

Research for Development

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Buildings for Education

A Multidisciplinary Overview
of The Design of School Buildings

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Politecnico
di Milano 

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Research for Development

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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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About the Editors

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Massimiliano Bocciarelli is an associate professor at the Politecnico of Milan, he has been lecturing in the areas of structural and solid mechanics at the School of Industrial Engineering and of steel and concrete structures within the School of Architecture. He graduated at the Politecnico di Milano, completed a Master of Science in Structural Engineering at Chalmers University of Technology in Sweden and a Ph.D. in Structural Engineering at the Politecnico di Milano. His research interests have been primarily focused on numerical methods for the modeling of the service and ultimate behavior of materials and structures with particular regard to the diagnosis of masonry historical structures. He is author of more than 40 papers on international journals and two book chapters.

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of various projects for public and private buildings' new construction and refurbishment and achieved mentions and awards in design competitions.

Raffaella Neri Graduated in Architecture in 1986, she is a full professor at the Politecnico di Milano. In 1993 she gained her Ph.D. in Architectural Composition from IUAV, Venice, with a dissertation entitled, "Essay on construction. Research into the role of construction and architectural design in relation to type and decoration". In 1994–1995 she worked on organizing the exhibition entitled, "The Center elsewhere" (coordinated by A. Monestiroli), La Triennale di Milano. Since 2003 she has been a member of the teaching staff body for the Ph.D. in Architectural Composition at IUAV, Venice. Her research activities include the theory of architecture, urban design and the role of construction in design. In recent years she has studied compositional principles for residential developments and the issue of redevelopment of brownfield sites and former military zones. She participates in design contests, winning the Luigi Cosenza National Architecture Award in 1996.

Urban and Social Role of School Buildings

Massimiliano Bocciarelli, Laura Daglio and Raffaella Neri

The school system has a fundamental role in the construction of the urban collective places.

Settlement's principles and architectural typologies are closely related to the educational models: the idea of the city, the principles of the construction of the public spaces and school systems are intertwined in order to establish the relevance of the formal education and of the corresponding places in the development of a civil awareness and the identity of places.

The different orders of schools—from those for children to universities—strongly diversify their urban role and their ability to establish new centers: they define a hierarchy of urban places that represent, from time to time, benchmarks for the districts, the city or a vast territory.

In this section, some significant case studies are explored: they especially show an important and evident relationship among educational models, architectural and typological choices and the urban role of the school complexes. The role and the capacity of the new settlements to adhere to the recent educational models and to give adequate response to the construction of the modern city have been tested through architectural designs and competitions.

The first contribution offers a general overview of the buildings for education in different historical and cultural contexts. Two important pedagogical models are compared that have strongly influenced the design of two ancient complexes in Milan: the Rinnovata Pizzigoni (1911) and the School of the Trotter Park (1918). Inspired by northern European experiences, these open-air schools highlight the role of green spaces as the center of a new educational approach based on low-rise pavilions organized inside a park and thus complying with the hygiene and health ideal, which originated them.

Another reform that expanded the education models is then investigated through the work of outstanding Milanese architects: Ignazio Gardella, Arrigo Arrighetti and Roberto Menghi who contributed to develop the civil role of schools during the social and urban reconstruction period after the Second World War. A significant research area analyses prefabricated construction systems typology and layout—to

respond to the fast increase of the students and the need of new educational spaces—and the school autonomous isolated new settlements as a model for urban growth.

The third contribution explores the function of educational facilities as community outposts for the construction of new city expansions, aimed at triggering its growth and development. As a case study, the research and design activity carried out by Guido Canella on Milanese outskirts and suburbs are analyzed.

A second group of contributions provides a historical retrospective on the relationship between schools and their cultural context. In the Chapter “*Imagining the School of the Future*”, the connection between education and the school as an institution is analyzed in its legislative, social, organizational and spatial dimensions starting from the work of Ciro Cicconcelli, Director of the “*Centro Studi per l’edilizia scolastica*” (a national think tank for school buildings), who recognized in 1958 the classroom as the minimum unit of the school organization. Twelve architects were invited to imagine and represent their idea of a classroom for the future to be shown in a public exhibition.

The historical case study of the agricultural reclamation and planning of the Agro Pontino in the fascist period illustrates how the new schools had a pivotal role as urban public buildings and new civic centers, with the task of determining the identity of the new settlements as well as an important educational character.

A comparable example, although in a different context, is represented by the schools in Northern Greece in the period between the two World Wars. In this case, school buildings represent the effort to reinterpret, in the light of a contemporary perspective, the Greek rural culture between tradition and modernity, to provide an identity not only to the places but also to the newborn nation.

A further case study belongs to a different context, the city of Buenos Aires in Argentina and investigates the role of schools as a mean of social and cultural integration. This chapter analyzes a massive construction plan implemented between the nineteenth and the twentieth century to build up the identity of the growing capital city.

Another group of contributions introduces the topic of higher education and of campuses: this is a specific topic involving advanced teaching and learning models and, therefore, a different set of principles concerning spatial organization.

A special study, reporting the results of a historical research, analyzes the many influences that led Thomas Jefferson, the third President of the United States, to conceive and implement the innovative project for American Universities.

The two following contributions collect some of the proposals submitted for a competition launched by Milan Municipality and Politecnico di Milano and inviting the academic staff to design a masterplan for the new campus in Milano Bovisa, in compliance to the new urban planning regulations. The projects presented interpret the topic integrating the new university settlement and its urban surroundings with the research, didactic and residential (student and conventional housing) facilities together with public services in order to regenerate the suburban neighborhood.

The contribution by Castaldo et al. illustrates the winning entry design for “*the Collegio di Milano*” extension, offering a rethinking of the student housing

typology with a special focus on the issue of design quality and its development up to the detailing phase.

An urgent topic in Italy is represented by the challenge of reconstructing the school buildings and the towns after disastrous natural events. The case of the 2016 earthquake in Central Italy is presented here, with the analysis of the role of the educational facilities in the regeneration of the areas hit by disasters and in the re-creation of their identity. The methodologies of intervention are discussed whether to adopt a philological approach, a modern language or a typological reinterpretation of the destroyed buildings.

The last contribution is a collection of new school design proposals submitted for the national competition (“*Scuole innovative*”) recently launched in 2015 together with a massive investment program for the renovation and upgrading of the existing stock. In spite of the different levels (nursery, primary and secondary schools) the projects offer an overview of the current approaches investigating the spatial and layout changes, generated by the current evolution of the educational models and the relationship between the school complex and the neighborhood, as a collective space able to interpret the identity of the urban places.