Polytechnic University of Marche
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The School in the Contemporary City

Conceptual ideas in Italian and English practice in education

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Abstract

The thesis explores the role of school architecture and his surrounding built environment as educational mediators through the innovation of educational spaces and the creation of cultural interactions between school, neighborhood and other educational organizations.
The aim of the thesis is first to understand theoretical ideas linking pedagogy and learning with architectural, landscape and urban design, including reference to celebrated Italian examples from the 20th century. It develops a critical reading of scholastic architecture in different European contexts that use the physical space and their surrounding environment as a resource for learning.
The research also purposes to use case studies from the UK's vast investment in Building Schools for the Future to provide some guidance for the design and management of secondary schools in Italy for the 21st century.

Key words:
School architecture – contemporary city – secondary schools - 21st century - pedagogy – learning space - community

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Introduction

The architecture for primary and secondary education is a theme that is more relevant than ever, the subject of numerous scientific and popular publications, both in the field of construction and in that of pedagogy.
From the end of the twentieth century the themes of personalized learning and the renewal of teaching interface with the world of architecture in relation to the design of schools and spaces for training.
In Northern European countries and in the Anglo-Saxon world, architecture has been considered the third educator for decades. Broadening the geographical horizons to North America, to some experiences in South America (Brazil) and to Australia, it is evident that public policy and private bodies, together with the figures involved in the design of schools, work constantly in searching of valid models for an innovative and inclusive teaching but also for an increasingly sustainable architecture, open to the city and with an appealing aesthetic.
In Italy public policy has dealt with the theme of school architecture over time in a partial and non-continuous way, referring only to some aspects concerning the design of school spaces, including the search for a compositional language in the academic field that derives from traditionally structured schools of thought, the design of learning environments in relation to pedagogical methods, the distribution possibilities of school furniture and proposals for future classes, the improvement of environments, the upgrading of school facilities, the safety and efficiency of schools.
On the subject of the relationship between the urban context and the architecture of the school, the Italian panorama is lacking both in the methodological design approach and in theory. From the comparison with other geographical realities it emerged how numerous are the design experiences of foreign school architecture that prove to be at the forefront in this field.
The Italian framework, on the other hand, shows significant problems that characterize a large part of school construction. Hence the need to formulate a type of conscious design that incorporates the school architecture within a broader area management program.
The terms “school”, “contemporary” and “city” are attributed to the following meanings.
The school is a social institution, managed by the State or by private individuals, responsible for education and located in a physical structure in which a group of adults (teachers, managers, educators) provide cultural inputs that can be useful students to enrich, and then independently expand, their cultural background in order to acquire tools to read the reality of the world around them. A social connotation is given by Beate Weyland, who defines the school as a place where a community transmits and develops its cultural heritage [Weyland B., 2017].
The term "contemporary" refers to events or things that belong or happen in the present; in this area of research it refers to the city and architecture of the 21st century.
The contemporary city is the environment characterized by spaces and architectures with strong social purposes in which lives the modern man. The contemporary city should be

suitable for all people and definable as free territory, connected to multiple networks, with an organized information system, which starting from its identity and its landscape allows a multiplicity of uses that makes it welcoming.
The city is also a deposit of knowledge that can teach those who are able to see and seize its opportunities to live better.
Point of views of Rossi, Boeri and De Carlo architects are also shared.
The city is the physical result of a collective construction over time by the community, in order to create a suitable environment to live. [Rossi A., 2011].
According to Giancarlo De Carlo the city is a continuous source of architecture teaching. [De Carlo G., 1992].
Living in a city and studying its architectural, technological and engineering aspects is for De Carlo a source of learning, hence the idea of the city as a "school". [Boeri S., 2016].
The research aims to examine the role of schools in the urban context of the contemporary city understood as places of education of the new generations but also as a driving force for social and urban regeneration.
The objective of this research is to investigate on the contemporary relationship between the school building and the city of the 21st century, focusing attention on the spatial design of secondary, at the beginning of the 21st century, in their immediate landscape or urban context.
Starting from the critical issues that characterize the secondary schools condition in Italy, we want to expand the field of investigation to the international sphere, in order to analyze successful practices in the European context. The criteria that determines the choice of the examples cited is given by the identification of those elements or design choices that provide architectural, pedagogical and social quality to school buildings as learning spaces and as artifacts relating to the surrounding space and the city.
In some cases the analysed books, papers and policies spread beyond secondary schools to cover primary schools and some of the material comes from the 20th century anticipating the 21st century. Some examples discussed are located in towns rather than cities, since the Italian territory is mainly characterized by medium and small towns and some cities. For this reason it was considered appropriate to contemplate schools in urban contexts at different scales.
Going over some representative cases of school architecture of the twentieth and twenty-first century and analyzing the relationship they establish with the city and the landscape, the research aims to understand the topic from various perspectives including: the place of the school within the city, both its physical location and social role; architectural and landscape design of the school buildings; pedagogical theories and practice related to school design. As background, the dissertation also sets the scene on the evolution of the school systems in Italy and in the UK, and on design guidance.
The study of some emblematic cases of second-level schools carried out in London and in the Anglo-Saxon context after 2000, can provide food for thought for our country on what are the challenges that educational environments should face today in the context of our cities, the meaning of these spaces, their identity, the values and specificities, their

potential and their contribution in the pedagogical, architectural and social field within the contemporary city.

0.1. Origin of the research and premise of this work

The research behind this PhD thesis had a formal beginning within the Department of Civil and Building Engineering and Architecture (DICEA) at Polytechnic University of Marche, where one of the main project themes proposed by the DICEA design professors concerns educational spaces in contemporary local contexts.
Conferences and exhibitions held on the school architecture, in addition to the debate with internal and external professors of the department, raised my interest about this topic and the idea of writing a thesis on the school in the contemporary urban context.
My knowledge on this subject does not derive only from the study carried out in the years of the doctorate, but has gradually settled in the previous years. The training as an architect at Polytechnic of Milan, the specialization in art and design teaching, and the practice in secondary schools in some areas of northern and southern Italy, have brought me closer to this theme both in school architecture and in school education in a real way.
As a teacher of art and design education, I experimented with a particular approach to learning space, in which the division between formal and informal learning space does not find a real foundation.
According to some recent study on teaching and learning spaces, the art and design education is already the paradigm for new types of learning, because of its emphasis on open-ended multi-disciplinary and problem-based learning; on open plan and studio-based learning, built around collaborative critique and self-reflective iteration. [Boys J., 2011].
As I experienced particularly during two teaching years in a secondary school in Puglia, where the pedagogical model named "Senza Zaino" (without backpack) was introduced, the learning process can take place in formal and informal spaces and vary its modalities even in a limited time, such as a school day or a lesson hour.
It requires the possibility of adapting learning spaces to varying educational activities, even in narrow environments, such as the classroom, and that the furnishings can be adapted to the various didactic activities.
In this circumstance, as well as on other situations of teaching in public and private schools, I could ascertain the inadequacy of Italian school architecture compared to the demands of educational practices and education needs of students and local communities.
The intention to analyse the school construction condition in Italy and to explore good practices conducted in recent years in Europe, led me to undertake this research and to spend a period of mobility at UCL Bartlett Real Estate Institute in London.
From the study of education practices in different physical contexts and from the practical experience in school, an increasingly complex framework on the relationship between learning and space has emerged, since always different parameters and situations come into play.
Today learning environments have very fluid boundaries: interior spaces can offer greater flexibility in terms of architecture and uses, new spaces can be added to existing spaces, the school's external spaces can be used for this purpose and the physical limits of the school can become more permeable to open the school to practices of community participation.

We want to explore the learning spaces actually designed in some contemporary European contexts, moving from the critical points of the scholastic architecture and the learning spaces of Italian secondary schools, and looking at good practices identified in some secondary schools in London.

0.2. Conceptual reference and framework

Since the end of the last century, the themes of personalized learning and the renewal of teaching interfaces with the world of architecture in relation to the design of schools and spaces for training.
The Architecture should be considered the Third Educator (reference to L. Malaguzzi – Reggio Children). Collaborative pedagogies, oriented towards increasingly inclusive forms of learning require a different design approach in terms of school architecture.
In contemporary city, the expansion of the learning environment concept does not only correspond to the school building, but also expands to an urban and territorial scale.
The school plays an important role in the construction of the urban landscape. It becomes an element of organization of life around itself.
Therefore collaborative teaching methodologies and the quality of learning spaces should become one central element of public politics.
The architecture of educational spaces, specifically the scholastic ones, in Italy are lack in terms of adaptation to changing needs.
The renewal of learning and training spaces deserves becoming a central theme in Italian public policy, as it has been for years in other European countries.
It is necessary to rethink at the design of scholastic spaces in relation to changes in learning and teaching methods and tools and at the same time considering the school as one of the many educational agencies within the district and the city of the 21st century. The school is part of a complex context with which it must measure itself and interact, to be considered still an effective learning environment.
On the Italian scene there is a greater lack of secondary school projects and buildings, while in recent years more kindergartens and primary schools have been built, especially in northern Italy.
As a possible reference model, it has been considered *Building School for the Future* (BSF) Programme, implemented in the UK, between 2003 and 2010, for the objectives and the actual construction of secondary schools.

Research Questions

1. What are the qualities that a 21st century secondary school should have to be considered a good example of school architecture within the contemporary city?
2. What characteristics should school spaces have to be considered as valid learning environments for current generations of students?
3. Are connective spaces, such as passageways/corridors and entrance halls, and outdoor spaces designed and used as learning spaces?
4. What are the physical indications that make the school well integrated in the neighborhood and in the city?
5. How does the school prove to be a neighborhood educational agency, open to wider users and outside school hours (for example with educational / recreational activities) open to citizens?
6. How does a school architecture take into account (consideration) the territorial and environmental needs of the specific place?
7. Can neighborhood institutions and educational agencies contribute and / or interact with the school to create an effective training network?
8. How can a new school contribute to the urban and social regeneration process in the neighborhood?

0.3. Objectives

The aim of the thesis is first to understand theoretical ideas linking pedagogy and learning with architectural, landscape and urban design, including reference to celebrated Italian examples from the 20th century. The research also purposes to use case studies from the UK's vast investment in *Building Schools for the Future* to provide some guidance for the design and management of secondary schools in Italy for the 21st century.
The thesis also deals with the capacity of a new school architecture projects to become a driving force within an urban area, contributing to increase the architectural quality and the built environment and becoming a social reference point for the neighborhood.
The architectural characteristics of school buildings, newly built or renovated and expanded in last years and their physical and social connections with the setting are investigated.

Specifically:

1. The thesis aimed to investigate the connections between school buildings and the physical context in which they arise, particularly the urban context (building, surrounding, city).
2. The thesis further considers how the architecture responds to the changing needs of the 21st century school, identifying values that determine its qualities. From this perspective some case studies were examined trying to delineate the qualities in relation to the architectural value, to the pedagogical value, to the environmental value and to the social value.
3. The thesis sought to analyse how the quality of school spaces add value in regard to the built environment, the education of student and the social life in the neighborhood.
4. Highlight the critical points of secondary schools architecture in Italy and propose models to refer.
5. The case studies evaluated are Secondary Schools built in London (UK) from 2008 onwards;
6. all of them are part of the *Building School for the Future* programme, of which both the spatial and architectural qualities of the buildings were considered, as well as objectives and the development mechanisms of the programme at national and local level, as a possible model for the improvement of secondary schools in Italy.
7. Two of the three case studies examined are selected in less better-off areas of London: Regent High School in Camden district, in the ward of St Pancras and Somers Town, and Bridge Academy in Hackney district. UCL Academy, instead, is located in Camden Swiss Cottage, an area characterized by a very varied socio-economic structure, with rich areas and, in some sections, areas with council houses. It is interesting to examine the qualities and the characteristics that make it possible to define the success of a school in a specific context.

