, there was no obligation to build in compliance with anti-seismic regulations. Only in 1974, through the law of February 2, 1974, n. 64, a new national seismic regulation was established which defined the reference framework for the seismic classification methods of the entire national territory, as well as for the drafting of technical standards. Immediately after the earthquake of October 31, 2002, that hit the territories on the border between Molise and Puglia, the Civil Protection adopted the ordinance of March 20, 2003, n. 3274, in order to provide an immediate response to the need to update the seismic classification and seismic regulations. According to the ordinance n. 3274, and unlike the provisions of the previous regulations, the entire national territory was classified as seismic and divided into four zones, characterized by different seismic hazard.

This brief history demonstrates that seismic regulations in Italy are quite recent. Indeed, according to the new registry launched by the Ministry of Education University and Research (Miur 2017), only 8% of the schools was designed in compliance with seismic regulations, 54% is in a vulnerable zone, and around 19,000 buildings are situated in high-risk seismic areas. The collapse of educational buildings in the 2009 and 2016 earthquakes in central Italy and the tragedy of San Giuliano di Puglia (2002), where 27 children died in the primary school building collapse, represent a clear symbol of the gravity of this problem.

A second major issue is related to the inadequate energy performance of the educational buildings, again due to the old construction date and to the evolution of the regulations on the energy performance of the buildings, the first being enacted only in 1976, but with very low requirements in comparison with the current situation. Although the European Energy Performance of Buildings Directive (EPBD) requires that *“the public sector in each Member State should lead the way in the field of energy performance of buildings”* and *“buildings occupied by public authorities and buildings frequently visited by the public should set an example,”* almost 85% of the school buildings in Italy belongs to the bottom classes of the energy performance ranking. Only 5% (Legambiente 2018) of the stock can be classified among the first three classes, a percentage corresponding to the constructions completed after the 2001, when the first regulations requiring a high standard of energy efficiency were enacted. Hence, if the lack of sufficient structural safety can appear as a real threat, the inadequate energy performance is certainly a

waste of resources and a lost chance as well. Energy retrofit programs in fact can become lighthouse projects not only because schools are public buildings visited by pupils, their parents, and the staff, but also because the direct understanding of the behavior of the building envelope and technical systems can help children learn how to support energy savings as responsible users and transfer the knowledge to their families. A further issue to add to the serious situation of the national heritage, related to both structural safety and energy poor performance, is the significant gap between northern and southern regions; an imbalance which characterizes also the funding for ordinary repairs, let aside renovation interventions.

Furthermore, health and indoor comfort requirements should be addressed, especially when considering that almost 10% (Legambiente 2018) of the existing complexes should be cleaned from asbestos.

Finally, the shift toward a knowledge society where information and knowledge are expanding in quantity and accessibility is introducing major changes in teaching and learning models. The information revolution has changed the way we interact with people and things. We live in a society where information is spread out in a large-scale dimension, and new technologies become new tools to change the relationship between time and space. Learning happens everywhere. The new generation of net-native pupils, with an increasingly different set of expectations about space and time, will require constant access to learning materials and resources to share within and beyond the school. Inter-disciplinary learning and collaborative peer-to-peer learning will become increasingly common. New educational models and approaches will be required to help multiple generations, belonging to diversified cultures and in different fields. This will require a general rethinking of the school layouts to overcome the actual strict zoning of the functions and to respond with a higher flexibility to the rapidly changing demand.

The barriers toward the starting of a concrete policy for the renovation or the replacement of the existing stock are varied. It is not just a problem of economic resources but also of a complex set of different issues related to both the diversity of the heritage and the heterogeneous set of institutions responsible for the construction/renovation process. The schools in fact are managed by municipalities as well as by provinces and also directly by the central state. The interventions, considering the major presence of public buildings, are very often subjected to the national public works legislation, requiring a significant effort in planning and organization. One of the challenges is thus how to support municipalities or institutions, especially the smallest ones, in the process from the design activity, to the tendering, to the site inspections and co-ordination during execution, until the final acceptance testing.