0.4. Structure of the research and methodology adopted

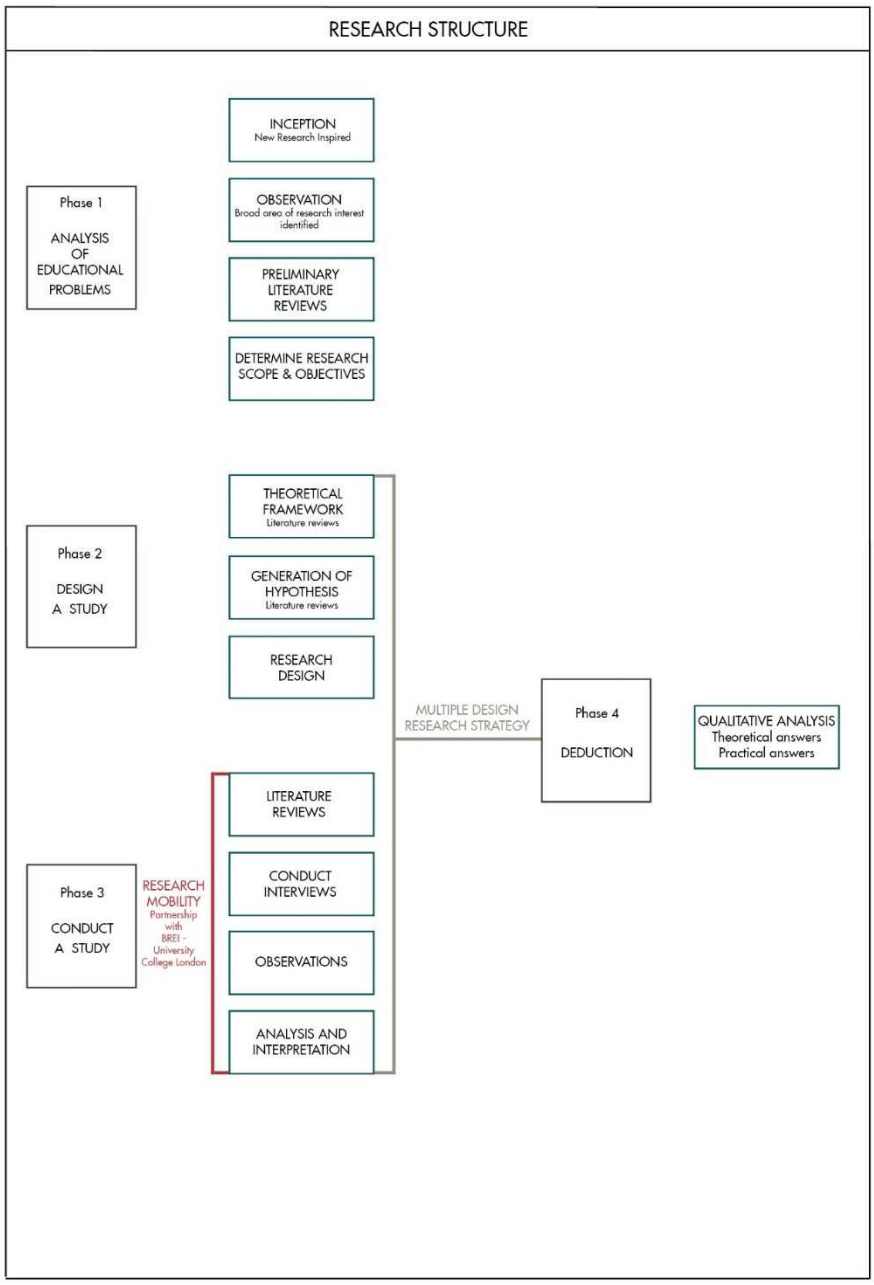


Fig. 1-1 Research structure diagram by author.

Methodology and analysis

The study is conducted following a multiple design research strategy, based on various activities such as data collection methods:

a. An investigation of the components of best practices in the construction of schools that offer educational spaces functional to the needs of students in various physical context, especially in the districts of contemporary city;
b. Use of multiple sources – documents, official reports, annotated bibliography, observations – to describe the state of Italian art in secondary school architecture and the European perspectives;
c. Study of the physical relationship that school buildings establish with other structures in the neighborhood through observations and photographs;
d. Three case studies of publicly funded secondary schools of Local Authorities in London. All these schools, built under *Building School for the Future* programme, were studied using semi-structured interviews with school staff and architects who designed them.
e. The choice to focus on the study of Building School for the Future schools depended on:

    1. the *Building School for the Future* national program takes into consideration not only to the school building but also to the surrounding and landscape reorganization of the areas where the schools are located, with the creation of areas for sports, games and outdoor educational activities
    2. many of them are made available to the local community in extra-school hours for exhibitions, conferences, religious services and sports activities
    3. several inspiring principles and practices outlined in the *Building School for the Future* program can be taken as a reference for Italian secondary schools, such as attention to social aspects such as the interaction between school and local community
    4. some reservations in considering the applicability of UK designs to Italian schools are due to the fact that the population of the two countries is similar but the UK school population has been expanding especially in cities so more recent, new schools have been created that may better illustrate contemporary and future concepts of educational needs and the related design of schools.

f. Interviews with Professors at the Department of Urban Studies in Faculty of the Built Environment at Bartlett School of Architecture;
g. Use of individual school staff and few citizens to provide information on the perception of school quality level considering the architectural characteristics, the learning environments, the improvement of the neighborhood environment, the use of spaces and contribution in social terms, through a (structured/semi-structured) questionnaire which generated qualitative data;

h. Interviews with representatives of other neighborhood educational agencies, such as The St Pancras and Somers Town Living Centre and WMC (Working Men's College) Camden College;
i. A file review of documentation held by the Ofsted (The Office for Standards in Education, Children's Services and Skills), Department for Education and skills, Nationalarchives of UK Government, and provided by European Commission and CABE (Commission for Architecture and the Built Environment);
j. Information search and consultation of Camden and Hackney Council reports on urban, social and environmental issues;
k. Attending at conferences at BREI (The Bartlett Real Estate Institute – UCL) about Learning Environments, at UCL Institute of Education (IOE) about children and school education, at University of London (UOL) about Learning Environment of the Future and Digital Platform for Learning;
l. Selection and study of literature chosen in UCL Bartlett-Faculty of Architecture Library, in IOE Library, RIBA (Royal Institute of British Architect) Library, in Camden Local Studies and Archives Centre, in Swiss Cottage Library, UNIVPM Library, POLIMI Library.

0.5. Criteria for the selection of case studies and outline of analysis

The theme of secondary school architecture has been examined in depth, since in Italy projects for new secondary schools are in clear minority compared to those for primary schools and kindergartens. Even the specific studies on the spaces arrangement in relation to the students educational needs and the community social necessities are currently little developed.
Attention has been focused on the *Building School for the Future* program carried out in England between 2003 and 2010 since it is considered a valid model for the construction and renovation of secondary schools, given the complexity and the methodological deepening and the huge quantity of bodies and professional figures involved.
Research on schools built under BSF program began as soon as the research topic of the doctorate was focused.
Among the parameters that drove the design of BSF schools, those that mostly crossed with the themes of my research are:

- well-designed schools;
- build quality;
- specialist spaces that support curriculum;
- variety of learning spaces (different shape and size classrooms, learning spaces outside the traditional classroom environment, hall, circulation space as learning environment, system of Houses, laboratories);
- spaces for formal and informal learning;
- flexibility of teaching spaces;
- connection between indoor and outdoor space;
- stimulating school grounds;
- facilities open to citizens;
- broaden the idea of teaching and learning to collective practice, with social connotations.

During the first weeks of study spent at UCL Bartlett Real Estate Institute, I attended conferences on learning space, spatial layouts and quality of place and its derived value. I also interviewed experts on educational space and urban environment in different contexts, with a focus on England and London city.
Based on information and suggestions collected, the following schools have been identified: Regent High School in Camden district, UCL Academy in Camden Swiss Cottage, both in north west London, and Bridge Academy in Hackney district, north east London.
The selection of these secondary schools was also based on the period of construction, included between 2007 and 2014, and on limitation of the area, that of northern London, included in the Inner London, the most central area of the city included within the Greater London.

The three case studies identified were analysed according to the following items:

Outline of the Information Sheet
- School name
- Main data
- Short description

Site History;
Urban Analysis of City Scale;
Neighbourhood and Architectural Character Elements;
School Design;
- Interior Space
- External Space

Urban integration;
Sustainable design;
Educational model / Learning environment;
Facilities open to the community;
Partnership with other institutions;
Community learning district;
Public spaces and Social life.

First Chapter

1. Theoretical premises on the relationship between the learning environment and physical space

As part of the education reforms that have affected public policy during the twentieth century, and the most recent of the twenty-first century, the themes of personalized learning and the renewal of the didactic approach are considered two fundamental aspects that affect development of students (contribute to full development).
For this reason, different pedagogical theories tend to promote a type of teaching based on a changed relationship between teacher and learner, a different way of transmitting and acquiring knowledge and skills, a dynamic (and experimental) use of school tools and spaces.
In traditional teaching defined as "cathedrals", generally set on the frontal lesson in which the teacher has a predominant role (*teaching centered*), the learning environment coincides with the physical space of the classroom.
Alternative teaching methods, on the other hand, require that the learning environment is not limited to the confines of the classroom but that it includes additional spaces in the school, such as the external space of relevance, and all those spaces that can constitute an effective learning *setting*.
The adaptation of the scholastic architecture is therefore a fundamental element of this mosaic which has as its subject the learning process and the physical space of the school. The renewal of training spaces should go hand in hand with the desire to experiment with effective teaching methods, adapted to the changes dictated by an increasingly globalized and connected society, through the use of teaching methods alternative to classical teaching, of a transmission type.
For several decades we have been talking about *cooperative learning*, a modality that gives the student an active role in the learning process, based on mutual collaboration by students in the acquisition of skills, within a less rigid learning environment than the 'traditional classroom, in which one can move with greater autonomy, modifying the arrangement of the furnishings according to the needs linked to a specific activity, using tools and devices functional to an active learning process.
The fundamental role of the learning space in educational processes, on the other hand, had already been highlighted by the founding fathers of pedagogical activism, among which we can mention Montessori, Dewey, Don Milani, Freinet and Malaguzzi.
Activism was an important chapter in twentieth-century pedagogy, mostly until the 1950s, deriving from a process of democratization of society, which saw the school set aside the elitist inclination and open up to the masses, offering educational experiences of avant-garde, alternatives to traditional teaching. The school becomes a key institution of society and proposes educational experiments in which "doing" is preferred to the theoretical transmission of content.

This international movement, mainly European and North American, has revolutionized the way of doing education, redefining the roles and possibilities of action of the main actors of school life: teachers and students.

As Cambi argues, *activism has brought about a radical reversal of education, focusing on 1) the child, his needs and abilities; 2) the doing that must precede knowledge, which evolves from the global to the distinct and which therefore matures initially on the "operative" level, as Piaget pointed out; 3) learning that focuses on the environment and not on codified and systematic knowledge.* [Cambi, 2005, p.14]

Activism is at the root of the innovative vision of recent decades in the field of education sciences, where terms such as "Educational Landscape", "Learning Paths" and "Learning Environment" have been introduced, signifying the shift from a paradigm teaching as a learning paradigm.

The teacher no longer has a dominant role as a content transmitter but becomes a facilitator in the process of constructing students' knowledge, that is, he guides them and organizes situations to facilitate their learning.

The teacher has the task of organizing the context of the activities to make the learning process as profitable as possible. The environment is conceived as an *action space created to support and stimulate the construction of skills, abilities, knowledge and motivations. In this action space, interactions and exchanges between pupils occur - objects of knowledge - teachers.* [Fantinato]

Malaguzzi, creator of the "Reggio Children" model, introduces the idea that the physical environment is not neutral, but that its characteristics, its shape and its qualities give it the role of "Third Educator". Physical space becomes a resource for the development of creativity. Factors such as visibility, flexibility, light and shadow, reflection and multisensory space contribute to improving the ability to learn and promote the intellectual growth of the child. [Thornton, Brunton, 2010, p.5]

The concept of learning space is understood (here) in a very broad sense, which goes beyond the boundaries of a physical, precise and circumscribed “place”, to understand different spaces and places that are not only concrete and tangible but also intangible: the environment of learning is the set of physical and virtual places, physical spaces (classrooms, corridors, library, gym, garden, etc.), organizational, emotional-affective, mental and cultural.

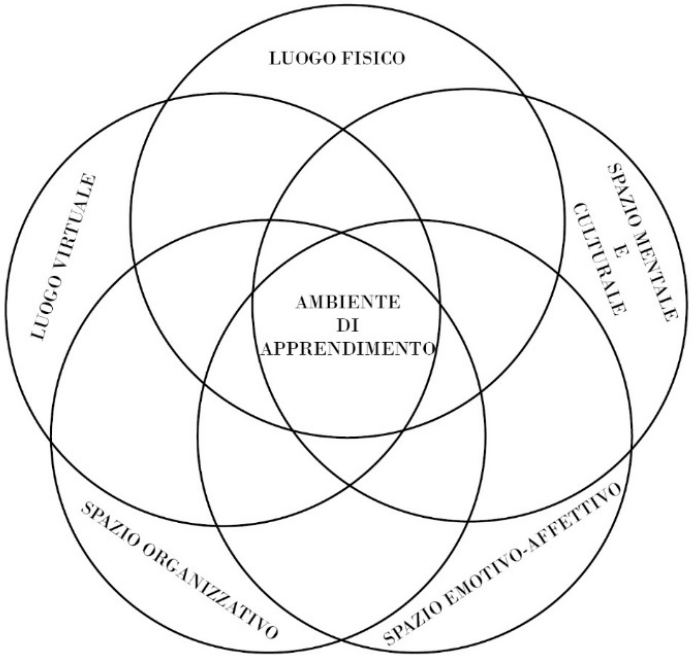


Fig. 1-1 Diagram developed by the author to outline the concept of a learning environment, understood as the combination of the physical and virtual place, the mental and cultural space, the emotional-affective space, the organizational space.

As Tiziana Morgandi [Morgandi, 2017] points out, *space is not a "neutral" container, it has expressive qualities that are "read" and perceived by its inhabitants; it conveys meanings, values and identities that are interpreted by those who live it; for example it promotes or inhibits possibilities of use and behavior. Space is therefore, with time, the set of conditions that make an event possible, it is a dimension of everyday life. According to Morgandi,* ***space*** *takes on the connotation of* ***context*** *when we understand it as the outcome of a web of objects and people, of relationships and narratives. Instead, the place is defined as a portion of space delimited ideally or materially*.
In the transition from the 20th to the 21st century, the new generation of learning spaces contributes to changing the social cognition of the nature and role of education. The spaces of formation of the XXI century testify to an era of rapidly expanding mass systems that also influence the world of education. This phase began at the end of the 20th century, and required a change of scenery (perspective): a learning environment that is more student-centered, which reflects the conception of students as clients, while at the same time trying to integrate physical learning spaces and virtual. [Marmot, 2006].

Contemporary learning environments can be divided into three types, identified primarily by Wilson [Wilson, 1996]:

- classroom learning environments: these are physical environments such as classrooms or laboratories, mainly intended for the class group;
- virtual learning environments, in English Virtual Learning Environment (VLE), practiced by web users who constitute virtual communities. These environments are very large, since they can involve a large number of users who can establish virtual communication and exchange material;
- immersive environments: they are also virtual environments that reproduce the image of real environments, created through specific software, in which the user can interact through an alter ego that allows him to make experiences. They can be used both individually and with several people and are generally connected to the network.

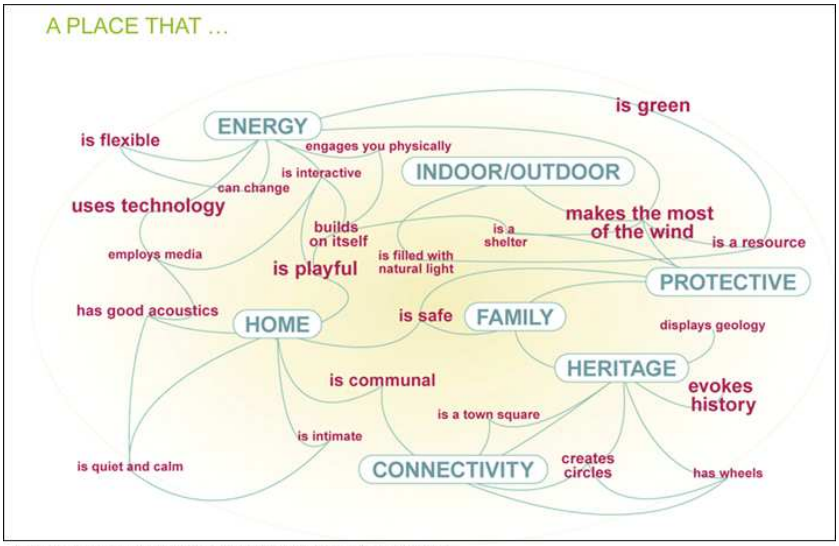
In Italy, in recent decades, the need to innovate school environments in the various education cycles has been highlighted, given the growing diffusion of **digital teaching for skills** and **collaborative or alternative teaching methods** with respect to frontal lessons.
Digital technologies are a valid tool to solve some problems related to traditional teaching and to use functional methods for metacognitive processes. The new generations, defined by Marc Prensky [Prensky, 2010] as "digital natives", implement different learning procedures compared to "digital migrants", who have acquired computer skills over the course of their lives and used the computer with the keyboard and mouse, according to a text mode. Digital natives prefer visual communication to written communication, they can perform multiple tasks simultaneously, they are multitasking, they have a type of reticular learning, which develops simultaneously in different directions. The latter more easily carry out group or network activities than digital migrants, who have a sequential learning style and a more sectorial knowledge.
To solve one of the problems underlying the incommunicability between first and second cycle students and the teaching class in Italy, it would be desirable for the latter, with an average age among the highest in the world, to show less resistance towards digital technologies and a greater opening by the school towards the cognitive style of digital natives.
Many teachers, in fact, are reticent in recognizing the validity of a teaching in which communication takes place through interactive images and animations, as their training took place with sequential procedures, incorporating information from texts and manuals in paper format and from oral lessons.
Teachers of an "effective contemporary school" should be able to practice interactive communication to keep pupils' attention high, involve pupils in group and research activities in a cooperative and collaborative learning system.
A recent Italian law, the law n.107 / 2015, concerning the Reform of the national education and training system (Reform more commonly known with the definition of "Good School"), proposes to adopt digital technology as a didactic tool for the acquisition of skills, and to this end promotes a National Plan for the Digital School (PNSD), a programmatic document that outlines an innovation strategy of the Italian school with the aim of placing it in the digital age.

David Perkins identifies and defines the tools and devices, both classic and technological, that should be included in a contemporary learning environment [Perkins, 1992]:

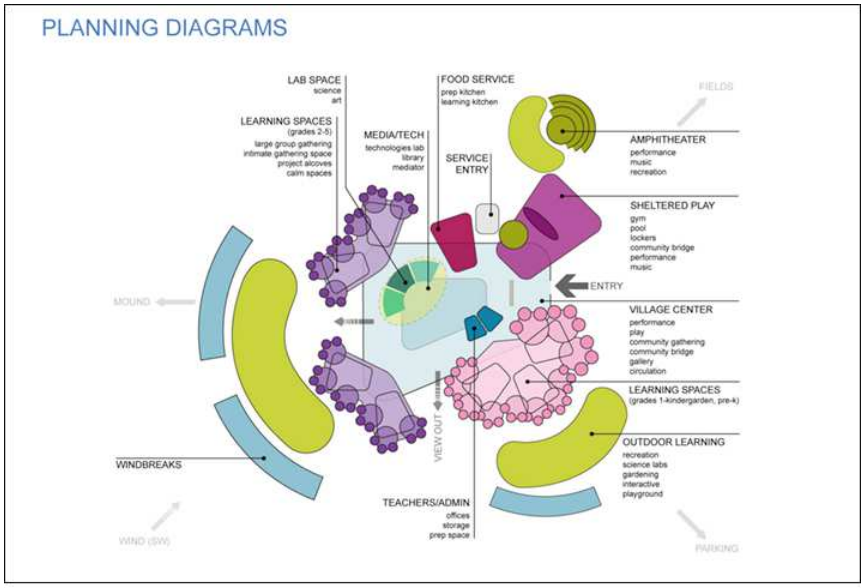
- information banks, ie the resources used by students to retrieve information, from the more traditional ones, such as books, printed, audiovisual, to digital and the web, which are found in a class 2.0;
- surfaces for symbols, or the supports on which the symbols of written or spoken language or mathematical symbols can be fixed. They range from classic surfaces, such as notebooks and sheets, to word processing or presentation software, of a class 2.0, managed by computer, tablet or smartphone;
- *Phenomenaria*, termine impiegato da Perkins per designare delle aree in cui è possibile osservare e manipolare dei fenomeni. Nelle classi tradizionali possono essere piccole serre, acquari o microambienti in cui si svolgono i comportamenti di esseri viventi. Nelle classi 2.0 i *Phenomenaria* sono delle riproduzioni di ambienti tridimensionali, giochi immersivi o simulazioni virtuali;
- construction kits, which can be used by pupils to manipulate and assemble components. In traditional teaching, for example, they are made up of Learning Logs, where students write down the activities they carry out under the guidance of teachers. In the 2.0 classes the building kits can be software for the creation of Learning Objects or other digital content;
- task managers, figures usually identifiable in teachers, or in classes where constructivist pedagogy is applied also in the pupils themselves. To record and monitor activities, managers can use evaluation grids or in classes 2.0 specific software for evaluation.

Digital innovation is attributed to the role of connecting the school with the more open and active part of some working environments, such as universities, associations and businesses.
While underlining the essential educational role that derives from the interaction between teacher and learner, the National Plan for the Digital School associates digitization with an idea of **innovative, open and inclusive** school in a changing society.
The growing diffusion of **information technologies** in schools and the attempts to introduce a **collaborative pedagogy** in the structure of public education, make it necessary to rethink and adapt learning spaces to the different scales of architecture, both in the interiors and in the volumes, and in the relationship with the surrounding context that with the city.
To make a collaborative teaching supported by IT technologies concrete, it is necessary that the learning environment has adequate spaces and is designed with appropriate criteria: it must be set up with tools and devices functional to the activities that the teacher will have to plan in detail.
The growing use of digital tools, primarily mobile technologies, has led to rethinking the physical space of the school. The frequent use of technologies by students and teachers in the didactic activities of the different disciplines has led to a more flexible configuration of

the school space and more generally of the learning environment, making it more fluid, flexible to changes in the disposition of the subjects involved, tools and furnishings.
The flexible use of space, determined by the use of mobile devices such as computers or tablets on the network, interactive screens and projection tools, allow greater freedom in the use of physical space by students, as they are not obliged to sit on the desks or even moving the benches, suitably equipped with wheels.
The use of modular furnishings, which can be assembled according to different configurations and according to different learning settings, *favor horizontal and reticular processes functional to group discussions and individual works* [Morgandi, 2017].
The association between pedagogy and digital technologies has led to a widening of the boundaries of the learning environment, no longer coinciding with the physical space of the classrooms and the school building but open to other physical places, such as the home, open spaces of the city, squares and monuments, and which also include virtual and emotional places.



Concept Diagram was created by LHSA+DP based on the design charettes



Planning Diagrams of the proposed facility and site amenities

Fig. 1-2 Gross R., Design for Learning: Evolution in Pedagogy and Physical Space", AIA, LEED AP | Associate, LHSA+DP

In outlining the diagrams on the learning environments, the study of LHSA + DP designers takes into account the wishes of the students through a process of participation in the project which aims to transform the public school learning spaces as a whole, with a view to passing the frontal lesson and taking into account not only the academic objectives but also the development of students' creativity and curiosity.

1.1. Learning and teaching environments: pedagogy and architecture from the origins to the first half of the 19th century

The school is a place where children and young people share most of their time, where common educational goals are set. The classrooms and more generally the didactic spaces influence the experiences and relationships of young people.
The school system of class division is practiced in the Western world since the end of the fifteenth century.
The method of transmitting knowledge on the basis of a structured model is remote, since the first schools arose in the East, in the Egyptian, Hebrew and Phoenician civilizations [Kahn, 2011, p.5].
In ancient Greece education was given in the family environment, among the poor classes with the aim of handing down practical activities, while the young of an aristocratic class were oriented towards civic-political education. although the educational purposes were different between Sparta and Athens, a common element in all of ancient Greece was that school activities were carried out in the public spaces of the city. The Greek city development leads to the transformation of school types.
In Hellenistic cities the gymnasiums, which arose initially due to physical activity, became a study space to educate young people about civic culture and physical training in order to fight in war.
Gradually the gymnasium is included in the agora, becoming an "urban type" in the monumental city center.