The decision for the construction or the retrofit of the school building should consider the relationship with the urban context and the possible potentials that the public building and its annexes can add to the community, for example, in terms of quality of the public spaces, additional resilience in case of emergency<sup>3</sup> and of lifelong learning<sup>4</sup> or integration with other public facilities. A new construction or a requalification can also trigger the regeneration of the surrounding neighborhoods.

## **The Challenge of Renovation and New Buildings Design**

From 2014, in Italy a vast program<sup>5</sup> of construction of new schools and requalification of existing educational buildings that affect, in different ways, every level of education, from primary schools to universities, have been public financed. Different architectural design competitions were also proposed, beyond the attribution of the design task, to collect innovative proposals able to explore new solutions and approaches for the renovation of the educational facilities. Many examples and competition applications are collected in this book.

This program concerned the transformation of educational and pedagogical approaches, aimed at improving the effectiveness of learning models, as well as the requalification of the existing buildings from an energy-saving and structural safety point of view, the latter with particular regard to seismic vulnerability of the existing buildings.

These themes have long been a field of great interest, experimentation, and research, aimed at developing projects, models, and intervention strategies where different disciplines and skills are involved. The possibility of giving old places a new identity, to update buildings according to the new educational and teaching models, to develop projects that take into account the actual needs of energy savings and structural safety is deeply investigated in the following chapters.

On a broader scale, all these needs offer the possibility of redesigning complex existing buildings and developing projects that play an important role also at the urban level, by becoming reference places, opportunities for redevelopment of degraded parts of a city, new cultural, and civic centers.

This book describes the results of some of the research and consulting works, carried out at the Department of Architecture, Built Environment and Construction engineering (Politecnico di Milano), related to the design of new schools and to the

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<sup>3</sup> A structural safe school building in seismic areas can be used, for example, as a possible emergency center or temporary accommodation in case of necessity.

<sup>4</sup> The often-unused spaces of a school building during the evening or weekends can host courses for adults or other continuous learning programs or different activities for the whole community.

<sup>5</sup>Of the ten billion euros invested, five have been spent by municipalities, provinces, and metropolitan cities to construct 300 new buildings and start 12,000 renovation projects. ItaliaSicura, the Council of Ministers authority created to lead and manage the renovation programme, was closed in July 2018 ([https://www.corriere.it/scuola/primaria/18\\_luglio\\_05/edilizia-scolastica-ambiente-governo-chiude-italiasicura-edef7264-8017-11e8-841c-47290107a48c.shtml](https://www.corriere.it/scuola/primaria/18_luglio_05/edilizia-scolastica-ambiente-governo-chiude-italiasicura-edef7264-8017-11e8-841c-47290107a48c.shtml)).

requalification of existing ones. The description of these activities has been organized into three sections, where particular emphasis is given to the effective collaboration with institutions at various levels and the synergetic combination of the different disciplines involved, needed to respond to their requests through applied and basic theoretical research works.

The chapters, organized into the three different sections, investigate central themes about the buildings for education, focusing, in particular, on the definition of multi-disciplinary approaches for the design of new schools and for the upgrading of existing ones. Among the main topics highlighted, the first section focuses on the relationship between the city and the school as a civic building with a public role for the community also to possibly host different functions. Accordingly, some recent concept designs are featured, carried out within national and international competitions, and analytical and historical studies on the theme of schools and on their typology, as well as on the role of these buildings at the urban level, are reported. In the second section, innovative solutions for both the design and the construction process are analyzed, and in some applications, particular relevance is given to the building information modeling (BIM) strategy as an optimal tool to achieve a synergetic combination of the different disciplines involved. Finally, the third section focuses on the built heritage, particularly: (i) on the tools, technologies, and approaches required to upgrade the existing buildings, in order to comply with the new regulations (in terms of seismic resistance and energy performance); (ii) on the possible transformation of unused constructions into buildings for education, and (iii) on the management of the existing stock. Theoretical as well as applied research paths are reported to illustrate the topic both from the methodological point of view and through real case studies.