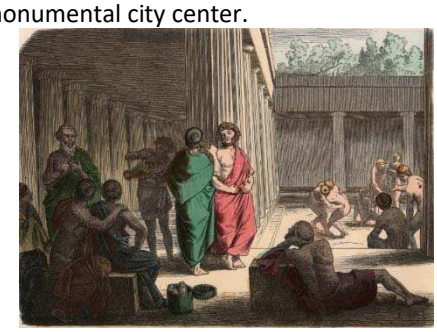


Fig. 1-3 (1) Ancient Greece: In the Gymnasium. Platonists, epicurians, cynics and wrestlers - Coloured engraving by Heinrich Leutemann (1824-1905). Getty / Stefano Bianchetti. Source: https://www.liveabout.com/greek-architecture-basics-4138303 (Visited on 5-10-19).
(2) View of the south gate and colonnaded portico of the Gymnasium and Forum in Cyrene (Libya), originally built by the ancient Greeks. Suorce: https://www.alamy.com/stock-photo-view-of-the-south-gate-and-colonnaded-portico-of-the-gymnasium-and-47408522.html (Visited on 5-10-19).

In ancient Rome there was no building devoted to education and lessons were held in parts of temples or public buildings. The whole city was a place where education could be given and it can be said that the school was widespread in domestic, civil and religious spaces. [Marcarini M., 2016, p.31].
The classroom was set up along the crowded porticoes of the forum, separated with the use of curtains or in some rented room.

In Roman society the education of children was mainly given in the family, from the age of seven the education of the child was entrusted to the "*pater familias*"; later, when schools were instituted, under the guidance of a teacher. The aristocratic families commissioned to educate their children a cultured slave, called "*litterator*" or from the age of seven the aristocratic children attended private schools run by a slave teacher. [Marrou, 2010, pp.307-321, p.311].

Emperor Hadrian devised a space for education: the "*Athenaeum Romanum*" it constitutes a first university in the shape of an amphitheater where teachers could take lessons without any cost for the students.

In Constantinople the emperor Constantine founded a university formed by an articulated body of schools and chairs for middle and high school teaching. [Carbonara,1958, p.835].

A substantial change occurred in the transition from classical to medieval school, as the need arose to educate priests.

In the fifth century A.D. there was the crisis of classical culture and the education of priests, which until then was Hellenistic, underwent a change, passing under the guidance of the church itself.

The bishops and their collaborators taught lessons in cathedrals in order to train young religious.

In Europe during the Middle Ages, until the 11th century, education was promoted by the clergy and was given essentially to the children of nobles and for the training of priests. (Manacorda, 1913).

The environments in which the lessons were held were convents, parish schools and cathedrals.

In the twelfth century the religious orders of the Dominicans and Benedictines gave a boost to higher education, promoting the birth of the first universities. The first university in history was established in Bologna in 1088.

In Middle Ages there was still no idea of a specific space dedicating to education. From the fourteenth century on, some benches were inserted in the porticoes of the convents and churches; the students were usually seated on benches and the teacher had a chair and a lectern at his disposal.

With the rise of free municipalities, municipal schools were born, which joined the religious ones. In some cases lay schools took place in rented rooms of convents.

In about 1500 a new pedagogical model was born which expanded from France to Europe. The "Collège", founded around 1300, in which young students flocked, gradually began to become places where lessons were learned, where the teachers were hierarchically divided into "masters", "Pedagogues" "regents".

The first class division model was implemented in the late 15th century in the Netherlands. In the colleges of the "Brothers of Common Life" the students were grouped on the basis of the progression of learning. In doing so, the students all within the classes understood the contents of the lesson.

The Colleges of the Society of Jesus, founded by Ignatius of Loyola in the first half of the 1500s, played a fundamental role in the history of education.

The Jesuit Order has strongly influenced the education of young people as it has established an educational method, defined in the document of 1599, "*Ratio atque institution studiorum*". [Marcarini M., 2016, p.42].
In the document there are 463 rules that outlined a teaching based on a strict discipline and on the school organization based on the division into classes, on the separation of subjects, on the development of lessons, with the possibility of adaptations to local situations.
The Jesuits also show attention to school spaces, choosing healthy and peaceful places for the construction of their colleges.
In Jesuit colleges the spaces were well organized according to the functions and the classrooms were called "schola".
The school organization promoted by the Jesuits remained in force until 1773, when Pope Clement XI suppressed the order.
From the 17th century, European states took action to take charge of the management of public education: institutes were established in the main town centre and small colleges in small towns and in the countryside.
A decisive turning point in the conception of educational spaces came in Europe with the Enlightenment, which allowed us to associate the pedagogical function to the culture of secularism.
In the 18th century state and no longer municipal public schools were established, which from the Middle Ages on had characterized non-religious education. [Checchi, 2010, p.20].
If we examine the pedagogical aspects that accompany the change in school and education, we can find that the greatest changes have been encouraged by the Enlightenment movement.
The criticisms of society and culture by Enlightenment intellectuals favored the spread of secular culture and the promotion of state schools.
J.J. Rousseau (1712-1778) laid the foundations for modern pedagogy and in his famous publication "Emilio" (1762) he underlined the importance of an autonomous pedagogy, capable of detaching itself from the cultural tradition. He introduced the idea of "natural education", which promoted spontaneity in the child's behaviour, and not based on the strict rules of society. Rousseau promotes the idea that the child should experience the sensitive world and that the environment should support the development of the child's natural aptitudes.
The physical space and environments in which the educational act takes place in Rousseau's idea play a fundamental role. Rousseau was one of the first pedagogists who examined the relationship between space and learning, criticizing the rigidity of school spaces as the limit movement.
He maintained that the physical environment is an essential part of education and introduces the idea of space as a "third educator" (in addition to nature and individual development and the social environment), which will later be taken up by Maria Montessori.
Some Rousseau's ideas were taken up by Pestalozzi, with the difference that the latter claimed that education according to nature should be guided by the mother and that the environment should have characteristics common to family education.

Pestalozzi believed that life itself has an educational function and the student's growth should take place through "hand, mind and heart" thus criticizing the school organization and methods.
Pestalozzi influenced the pedagogical models of Froebel, Maria Montessori and the Agazzi sisters.
Froebel identified in the kindergartens, places of mediation in the transition from life in the child's home to life in school.
Around 1840 the United Kingdom had opened more than a thousand kindergartens, in France one thousand five hundred, in Italy one hundred [Polenghi, 2005].
In the nineteenth century the affirmation of positivistic culture and the central role attributed to the observation of reality, led to consider pedagogy also an "experimental science". Educational processes began to be studied experimentally.
A great contribution to the birth of the "educational sciences" was given by John Dewey (1859-1952)
Dewey and Montessori criticized the passive school model, organized according to corridors, classrooms and lined up desks.
This traditional school model prevailed during the 1800s in almost all European countries, and in many cases it also persisted in the 1900s.
In the nineteenth century governments support the principle of institutionalizing popular education, therefore affirming the need to institute schools and courses for the education of wide population sections, especially in cities.
In the most industrialized countries, such as German, England and United States, schools design and construction become a central topic for public policy and administrations.

Fig. 1-4 (1) School in Paisley (England). First half of the nineteenth century. The hall can be joined to the classrooms by opening sliding walls. Source: Carbonara P. [1958], Gli edifici per l'istruzione e la cultura, p.845.
(2) School in Johnson Street, London (England). Second half of the nineteenth century. The hall is separated from the classrooms. Source: Carbonara P. [1958], Gli edifici per l'istruzione e la cultura, p.845.

An implication of industrialization on educational practice is the creation of the first nursery schools in Scotland, on the initiative of Robert Owen, who in 1799 introduced in New Lanark, the secular childhood schools for the workers sons of the factory he managed. It is called "Institute for the Formation of Character", the first infant school in the world.
He also introduced a first example of a full-time school also open to adults, where his utopian socialist ideas were practiced to reconcile factory work with education.
Owen's ideas of early education were provided to prevent children from working in factories, a widespread practice in England. While Owen moved to United States of America

to found an ideal community, his ideas spread in England by Buchanan in London and by Wilderspin, author of the book “A System for the Education of the Young” in which he outlined a learning process through experience to develop of intellect and good feelings. Wilderspin’s ideas influenced educational practices in nursery schools in Europe and North America and with this goal in 1834 was founded the “Society for nurseries of the Mother Country and Colonies” [Carbonara, 1958, p.845].
The innovations in education and in the infant schools building implemented in Scotland and England inspired both Italy and other European Countries.
Howerer overall the school buildings in XIX century in England still derived from the ecclesiastical typology of “church hall” and the Church still have an important role in education. [Checchi, 2010, p.21].
According to Carbonara, in the English and American schools the architecture has a common element: foster community life and social practices, not just educational ones [Carbonara, 1958, p.846].
Since the early 1800s England is one of the pioneer countries in the history of secular infant education and school architecture not disciplined by ecclesiastical rule.
In the nineteenth century the school space was designed to develop educational pedagogical techniques and disciplinary practices conceived as “technologies of governance”. [Grosvenor, Rasmussen, 2018].
According to Hamilton, the modern classroom was invented, together with a teacher, furniture, texts and teaching aids, as a site of mass production and social efficiency [Hamilton, 1989].

Fig. 1-5 (1) Pupils with counting-frames in classroom, about 1930.Source: Nationaal Archief / Spaarnestad Photo/ Collectie Spaarnestad.
(2) Employees hand rolling cigars in a cigar factory: Ybor City, Florida. Source: State Library and Archives of Florida / Department of Commerce collection / www.floridamemory.com/items/show/56157 (Visited on 14-9-2019).

At the same time, Maria Montessori's ideas influenced school construction: in 1907 the first "Children's Home" established by Montessori was inaugurated in Rome, in the popular district of San Lorenzo.
All over the world similar structures arose, inspired by the Montessori model.
They represent the first attempts to put the school at the center of social life and offer a more advanced model of the educational institutions promoted by Owen and Wilderspin.

In the period between the two wars, school construction saw some ideas of pedagogy applied to architecture materialize. In many European countries, school architecture models are proposed that focus on the needs of young people and which are taken care of in the formal, pedagogical, hygienic and social aspects.

1.1.1. International public policy on education and school design in the 20th and 21st centuries

In Europe and Western Countries in the twentieth century there was a promotion of high levels education, but despite massive economic and intellectual investments, the problem of literacy remained significant.

Continuity emerges from an analysis of the census statistics relating to Europe in the early twentieth century with the mid-nineteenth century. Although all countries have made progress, their respective has not changed literacy «class». The levels in Central and Northern Europe were above 95%; to the West above 80%; in Austria and Hungary they stood above 70% (with progress here extraordinary); in Italy, Spain and Poland above 50%; in Portugal and in the Catholic-Orthodox countries they settled just around 25%. Thanks to the establishment of educational systems and the beginning of development economic "modern", previously disadvantaged regions managed to reach rates of high literacy. However, without these differences had been canceled in the standard of life, wealth, productivity and national well-being, nor internal inequalities by region, age, gender, class or ethnicity.

Around 1950 the countries of southern and eastern Europe boasted literacy levels of 80%, except for Portugal, the Mediterranean islands and Albania, where the index was located only

around 50%.

Literacy has continued its extraordinary long-term growth, and in the process, national gaps have shrunk in the basic levels. Nowhere, however, the constant rise of the literacy rates have resulted in radical transformations for nations, companies or individuals. Poors, poor nations have mostly remained so, and other differences have remained - geographic, social, related to age and sex. [Dal Passo F., 2003, p.16].

The twentieth century was a century of rupture, attributable mainly to historical events that changed the politics, life and culture of Western countries.

Cambi identifies some "structure-events" that will lead to implications also in the pedagogical field:

- the end of tradition and the increasing speed of modernization;
- the technology advancement;
- the fervid insertion of the masses, young people and women in history;
- the tragedy and the horror of holocaust;
- the globalization arrival.

The globalization during the twentieth century took its starting point from colonialism and then, over the last few decades, it transmuted into economic, communication and information globalization. [Cambi, 2005, pp.6-7].

These events have affected social practices and the pedagogy of the twentieth century has been renewed and has itself established itself as a widespread social practice.

The new mass society has led to the renewal and spread of pedagogy, both in its democratic and totalitarian sense. The whole society has been pervaded by educational processes, with new methods, deriving from scientific and technological innovations.
Twentieth-century pedagogy has become an empirical science, distancing itself from philosophy and assuming the role of "organizer of practices".
Pedagogy and education have been used as a factor in the development of the industrial society, promoting education in order to spread shared values, reduce social conflicts and promote ideological conformity.
Twentieth-century education was shaped on the basis of three paradigms: literacy, mass culture and lifelong education [Cambi, 2005, p.10].The school assumes the fundamental role in society of educating the masses.
It becomes the primary institution responsible for shaping democratic society.
In the wake of this ideal between the last decade of the nineteenth century and about the middle of the twentieth century, avant-garde educational experiences spread, based on the centrality of the child and on the idea that "doing" takes priority over “knowing”.
In the period between the two wars, school construction saw some ideas of pedagogy applied to architecture materialize. In many European countries, school architecture models are proposed that focus on the needs of young people and which are taken care of in the formal, pedagogical, hygienic and social aspects.
According to Grosvenor, already from the First Post-War period, *Children were seen to symbolise a new and better future and Modernist architects saw their role as helping to build a new society, a society where the design of schools was seen as an agent of social change.* [Grosvenor, Van Gorp, 2018].
Following the two world wars, great attention was given to the needs of children, with research in the pedagogical and psychological fields and on how to optimize the spaces in which they live.

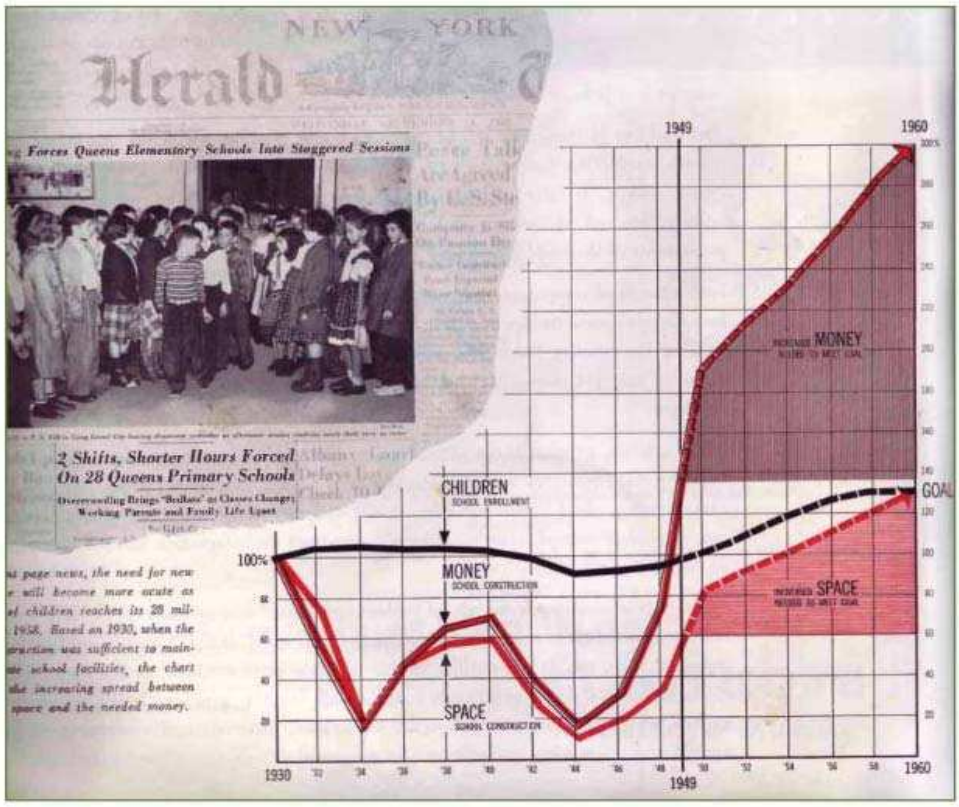


Fig. 1-6 In October of 1949, Architectural Forum magazine published a special issue dedicated to school design. The graph shows predicted needs in school construction to meet increasing enrollment demands. Source: Baker L. [2012], A History of School Design and its Indoor Environmental Standards, 1900 to Today, National Clearinghouse for Educational Facilities, a program of the National Institute of Building Sciences, Washington, DC 20005-4950, USA,p.10.

In Europe, since the second post-war period, public policy has raised the question of the renewal of schools and learning spaces.

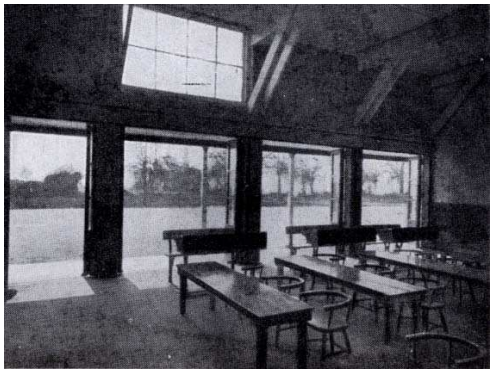
At that time the political priority in many countries was the reconstruction of entire neighborhoods, providing public houses, schools and many other facilities necessary for the city and for new areas built from the beginning.

The research for innovative construction shapes and design for new school architectures, with the aim of creating monuments of modernity, settles with a social and pedagogical perspective, attentive to the requirements of urban life and the needs of the child.

In many Countries the construction of public buildings, including schools, meant contributing to a process of democratization and civilization and opportunity for renewal of the public heritage in the architectural and building field [Kozlovsky, 2013, p.93].

In post-war English architectural culture, the school symbolized the new welfare state and the program to rebuild the education system allow to formalize new models of modern architecture.

The Modern Movement contributed making school architecture a internationally major theme, on which many renowned architects measured themselves.
il movimento moderno contribuì a fare dell'architettura scolastica un tema di rilievo, su cui molti architetti di fama internazionale di misero alla prova.
As Kozlovsky states, *the school provided a fertile ground for modern architecture because new forms of child-centered pedagogy and health standards for air and light allowed architects to implement many of the spatial and formal attributes associated with modernism, but also because the modernism's claim to represent progress fitted well with the perception of the school as a place where the citizen of the future was to be habituated into modernity.* [Kozlovsky, 2013, p.94].
The architect Bruno Taut built in Berlin in 1927 a school inspired by the pedagogical ideas of an active school, according to the model outlined by Dewey, and an open-air school. The school is located in the new district of Neukolln, and consists of 90 classrooms grouped according to the teachings. Pupils could move from one classroom to another and learning spaces varied according to the subject. The open spaces in front of the classrooms could be used as teaching spaces.



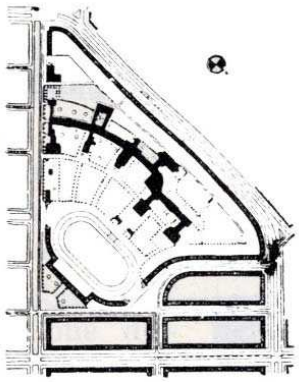
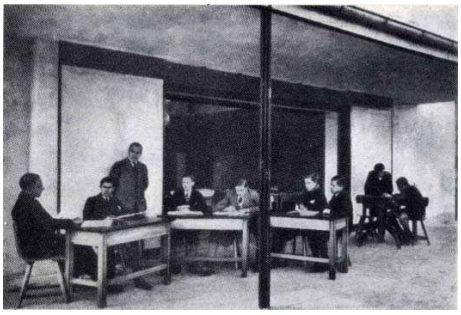


Fig. 1-7 (1) View of an open-air school classroom in Grafschaf Herts (1924) in Germany. Source: Carbonara P. [1958], Gli edifici per l'istruzione e la cultura, in Architettura Pratica, vol.7, Unione Tipografico-Editrice Torinese, p.861.
(2) Plan of the school in Berlin-Neukolln designed by architect Bruno Taut in 1927. Source: Carbonara P., ibid., p.863



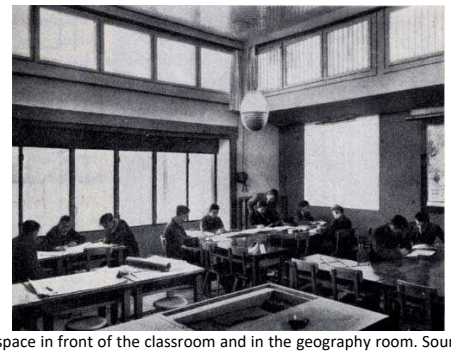


Fig. 1-8 Lessons in the school in Berlin-Neukolln: outdoor lesson in the space in front of the classroom and in the geography room. Source: Carbonara P., ibid., p.863

In the second half of the 1900s, the European architect who devoted himself extensively to the design of schools with multipurpose spaces, well connected to each other and to the outside, is Herman Hertzberger. He continued the research of Aldo Van Eyck, developing reflections on the "pedagogy of space" outlined by Maria Montessori.

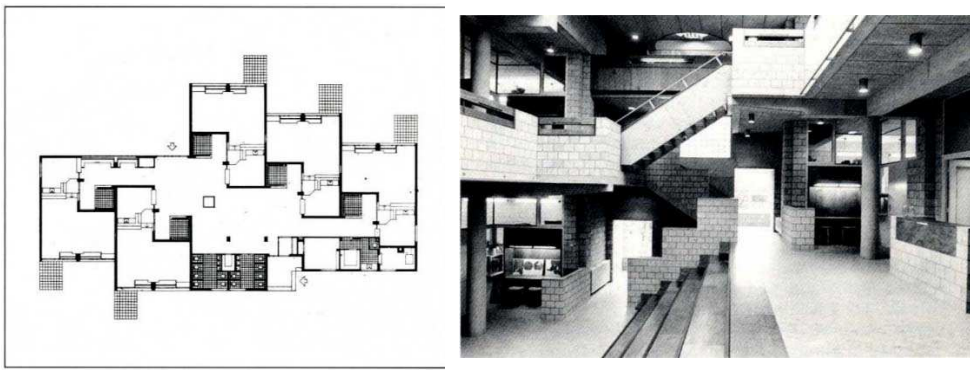


Fig. 1-9 (1) Montessori School in Delft (1960) designed by architect Hertzberger. Plan of the first built nucleus.
(2) Montessori e Willelmspark Schools in Amserdam (1960) designed by architect Hertzberger. The internal hall. Source: Continenza R.[1988], Architetture di Herman Hertzberger. Dalla forma alla partecipazione, Gangemi Editore, Roma, p.41.

Fig. 1-10 Montessori School in Delft (1960) designed by architect Hertzberger. View of the communal hall. Source: Hertzberger H. [1991], Lessons for Students in Architecture, Ed. 010 Publishers, Rotterdam, p.62.

The school in Delft was founded in the early 1960s with the idea of increasing the building by adding autonomous functional units over time.
In the schools designed by Hertzberger, the common spaces and classrooms allow students to make various experiences given by the differentiation of the designed spaces: the niche with lowered ceiling, the corner illuminated from above, the largest space for collective activities, the places with a view of the landscape.
The architect Scharoun' public school projects for Germany between the 1950s and the 1970s are exemplary and avant-garde, designed with a view to reflections on "man and space". According to Scharoun, the school institution had the function of intermediation between individual and society, between family and state. The architecture of the school

was organized as a model of the city and the position and orientation of the classes had to favor the relationship with the outside world, to encourage the development of the personality within the community. In the unrealized project for the Darmstadt school, the area corresponding to the "open neighborhood" is the meeting point of the school but also the boundary between school and neighborhood [Kirschenmann, Syring, 2007, p.57].

Fig. 1-11 Aerial photograph of the Geschwister School at Lunen under construction in 1960. Designed by Hans Scharoun (1955-1962). Source: Kirschenmann J.C., Syring E. [2004], Scharoun, Taschen.

From the most recent literature it emerges that today there is little literature on learning spaces, instead there is a great deal about pedagogy and architecture, but these two research areas have not yet completely crossed.
International guidelines today provide an idea of school and education that includes the following concepts:

- Constructivist psychology: emphasizes learning as an active and constructive process rather than as an acquisition or reception of knowledge. A role of education is derived as a process that supports the construction of knowledge rather than its transmission from the teacher to the student.
- Pedagogical-didactic setting: it is profitable to create “complex” learning environments that take into account the theory of the field, active teaching, the mixture of different attitudes and cultures and the way in which specific concepts are constructed.