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# Space and Figuration of the School Building in the Construction of the Metropolitan Periphery: The School as a Social Emancipation Workshop



**Domenico Chizzoniti**

**Abstract** The research concerns the study of settlement forms for school buildings and their susceptibility to becoming public places and centres for aggregation. In particular, schools are analysed here as the set-up of a larger project of social redemption in the metropolitan suburbs. The paper analyses a possible approach to the problem in a situation in which the architectural design of space for education does not renounce the covering of a polygenetic role in the layout of the contemporary city.

**Keywords** Suburbs · Schools · Typological and figurative aspects · Education · Prototype · Marginality

## 1 Space and Figuration

According to the particular point of view of the art historian Hans Sedlmayr, a phenomenon has been underway since the middle of the eighteenth century, due to which there is a growing loss of symbolic primacy and mobilising effect, two unitary issues which were until then dominant in the landscape and in the structure of the city: the cathedral and castle-building. To these are added themes which are new, so to speak, such as rental houses, town halls, theatres, the stock exchange, parks, monuments, museums, exhibitions, schools, factories and so on. In fact, as a result of this functional and themed proliferation, as well as a certain tendency for typological perfection and, in any case, beyond Sedlmayr's spiritualistic vision—who, in this phenomenon, interpreted the beginning of the modern city's identity crisis—design

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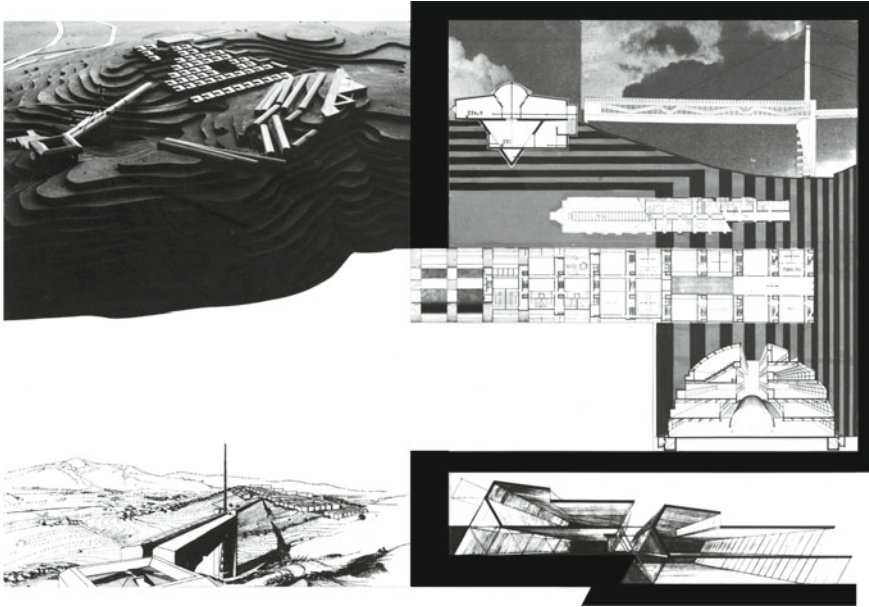
manuals take on a certain importance and also an operational consistency, tending to differentiate building types for specific requirements. Recently, specialized manuals tend to focus on the supposed infallibility of functionalist particularism, more than leveraging the constantly invoked typological flexibility. Thus, one wonders whether the “functional issue” still exists today, understood in the civil sense, as one which in place of the specialised user’s intended use, is still able to bring about instances of the continuing need for a representative characterisation of architecture (Ader 1977). The question put here forces us to consider how the propensity of contemporary architecture to adhere to the most disparate thematic opportunities, “from the spoon to the city” as would have been said in earlier times, pushes the project to be replicated at different scales, sizes and in the most diverse application contexts according to an attitude that is anything but specialised (Paoli 1960; Carbonara 1976). Yet, on closer inspection, it appears quite evident in recent times that even in architecture, themes considered reliable in the making emerge, perhaps in an allegorical sense being the most significant part of an author’s poetry: amongst these, for example, school buildings.