Effective learning also for value aspects, as well as for content aspects, must be based on practical activities that are never separated from the emotional involvement of those who must learn. The sharing of knowledge and the collective reflection on what has been done and what has been learned is fundamental. A radical change is therefore necessary in the role of the teacher, who from a privileged interlocutor and an undisputed transmitter of knowledge must rather become a facilitator of learning and promoter of interpretative paths.
Accredited methodological aspects in the field of pedagogical sciences are:

- -Interactive teaching based on doing
- Collaborative learning
- Metacognitive collective reflection
- Change in the role of the teacher

The perception and concept of Learning Environment is today articulated and complex as it includes a variety of spaces frequented by different stakeholders, coming from different disciplinary and social fields.
The learning environments are regularly experienced by teachers, students, educators, psychologists, librarians, that is figures engaged in the sphere of education, but at the same time they require the involvement of architects, summer planners and learning technologists, engaged in designing and fitting out the spaces appropriately physicists.
The learning environment since the 20th century is conceived as a "pedagogical dimension" [Mantovani, 2003] that involves the sensory, virtual, social and cognitive space [Poole, Wheal, 2011].
In the 21st century these spaces have become increasingly complex for greater use of technology in teaching.
According to Dussel, *the reconfiguration of classroom space and time with high availability of digital devices significantly challenges the possibility of intergenerational conversations, being so easy to switch off from adults' talk and demands and engage instead in conversations with peers* [Dussel, 2017, p.236].

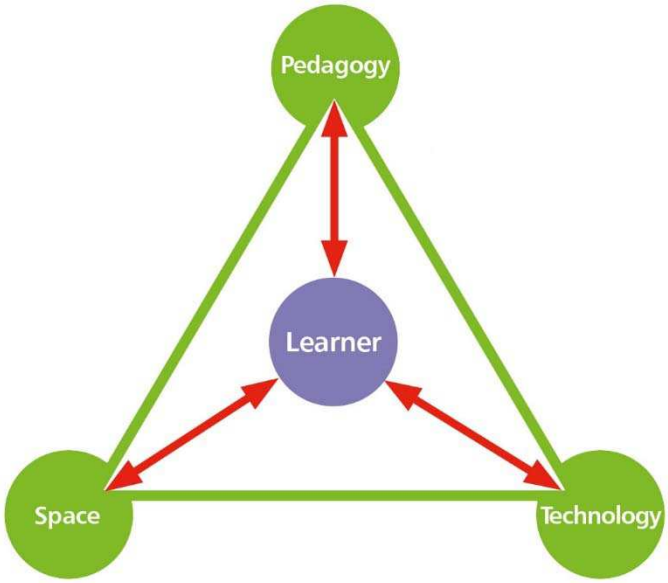


Fig. 1-12 The “Elusive Triangle” represents the learning environment in which the four elements, pedagogy, space, technology and learner are active participants. Source: JISC [2011], Learning, spaces and technology: exploring the concept, p.63.

The demand of adapting school spaces to the use of digital technologies and to calibrate the learning process on the basis of current educational and social needs, means that schools today must be conceived as a "context" formed by a variety of connected and integrated settings.
The learning environments of different school levels require spaces that are differentiated by size and function, modular and flexible, to perform the functions of contemporary teaching, in which the boundary between formal and informal learning becomes imperceptible, where wide space is given to creativity and collaboration experiences within the school and with the local community.
New learning spaces can promote pedagogical practices to foster innovative approaches, enriching the learning experience.
The learning environments of recent schools, being less rigid and structured, allow a more spontaneous use of spaces by students and, consequently, also the teaching method and the relationship with the teachers may endure changes.
The term "learning environment" is today widely used in the field of education sciences, in particular since the focus has shifted from the "paradigm of teaching" to the “paradigm of learning "
The student is placed at the center of the learning perspective and *the organization of spaces and times becomes an element of pedagogical quality of the educational environment and therefore must be the object of explicit planning and verification (l’organizzazione degli spazi e dei tempi diventa elemento di qualità pedagogica*

dell'ambiente educativo e pertanto deve essere oggetto di esplicita progettazione e verifica) [Indicazioni Nazionali per il curricolo, 2007, p.18].
The following diagrams show:

- changes in learning in the different periods: Pre-industrial, Industrial and Post-industrial knowledge era;
- the recent regulations relating to school construction in European countries and some non-European countries.

LEARNING	Pre-industrial	Industrial	Post-industrial knowledge era
Style	Informal, personal	Formal, impersonal	Informal, formal AND personal
Place in community	Family, local community	School separate from community	Re-integration with community, integral part of community.
Location	Around the village pump	Confined, separate	Local- beyond local- global- virtual
Time	Anytime	Set times, set ages	Anytime throughout life
Form	Nature, environment, "apprenticeship", with people cross section of ages, in community	Mass production, uniform experience based on age bands, detached from community	Personalised in nature, learning in "apprenticeship", in community, single age and cross age
Source and resources	Experience, elders, life, people, family, community	Books, experts, teacher "who knows", 1:many	Anytime, anywhere, anyhow with anyone – both experts and fellow travellers
Context	Learning *through* life	Learning *about* life	Learning through AND about life through real life and virtual life

Fig. 1-13 Changing contexts for education and learning. Source: OECD Centre for Effective Learning Environments[2011], Designing for Education: Compendium of Exemplary Educational Facilities 2011, OECD Publishing, p.25.

Tavola sinottica delle normative nazionali relative all'edilizia scolastica

	Italia	Inghilterra	Scozia	Danimarca	Francia	Olanda	Germania	Portogallo	North Carolina (Stati Uniti)	Victoria (australia)	Messico
Anno di emanazione *	1975	Education Regulations 2012; Corpus Linee guida 2014	Building Act 2004; Linee guida 2007; Technical Handbook 2013	Building Regulations 2010; Linee guida 2007	Codice edilizia abitativa 2014; Linee guida 1989	Building Decree 2012	2010	2009	Selected Laws 2014; Linee guida 2013	Building Code 2010; Linee guida 2010	Educational Building Laws 2008; Linee guida 2014
Linee guida ** concepite come corpo unico	SÌ	NO (varie normative)	SÌ	SÌ	NO (varie normative)	SÌ	SÌ	SÌ	SÌ	SÌ	SÌ
Premesse pedagogiche	SÌ	NO	NO (documentazione separata)	SÌ	SÌ (parziali)	SÌ (parziali)	NO	SÌ	SÌ	NO (documentazione separata)	NO
Elenco spazi della scuola ***	SÌ	SÌ	SÌ	NO	SÌ	NO	SÌ	SÌ	SÌ	SÌ	SÌ
Superfici minime	SÌ	SÌ	SÌ	SÌ	SÌ	NO	SÌ	SÌ	SÌ	SÌ	SÌ
Livelli di responsabilità ****	Comuni, Province	Autorità locali, Privati, Charity	Autorità locali	Comuni	Comuni, dipartimenti, Regioni *****	Scuole (School Boards), Comuni	Comuni (Bauträger)	Parque Escolar (ente pubblico)	Autorità locali, Contee	Federale e Stato (Victoria)	Federale (INIFED) e Stato
Livello di competenza per la normativa	Nazionale, Regionale	Nazionale	Nazionale	Nazionale	Nazionale	Nazionale	Federale, Länder	Nazionale	Nazionale	Nazionale	Federale

* Emanazione o ultimo aggiornamento.
** Linee guida concepite come corpo unico che, al proprio interno, rimandano a leggi specifiche.
*** Spazi necessari o possibili.
**** In particolare relativamente alla proprietà dell'edificio scolastico e alla sua manutenzione.
***** Comuni per infanzia e primaria, Dipartimenti per i Collèges (scuole secondarie di primo grado), Regioni per i Lycées (scuole secondarie di secondo grado).

Fig. 1-14 Synoptic table of national regulations relating to school buildings. Source: Borri S. [2016], Spazi educativi e architetture scolastiche: linee e indirizzi internazionali, Indire, Firenze, p.47.

1.1.2. Historical evolution of Italian public policies on education and learning spaces in the 19th and 20th centuries

> *Italy is a fascinating mixture of the old and new.*
> *On the one hand are its centuries of tradition, and on the other, parts of Italy which would almost qualify*
> *as underdeveloped areas.*
>
> George A. Male,
> Volume Foreword: Scarangello A.A., *Progress and Trends in Italian Education*, U.S. Department of Health, Education, and Welfare, Office of Education, Bulletin 1964, N.21.

The task of education in Italy, from the Middle Ages until the 1700s was the prerogative of the Church.
In northern Italy during the High Middle Ages the lessons were carried out in the other interior and exterior of the churches or under the arcades.
The first treatise on building, hygiene and school furniture and on pedagogical aspects was written in the 16th century by Giovita Ravizzi, entitled *De modo in scholis servando* [Carbonara, 1958].
In the 18th century there were fundamental changes due to a combination of factors, including the French Revolution and the spread of Enlightenment ideals, which led to undermining the exclusive power of educational function by the Church.
The consolidated organization in the Jesuit education system, despite the weakening of their political power on the Italian territory, continued to be practiced in their colleges attended by young nobles and upper middle classes.
Under Napoleon dominion the Italian organization of education began to acquire the characteristics of modernity and secularism. with the end of the Napoleonic period, the clergy acquired again the control of the educational institutes, and in particular the Jesuits focused on secondary education.
During the nineteenth century a centralized and unified school system began to take shape thanks to the enactment of laws and regulations.
Around the middle of the century the first main regulations was the “Royal Letter of 1847” promoted by King Carlo Alberto, with whom the responsibility for education was attributed to the state, provoking conflicts with the church for the reduction of its power in education.
The “Boncompagni Law”, dated on 4th October 1848, assigned control of public and private education to the State and divided the system in three levels: elementary level, secondary level divided into classical studies and professional studies, which allowed only access to work, and university level.
It gave great importance to the classical studies, with which students could enter the university, a path intended to train the ruling class. The school system assumes a pyramid

structure, with the following competent bodies: Minister, Superior Council of the public education, inspectors, councils and directors of education offices.
The “Casati Law” of 1859 is the fundamental nucleus of the Italian school system over the years of unity and in the following decades.
In 1878 National Regulations containing the instructions are drawn up, which become "Rules for the compilation of projects for the school buildings construction ", issued by the Ministry of Public Instruction in 1888.
The skills acquired in Piedmont in the field of school construction, through these laws are made available to the whole nation and used for the next fifty years or so. [Giaccone, 2016].
In Italy for many decades of the nineteenth century the learning spaces were not set up in specially designed buildings, but the schools were arranged in convents, private palaces, rental houses, warehouses.
Starting from the second half of the nineteenth century buildings were designed and built for the purpose, functional and meeting the requirements of hygiene and healthiness.

Fig. 1-15 (1) “Sinfonia azzurra” by Cesare Cattaneo, march 1928, oil on cardboard (private collection). Source: Croset P.A. [2012], Cesare Cattaneo 1912-1943. Pensiero e segno dell’architettura, cover flap.
(2) Photos of classrooms and lessons carried out with traditional teaching in the 20th century in Italian schools. (Source: Photo DIA-Indire).

Reflections on the quality of school spaces and the influence on pedagogical aspects are not a completely new theme in the Italian panorama. In 1952 the Ministry of Education set up a Study Centre for School Buildings, including architects, doctors, educators and

administrators, that set itself as objective to outline of the building typologies in order to answer to the didactic requirements of the republican and fascist Italy, defining New Techniques that previewed the use of prefabricated and industrialized structures.
In this context, the project of the architect Hans Scharoun for a primary school in Darmstad (1951) in Germany, in which efforts were made to translate educational principles into architectural forms, is a virtuous example, taking into account the practices of modern psychology applied to pedagogy.
Scharoun intended to give the child not a metric space but a psychological space as the shape of the known". The project was based on the idea that the development of the child is based on the relationship it establishes with the environment and that the school being the place where the children spend most of their time and for many years, It plays a fundamental role in the formation of social consciousness, elevating the individual from the sphere of the unconscious to that of knowledge.
In Scharoun's project the function of the school was that of intermediation between man and society and the architectural structure was to reproduce the model of a city, with its complexities and spatial and functional variations.
If we consider the didactic aspects, such as that of the learning spaces, we can note that the speech is still open today and experiments are underway to design flexible and comfortable spaces, suitable for teaching methods that are not only transmissible, but also interactive, based on collaborative learning.
In the twentieth century the debate focused mainly on the role of architecture and pedagogy, the two great disciplines that intersected precisely in the conception and use of the school spaces.
It is interesting to note that in Italy in the Post-War, a group of architects, pedagogists and urban planners, had been called by the architect Ernesto Nathan Rogers to give a contribution on the subject in magazine of "Casabella Continuità" of 1947 dedicated to Educational Architecture (Rogers, 1947).
Compared with the Northern European countries, school building in Italy in the 20th Century was affected by the consequences of war destruction, although from the 1950s, it was attempted to plan systematic interventions throughout the territory.
Already in 1947, architect Ernesto Nathan Rogers had expressed the view that 'educational architecture' (Rogers, 1947) was needed to solve the problems of education, a thesis largely denied in the immediate operational phase.
The rebuilding plan for schools in Italy was divided into two phases: the first, from 1945 to 1947, where pre-existing school buildings were repaired and refurbished; the second, begun around 1948, saw the construction of new schools throughout Italy.
In many cases, the newly built schools did not respond adequately to the teaching requirements of the innovative pedagogical theories of Dewey, Montessori and Pizzigoni. Most of the buildings were built with prefabrication techniques, which gave the schools a monotonous and conventional look.
There was a need to rethink the role of the school in the reconstruction of Italy in terms of teaching, teaching methods and architecture.

The pedagogists were already calling for the new school to be structured according to a type of active teaching, which would radically change the layout of classrooms and furnishings, and to encourage students' freedom in the learning process.
Rogers argued that architecture should retain the character of autonomous discipline, stating that teaching cannot replace the architectural dimension (…). The problems of education cannot be accomplished without an educational architecture" (Rogers, 1947).
Giancarlo De Carlo further widens the field of vision, highlighting how the debate on the school of tomorrow cannot prescind from the relationship with the territory in which it rises. He says "the urban problem of the school is the urban problem of the city (…). School is the nucleus of social life, closely linked to the life of the community, not limited in time and space, extended to the entire existence of the citizen and to the whole environment of the city". (Rogers, 1947)
De Carlo emphasizes the relationship that the school must establish with the city of the twentieth century, that in the phase of its post-war-reconstruction must consider the school building as an element that contributes in a dialectical way to the construction of the city. The architect refers to innovative forms of urban planning in foreign countries where the urban problem of the school is the urban problem of the city. The school is conceived as an element of the city that dialogues with it on the physical level, its functions and social interactions.
These demands are now more relevant than ever and the project of a school cannot take into account only the technical parameters, related to the field of construction, and pedagogical ones, but it must arise from a synergy of disciplines that converge in the project to achieve quality standards.
It is since 1960s that the theme of the design of educational spaces is dealt with the aim of a real renewal. The common goal of architects, psychologists and educators was to rethink school spaces to provide concrete answers to the needs of cutting-edge pedagogy.
In Italy, an International Congress of School Building was organized at the XII Triennale in Milan (1960), dedicated to the theme "The House and The School", and in 1963, during a Building Study Congress, the school inspector Luigi Romanini emphasized the attention on pedagogical requirements in the construction of schools.


Fig. 1-16 Furnishings and photographs exhibited at the XII Triennale in Milan. (Source:http://archivio.triennale.org/archivio-fotografico/esposizione/22514-12trn (visited on 08-02-2020))

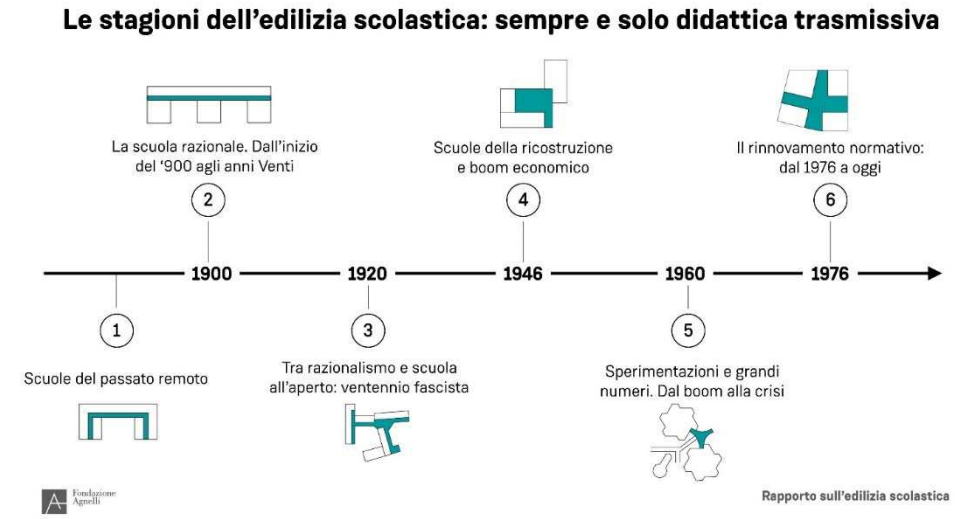


Fig. 1-17 Timeline with the main school layouts from end of 19th century to 1976. (© Fondazione Agnelli)

The diagram above summarizes the evolution of the design approach of Italian school architecture from the late 1800s to 1976, in relation to political and economic changes.
The Italian school building park had a rapid increase from 1950 to about the mid-70s, due to the fast schooling process. [Antonini, Boeri, et alii, 2015, p.114].
From 1974 to the second half of the nineties, the Italian government paid little attention to school construction.
In 1996 the Masini Law was approved (law no. 23 of 11 January 1996) which allowed the preparation and implementation of three-year and annual plans for intervention in school buildings, thanks to the provision of state amortization of mortgages that Municipalities and Provinces could take out for the realization of interventions of extraordinary maintenance and new buildings. The Regions had the task of planning these plans.
Thanks to this law, more than 12,000 interventions were financed in six annual plans, with an investment of around 3,000 billion lire, with loans borne by the state. For the first two three-year plans (1996-98 and 1999-2001) this intervention planning system worked and led to positive results.
This investment system has been gradually abandoned and since 2005 the loans borne by the state have been replaced by loans granted directly by the CIPE (Interministerial Committee for Economic Planning) and by the ministries of education and infrastructure, distributed for each region.
Law 23/1996 established the School Building Registry (AES), which however was presented with partial data only in 2015.

1.2. The school architecture of the 21st century in Italy and attempts of renewal

The studies on the quality of school building in Italy, conducted by the Ministry of Education, the University and Research (Ministry of Education), Legambiente and the National Association of Building Builders)show a discouraging picture not only for the small number of projects of advanced schools, but also for the criticalities that characterize a large part of the school building: age, seismic risk, and hydrogeological, need of maintenance, inadequacy with respect to the regulations of usability and fire prevention.
In recent years some progress has been made in the area of sustainability and energy efficiency, the use of renewable sources and services related to sustainable mobility.
The national public schools building surveys show that half of the school heritage does not meet one or more regulatory requirements and standards dictated by the Ministry of Education.
Another perspective to consider is the relationship with the territory: a school building must not constitute a closed, self-referent system, detached from the urban and social context; its functions should not only concern the conduct of educational activities closely related to the school system, but should also be part of a wider territorial management programme.
The construction or upgrading of buildings for education is part of the planning of a school network for the regions, whereas it is necessary to take account of factors such as the quantity and quality of educational institutions, local distribution and real needs in order to plan planning for the future, with architectures that are able to meet new and changing needs in a systematic and coherent way.
The architecture of educational spaces is overall required to have a certain degree of flexibility, to be able to accommodate a variable number of students from time to time and to respond adequately to different requests for training.
Giorgio Ponti, coordinator of the educational architecture area of CISEM (Centro per l'Innovazione e la Sperimentazione Educativa Milano) sets out some possible effective Plan choices, put in relation to building planning in school field [Ponti, 2014, p.31].:

- new institutions of schools and fields of study (nuove istituzioni di scuole e di indirizzi di studio);
- aggregation/merger of schools with the effect of creating comprehensive institutions (aggregazione/fusione di scuole con l'effetto di creare istituti comprensivi);
- aggregation/merger of schools with the effect of constituting"poles"d'offer, sometimes unifying equal or similar institutional types, giving life to a varied offer in educational opportunities and in a system of integrated use of resources; (aggregazione/fusione di scuole con l'effetto di costituire "poli" d'offerta, talvolta unificando tipologie istituzionali uguali o simili, dando vita ad un'offerta variegata nelle opportunità formative e in un sistema di fruizione integrata delle risorse);

- suppression of schools and fields of study (soppressione di scuole e indirizzi di studio);

Ponti considers that the creation of effective networks both at the level of resource organisation and design for common objectives can make a significant contribution to the planning process of the interventions of school building [Ponti, 2014, p.32-34].
He speaks of the “school and training network” made up of various educational institutions, considered both in terms of buildings and fields of study, which constitute the nodes of the network” of which the main ones correspond usually to the provincial capitals.
It’s emphasised the need for synergy between educational institutions to provide an effective response to the needs of young people, to support them in their choices of educational guidance, and to avoid repetition of school addresses and waste of educational provision.
The network concept is used to propose an integrated programming of the school network also the promotion of collaboration with local authorities and the social and productive partners to promote the overall development of the territory [Ponti, 2014, p.34].
Since the transition from school to work is a critical phase for young Italians, it is appropriate that training provision takes into account local needs, the economic environment and the labour market, to better target young people towards the occupational sectors offering employment prospects.
Considering the architectural perspective, Italy shows an uneven scenario, as most schools were built in discontinuous phases, on the basis of social and urban needs that were emerging mainly during the 20th century, such as population growth, changes in school systems, internal and external migration flows, the need to equip new residential areas with school buildings. [Fianchini, 2017, p.13].
After around 2010 in Italy, the institutions showed a renewed interest in the school building theme, probably following an international trend that led in many European and non-European countries to undertake research programs on innovative educational spaces and pedagogy, and to start the construction of new schools of all grades.
The fact-finding survey on the situation of school construction in Italy, drawn up in 2013, highlighted the need to review the policies adopted, since since 1974, for about twenty years, the Italian Parliament and Governments have neglected the theme of school construction, both from a regulatory and financial point of view. [Chamber of Deputies, 2013].
Since 2010, the planning task has passed from the regions to the local authorities, through the signing of agreements.
A fundamental rule for Italian school construction was the financial law n.289 of 2003, which established an extraordinary plan for the safety of school buildings, with particular interest in those schools that arise in areas subject to seismic risk. The financial law 350 of 2004 perfects the previous law and approximately 500 million euros are allocated in a "First excerpt program" and 295 million euros for approximately 900 interventions in the "Second excerpt program".

The data relating to the situation of Italian school structures can now be found at the School Building Register (AES), established with Law 23/1996 but which was in fact only presented on August 7, 2015, after 19 years from its forecast . Even if the data are still incomplete for some geographical areas of the territory (the certificates of usability, fire prevention, static testing, energy class are lacking), they nevertheless allow to have information on the state of the Italian school building in general [Union of Provinces of Italy , 2015].
In recent years the state has activated many projects and resources aimed at interventions concerning the school heritage. The following diagram shows the financing framework which is estimated to amount to 7.4 billion Euros, with approximately 27,721 interventions being implemented through national, European and regional programs and funding. [Legambiente, 2016].

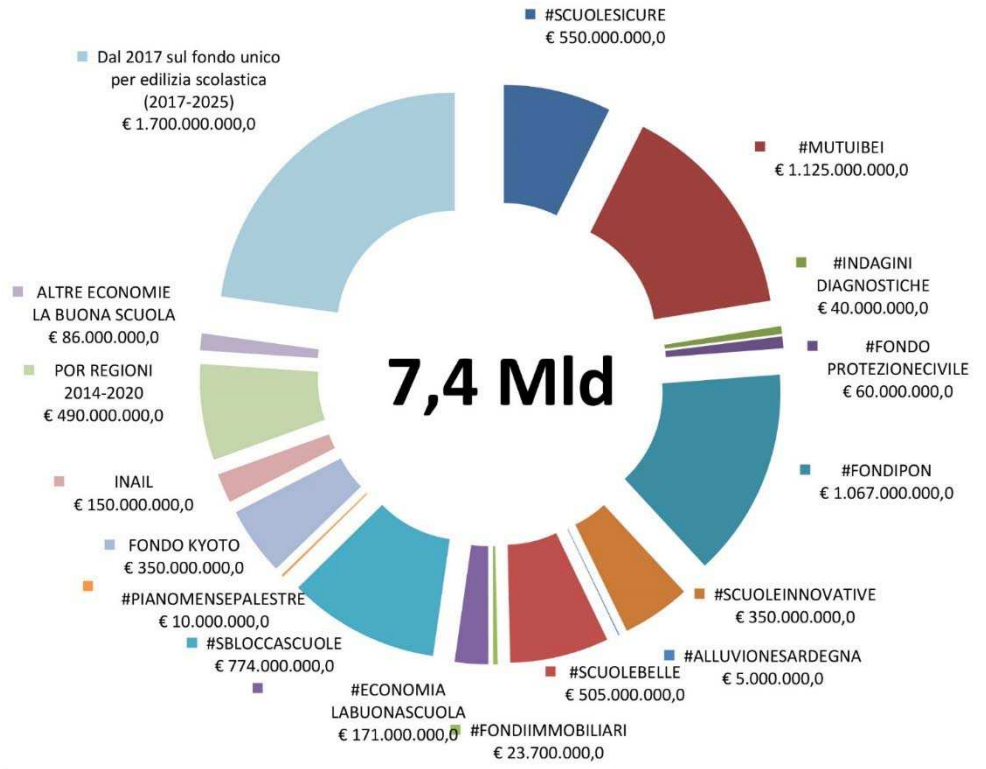


Fig. 1-18 Funding framework for the redevelopment of school buildings. Legambiente processing on MIUR data (2016). Source: Legambiente [2016], Ecosistema scuola. XVII Rapporto di Legambiente sulla qualità dell'edilizia scolastica, delle strutture e dei servizi, Legambiente Onlus, Roma, p.5.