Thus, this text relates to unique research which, in the wake of Italian architectural tradition, has contributed to not only building an aesthetic figure but a genuine operational research on the school building facility. It deals with, for example, the extraordinary experience of reorganising educational activities which, including through university research, was exploring didactic prototypes (Petrangeli 1989) on the basis of the work tradition for which both Camillo Boito and Mario Ridolfi highlighted some resistance in comparison with the conventional adaptation to the canons, recognised in those years, of Central and Northern European experimental models (Ward 1976; Perkins 2001). Several architects have moved along these lines such as Carlo Aymonino with his experiences in Pesaro, Aldo Rossi in Broni and Fagnano Olona and Guido Canella with several experimental projects in the Milan Hinterland.<sup>1</sup>

More specifically at this stage, and also due to time constraints, it is the work of Guido Canella which is to be analysed, in particular, the issue surrounding the school facility, its typological experimentation and therefore, also the potential for the user’s behavioural induction to the school building. Certain necessary clarifications should be brought forward to clear up the misunderstandings concerning the above-mentioned functionalist particularism which in this case would suggest, given the specificity of the theme, a propensity to technical specialisation deployed to support the different conditions of the project in each case (Panizza 1989). The first issue concerns the role of physical centrality so that the work of architecture, rather than mimetically adapting to it, assumes full economic, productive, social and even representative responsibility, presenting itself as dominant and not only monumental (Pizza 2007). See, in this case, the university settlement’s role in the *Competition Project for the University of Calabria in Montalto Uffugo, Cosenza, 1973* (Fig. 1).

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<sup>1</sup>Cf. A. Christoffellis, *Nel gran teatro dell’Hinterland milanese: scuole materne come case del popolo*, in “*L’architettura. Cronache e storia*”, 1976, n. 252, pp. 294–307.



**Fig. 1** Guido Canella, *Competition for the University of Calabria*, Cosenza 1973

As a countertrend to a practice that was by now not only prevalent in Italian architecture and to globalism as an aesthetic figure already decreed by the most steadfast supporters of International Style, the research by Canella and his team was exploring two priority areas: first, the aesthetic and compositional values that the considered modern monuments can exercise in the functional and representative revitalisation of entire central parts of the city; secondly, the strategic and structural value that both the conversion of large industrial urban areas and the reorganisation of the urban and regional mobility's large infrastructures (rail and road networks), rather than the reorganisation and strategic reconnection of large metropolitan functions, could have played in reconfiguring the role and the overall fate, for example, of an economically depressed area like Calabria.

These assumptions had already been validated some years before in the construction of a didactic prototype system for the city of Milan and its Hinterland<sup>2</sup> which, in different research occasions, including university research, affirmed a completely overturned perspective in comparison with some trends and a homogenous and repetitive intervention practice, founded on the presumption of the possibility of an improper comparison between different urban areas in terms of nature and culture,

<sup>2</sup>See Guido Canella on this issue: *L'utopia della realtà. Un esperimento didattico sulla tipologia della scuola primaria*, De Donato, Bari 1965; *Il sistema teatrale a Milano*, Dedalo libri, Bari 1966; *Università: ragione, contesto, tipo*, Dedalo libri, Bari, 1975; *Introduzione alla cultura della città*, Clup, Milano 1981; *L'edificio pubblico per la città*, Marsilio, Venezia 1982; *Per un'idea di città*, Cluva, Venezia 1984; *L'architettura italiana oggi. Racconto di una generazione*, Laterza, Bari 1989.

for which a common illness and a unique therapy would be identifiable. This therapy, in turn, emerges in conventional intervention models, deemed to be defined once and for all and universally valid (standard, decentralisation, regeneration, settlement rebalancing, but also, according to most recent models, area projects, pedestrianised historic centres, scientific and technological research parks, turreted and reflective business centres, museum conversions of each historical building and a green belt).

Therefore, strictly from an architectural point of view, what should be noted about this Canella's campaign on the role of the building is the established relationship between induction from the behaviour of human activities and typological design which, from its unique observatory, leads to figuratively (and therefore also typologically) innovate traditional education structures, for example through organisations able to condense collective functions through a programme that anticipates new management models for the hosted activities (Noal 2001). Amongst the unfinished projects, the *New settlement of the Politecnico in Bovisa, Milan*, is highlighted in this regard, presented at the "*Le città immaginate*" (Imagined Cities) *Exhibition of the XVII Triennial of Milan, 1987* which, placed in the historic suburbs along the north-west axis of the city of Milan, tends to reverse the tendency to detachment from the historical density of the productive context of that strip of the periphery, albeit through the figurative redemption of a typological exemplary principle to regain a now lost representative prestige in the university institution (Ader 1977). It is an operation that brings together authoritative typical factors such as that of the Filarete cross of the Ospedale Maggiore in Milan, or the prototype of San Matteo in Pavia, intersecting it with the most compelling Leonardesque allegories in the recovery of existing gasometers which, by virtue of an almost exemplary method of contextualisation, tended to contain architectural representation in the wake of history and in the context of tradition to loom over the city landscape.

Moving on from projects to achievements, it is then worth highlighting the contribution of Canella's aesthetics to school buildings. A poetry that was first engaged with obstinate consistency to subvert certain standards and some architectural trends prevalent in those years which, surpassing the borders of context, function and type, was venturing onto the international scene, spreading from Europe to North America and even to countries with a strong cultural tradition, such as England, Germany and Spain, an emblematic hagiographic calibre, almost extending to the autonomy of sculptural works, when it exhausts its meaning in mere appearance (Bohigas 1997; Curtis 2002; Dudek 2000). Thus, faced with this condition, which is necessarily schematic here, what inspired the work of Canella is the line of "resistance" to globalised internationalism which had revived in certain masters of the Modern Movement, from Dudok to Duiker, Neutra to Lescaze, Sert to Lurcat, from Beaudouin and Lods to Gatepac and so on, a line of aesthetic and moral reliability to be uniquely followed in designing the architecture of the school (Boesiger 1966; Dudek 2008; Cohen 1998).

Meanwhile in Italy, in the years of reconstruction, architectural research moved from the analysis of the conditions in which they debated some of the most engaging and influential current trends—the controversial relationship with the historical and geographical context, the uncertain internal functional requirement, the ambiguous



**Fig. 2** Guido Canella, *Infant School at Novegro di Segrate, Milan 1966*

external representative result, contention between suggestions of maximum domesticity and maximum elegance—to finally recognise the most casual criticism of the adoption of atopic internationalism as frontier aesthetics, and how the works increasingly entrusted to the subjective architect–artist inspiration were the most significant. Conversely, for example, the open-air relationship experienced at the school in Suresnes was for Canella not just a technical sagacity with regard to the particular users but rather a training option, able to undermine the conventional educational experience setting to explore experimental and innovative educational models: for example, in the relationship between open and closed spaces, between light and twilight, transparency and opacity, of which the configuration of the architectural space becomes a satisfied accomplice. His fondness of “shielded” projections would perhaps be clearer: these, in fact, from the first proposals, such as the *Infant School in Novegro di Segrate, Milan 1966* (Fig. 2) imposed a special relationship between interior protected space and exterior covered space as if there were a physical extension of the classroom interacting with the extension of the Lombardy plain’s landscape. The open-air “theatres” carved as loops to resume the overhang of the outer cover through circular steps, which connected the countryside level to the school, were the custodians of this interaction between the possible attitudes of space to correspond to the needs of institutional and experimental learning.

The same applies to the “*Don Zeno Santini*” *Infant School in the Service Centre at the Incis Village, Pieve Emanuele, Milan, 1968* (Fig. 3) where, for example, the search for that fading effect which he himself would have credited to some of his masters, Terragni and Gardella in particular, looking “against the light” and what filters into the contrast between opacity and transparency, and mass and brightness. In this regard the role of the texture of the glass blocks must be considered, which, like a drapery, buffers the doorways of the reinforced concrete structure, laying bare



**Fig. 3** Guido Canella, “Don Zeno Santini” Infant School in the Services Centre at Incis Village, Pieve Emanuele, Milan 1968

each tectonic element in its absolute conclusive expressiveness,<sup>3</sup> as well as the effect of the *tholos* coverage created for the *Nursery in Gennara di Abbiategrasso, Milan 1972*. However, it is the prototype created at Opera, *Infant School with Nursery in Zerbo di Opera, Milan, 1972* that the architectural facility for infant schools finds its greatest degree of functional, expressive, typological and figurative exaltation.

Thus, for example, the theatrical dominant is not only taken allegorically, in the symbolic metaphor of the gradually descending trend to the central body, but also functionally engaging a real theatre hall within the architectural body: each of Canella’s school buildings has a theatre. The “spiral” structure of architecture takes up a theme on the central plan dear to the author. The spiral is wound around a cylinder in an intermediate position which hosts the theatre on the upper level, those of the free activities directly related to the theatre and with a ramp connected to the countryside level and to the underlying refectory. Just by looking at the creations intended for infant schools, it is possible to isolate some recurring themes which, with different accents and in each individual case, progressively from an almost embryonic state of the mass, architecture “becomes an articulated body” for a typological overlap, figurative contamination, and for linguistic separation.

These themes could be summarised in the physical centrality of the architectural body, in such a way that the work, rather than mimetically adapting to its surroundings, assumes full representative responsibility and serves as a monumental dominant; in the emblematic denotation of its figuration, which adapts to the functional versatility giving rise to two distinct landscapes, exterior and interior; in the allegorical method as a reference alluding to that identity denoting the public and collective character of the “school home”.

<sup>3</sup>Guido Canella, *Gardella in controluce*, published in F. Buzzi Ceriani (edited by), Ignazio Gardella. *Progetti e architetture 1933–1990*, Marsilio, Venice 1992, pp. 15–17.



Between research and project, Canella operates in the Milanese and Lombard context, aiming to verify, in line with strategic structural intervention programmes, how a propulsive action of architectural representation on the building is capable of generating a settlement, or at least it can guarantee a physiological balance of the new Hinterland communities, decisive, therefore, in the polygenetic dualism city—countryside, or even more, the centre—periphery in the Milan case. And in this context of Milan and Lombardy, Canella explored and brought to the fore certain distinctive constitutive traits, identifiable in the special polycentric reinforcement which distinguishes them, in which original metropolitan traits were determined at an earlier stage, attempting to isolate certain values which, in their historical persistence, constitute genuine “invariant” settlements, employed operationally as an added value to the project. Thus, in an era of globalised modelling with respect to the school building example, Canella rediscovers some prototypes against which to orientate each intervention proposal.

This is, for instance, the example of the basilica plan which, when initially tested on the *Elementary School in the Services Centre at Incis Village, Pieve Emanuele, Milan 1968–1973* (Fig. 3), assumes the entire flexibility of the typological principle underpinning the three main bodies, the transversal one as a transept and the longitudinal ones as two large lateral halls, to respectively accommodate the atrium, opening onto the large gym lowered by a staircase, the refectory, the secretariat and all the facilities; while the actual classrooms were on two different levels on the longitudinal bodies. The case of the “*Fratelli Cervi*” *Elementary School and sports field in the Mirasole Village of Noverasco di Opera* (Fig. 4) was resolved a few years later in 1974 with an analogous plan and a similar typological peremptoriness. Here, the three halls, one central and two lateral, are intended for different activities: the central chamber for the gym in continuity with the auditorium, with spaces for free activities all connected at different heights but in visual continuity with each other through the large tiered hall which, with a theatrical layout, looks onto the entire central space; the two-side chambers to the classrooms for the elementary school on both upper levels and the infant school at the bottom level, with the services, the entrance hall, the refectory and the kitchen premises. The large transept houses the



**Fig. 4** Guido Canella, “*Fratelli Cervi*” *Elementary School and the sports field in Mirasole Village of Noverasco di Opera, Milan 1974*

vertical distribution system and brings together the horizontal connections, which open with a pair of large tympana and contain the special rooms that open onto the surrounding countryside.

Finally, some reflections are presented on one last aspect which should be considered trying to illustrate how Canella sought to define an authentic interpretation of those characteristics that are consistently comparable, the reasons of civil functionality and expressive-formal reasons that are evident in some projects and works that his research takes as “certain” references. These are, for example, those experiences in the context of the construction of the modern city, which can be taken as a cognitive reference relative to the problem and to the role of the school building. Suffice it to recall, limiting this only to some of the most significant: the initiatives of industrial paternalism and municipal providence in Milan and in the Lombardy area, where services in early industrialisation (schools, hospitals, boarding schools and economical kitchens), originally using the new types of the first industrial takeoff, are presented as free cornerstones on four fronts, at the same time generating an urbanisation “for centres”; Moscovite construction workers’ clubs in the twenties, authentic “social condensers” and monuments with new forms designed to compensate for the precarious urban and housing conditions of post-revolutionary Moscow through functional and behavioural wealth and figurative representativeness; the interventions of modern architects in the municipalities of Parisian suburbs, before and during the Popular Front, where modern architectural forms become an advanced management symbol for the city, and so on. For example, the monumental isolation should be observed to which the building for the *Middle School in Monaca di Cesano Boscone in 1975* was destined, located as the fulcrum of a contentious urban condition between the original core and progressive expansion zones kept isolated from one another by social situation, ethnic background and the urban fabric’s historical development. The opportunity to place complementary activities to the school building follows a typological principle. Therefore gym and locker rooms, special classrooms, auditorium-theatre with a stage and dressing rooms and public library were located in a cylindrical building with a central floor. This body was separated from the parallel bodies of ordinary classrooms, four per each floor for a total of 24 classrooms, with stairs and corridors set in an intermediate position to connect the classrooms on all three heights to the central cylindrical body. Such a facility corresponded to involving the entire community after school hours, for example. Not surprisingly, the programme resumed some advanced hypotheses that had already been explored for the *Civic Centre with a Town Hall, School and Sports Field in Pieve Emanuele in 1971* (Fig. 5), where original typological-functional mechanisms creatively combine new patterns of behaviour and figurative innovation in an attempt to counteract the incipient territorial and cultural standardisation processes with architecture in the post-reconstruction and post-economic boom years.<sup>4</sup>

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<sup>4</sup>L. Fiori, S. Boidi (edited by), Guido Canella. *Centro Civico di Pieve Emanuele*, Editrice Abitare Segesta 1984. E. Bordogna, *Meditazioni gaddiane*, “L’architettura cronache e storia”, no. 1st January 1986, pp. 6–47.





**Fig. 5** Guido Canella, Civic Centre with a Town Hall, Middle School and Sports Field in Pieve Emanuele, Milan 1971

I believe that this concise and schematic overview of some of Guido Canella's school architecture can perhaps contribute towards rethinking the public building's role for education in the current changed structural conditions and within the same new guidelines of international architectural culture. It seems that architecture which is claimed to be quality architecture increasingly tends to disregard its structural essence and the contextual horizon it is intended for, as well as a functional term apparently considered as increasingly inert and from which the latest design culture seems to consider itself fully liberated (Fig. 6).



**Fig. 6** Guido Canella, Infant School with Nursery at Zerbo di Opera, Milan 1972

Moreover, this work on school buildings, which had proposed the goal of a design intended for the hinterland in the Milan metropolitan area, was ultimately able to adequately contend both with the promotion of new collective behaviours and with the authenticity of a figuration rooted in the metropolitan landscape.

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