In the XVII Legambiente Report on the quality of school buildings, the funding lines for interventions concerning school construction are also shown in a summary scheme, among which the best known are "Safe Schools", "Innovative Schools", "Good Schools".

Le linee di finanziamento per gli interventi che riguardano l'edilizia scolastica

#SCUOLENUOVE
Raggruppa le linee di finanziamento volte a sostenere le nuove edificazioni di Istituti scolastici e la ristrutturazione completa di quelli esistenti, con particolare attenzione agli interventi di bonifica dell'amianto e di adeguamento alle normative per la sicurezza antisismica e antincendio, grazie allo Sblocco del Patto di Stabilità dei Comuni 2014-2015 e di quello delle Province e Città Metropolitane 2015-2016.

#SBLOCCASCUOLE
Prevista nella legge di stabilità 2016, libera dai vincoli di bilancio di Comuni, Province e Città Metropolitane gli interventi di edilizia scolastica e per la realizzazione di nuove scuole.

#SCUOLESICURE
Raggruppa le linee di finanziamento per gli interventi di messa in sicurezza delle scuole, di manutenzione straordinaria, per l'adeguamento alla normativa antisismica e per l'eliminazione delle barriere architettoniche, nonché per la rimozione dell'amianto.

FONDO PROTEZIONE CIVILE – Adeguamento sismico
Sono gli interventi sugli edifici scolastici finanziati dal Dipartimento della Protezione Civile attraverso il Fondo per interventi straordinari della Presidenza del Consiglio dei Ministri. Il Fondo, ripartito tra le Regioni sulla base del livello di rischio sismico dei territori, finanzia sia interventi di adeguamento strutturale ed antisismico, sia la costruzione di nuovi edifici scolastici, qualora risulti indispensabile sostituire quelli ad elevato rischio.

FONDO KYOTO
Promuove, attraverso la concessione di finanziamenti a tasso agevolato (0,25%), la realizzazione di interventi di **efficientamento energetico** sugli edifici di proprietà pubblica destinati ad uso scolastico ed universitario, ivi compresi gli asili nido e gli istituti per l'alta formazione artistica, musicale e coreutica.

PON - POR
Riqualificazione degli edifici scolastici pubblici: efficienza energetica, messa a norma degli impianti, abbattimento delle barriere architettoniche, dotazione di impianti sportivi, miglioramento dell'attrattività degli spazi scolastici.

POI
Finanziamento di progetti volti ad aumentare la produzione e l'efficienza energetica delle scuole.

#MUTUI BEI
Mutui trentennali a totale carico dello Stato, contratti dalle Regioni con Banca Europea degli Investimenti, tramite Cassa Depositi e Prestiti. Il finanziamento copre la ristrutturazione, la messa in sicurezza, **l'adeguamento alle norme antisismiche**, **l'efficientamento energetico** e la costruzione di nuovi edifici scolastici. Le risorse sono erogate a Comuni, Province e Città Metropolitane sulla base di graduatorie di priorità predisposte dalle Regioni. Gli oneri di ammortamento sono a carico dello Stato.

#SCUOLEINNOVATIVE
Concorso di idee internazionale per la progettazione e la realizzazione di 51 Scuole innovative.

#SCUOLEBELLE
E' il capitolo che riguarda gli interventi di piccola manutenzione, decoro e ripristino funzionale degli edifici scolastici.

#INDAGINI DIAGNOSTICHE
Finanziamento per indagini diagnostiche dei solai degli edifici pubblici scolastici.

ALLUVIONE SARDEGNA
Interventi di messa in sicurezza e ristrutturazione degli edifici scolastici dei Comuni della Sardegna danneggiati dagli eventi alluvionali del novembre 2013.

#INDAGINI DIAGNOSTICHE
Finanziamento per indagini diagnostiche dei solai degli edifici pubblici scolastici.

ALLUVIONE SARDEGNA
Interventi di messa in sicurezza e ristrutturazione degli edifici scolastici dei comuni della Sardegna danneggiati dagli eventi alluvionali del novembre 2013.

Fig. 1-19 Financing strategies for school building interventions. Source: Legambiente [2016], Ecosistema scuola. XVII Rapporto di Legambiente sulla qualità dell'edilizia scolastica, delle strutture e dei servizi, Legambiente Onlus, Roma, p.6.

Many loans have been started for the various types of interventions, but since there is no accurate analysis of the needs and the overall expenditure necessary for the adaptation of the schools, the funding framework appears articulated and shows critical issues regarding the complete implementation of intervention programs concluded.
According to the 2016 School Ecosystem report, the "School Education" program has brought to an end only 60% of the interventions financed, while the Civil Protection Fund, aimed at seismic adjustment, has only 35% of interventions completed. The most widespread funding among Italian schools, "Scuolebelle", still has 23% of funded interventions not completed.
The data deriving from the School Building Registry and the 2018-2019 State Schools Registry shows a high coverage rate of the national territory, therefore a more complete picture of the problems and state of the Italian schools than in the past, with the exception of restricted areas of the territory (data relating to Valle d'Aosta and Trentino Alto Adige are not available).

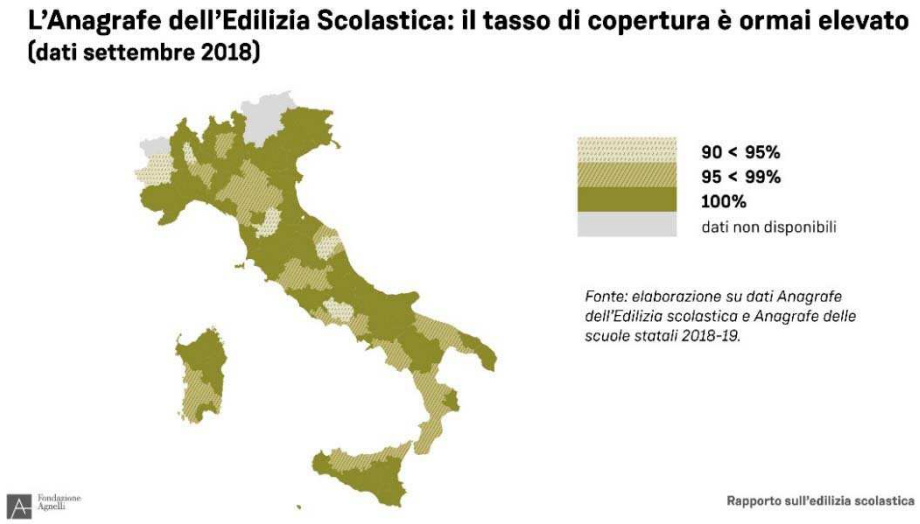


Fig. 1-20 National Coverage of the school building registry. Source: Fondazione Agnelli [2019], Rapporto sull'edilizia scolastica della Fondazione Agnelli, Editori Laterza, Bari, p.3.

The following diagram shows the numbers of school buildings in the different grades of schools and different paths of secondary schools.
The data show that most of the school facilities are kindergartens, elementary schools and comprehensive schools.
Among secondary schools, high schools prevail, compared to technical and professional institutes.

Quali scuole, in quanti edifici scolastici

Tipologie di scuole presenti	n. edifici	%
Scuole dell'infanzia	8.358	21,4
Scuole primarie	9.377	24,0
Scuole dell'infanzia e primarie	3.376	8,6
Scuole medie	4.286	11,0
Istituti comprensivi	6.889	17,6
Totale Infanzia e I ciclo	**32.286**	**82,6**
Licei	2.081	5,3
Istituti tecnici	1.491	3,8
Istituti professionali	1.663	4,3
Istituti superiori	1.388	3,6
Totale II ciclo	**6.623**	**17,0**
Istituti omnicomprensivi	170	0,4
Totale edifici	**39.079**	**100,0**

Edifici scolastici per tipologia di scuole ospitate, v.a. e %

Fonte: elaborazione Fondazione Agnelli su dati AES.

Fondazione Agnelli

Rapporto sull'edilizia scolastica

Fig. 1-21 The diagram shows the numbers of school buildings in the different grades of schools and different paths of secondary schools. Source: Fondazione Agnelli [2019], Rapporto sull'edilizia scolastica della Fondazione Agnelli, Editori Laterza, Bari, p.4.

1.2.1. Critical issues of contemporary school architecture in Italy

The school architecture framework in Italy, with reference to the construction aspects and design innovation of spaces, is still very critical today, Despite renewed attention to this issue by the relevant political bodies.
As stated in a concluding document on the Knowledge Survey on School Construction in Italy of 2 August 2017, the complexity of school building in Italy stems from many factors.

- the first concerns the concept of school building, which covers a wide range of aspects, from safety, structural protection, architectural barriers, anti-seismic and fire-fighting standards; technological and energy innovations, to the point of touching the aspect of setting up learning environments.
- the second refers to the Italian school buildings age, half of which were built before the 1970s, and to the uneven nature of new school building measures in Italy. Legambiente's 2016 School Ecosystem Report reports that 65 percent of schools were built before 1974, when the first anti-seismic legislation came into force; 40 per cent of schools are located in seismic risk areas; 31 per cent are subjected to static checks to verify seismic vulnerability; schools built according to anti-seismic criteria are less than 13 percent. In addition, the report stresses that school buildings in the southern regions are in much worse condition than in the centre-north.
- the third is the lack of a single State Fund for School Construction and unitary management of funding processes until 2012. The ordinary and extraordinary maintenance of schools is the responsibility of the local authorities owners, municipalities and provinces according to the grade of school, and interventions by the State have been implemented over time through additional contributions.
- the fourth factor relates to financing for the reconstruction of special schools following special events; such as the collapse of a school in San Giuliano di Puglia in 2002 and the seismic events of L'Aquila in 2009 and Emilia in 2012. The implementation of these measures has highlighted the lack of a coherent system of financing and management and highlighted the uneven nature of the rules, especially those that define the connections between central administration and local authorities.
- the fifth factor is determined by disasters, with particular reference to the earthquakes of 2016 which made it necessary for Parliament to extend the rules; further deepening with respect to the rules drawn up after the earthquakes of L'Aquila and Emilia.

All these factors have made discontinuous the survey started in 2013, in addition to the constant changes in the situation of Italian schools.
The main objectives of the Knowledge Survey on School Construction started in 2013 were to assess the state of implementation of the school building register, the assessment of local and central planning and management skills with a view to drawing up a ten-year plan, and

the proposal of exceptional criteria to speed up a school building plan, particularly in the emergency phases.
An interesting concept speaks of the measures to adapt existing schools to the new educational needs, with the aim of making the school a "civic centre" capable of fulfilling educational, social and cultural functions.
Knowledge Survey on School Construction started in 2013 outlines an extremely critical situation: more than 50% of the 42,000 buildings are not up to standard and about 10,000 of them should be demolished.
The Provinces manage about 5179 school buildings and funding has been reduced by the Stability Pact (from EUR 727,894,744 to EUR 513,272,984) resulting in a lack of funds for maintenance and risk of unavailability of some of them. This fact has also led to overcrowding in classrooms not suitable for size and quality to the teaching activity.
This document also deals with aspects related to the organization of teaching spaces and a need for confrontation with international contexts, in which the theme of spaces for the improvement of teaching and learning processes is taken into great consideration.
It is also identified as a central objective to connect the school with the territorial context, both physically and socially, by broadly outlining a "*school of the future open to the territory and made of multifunctional places and flexible furnishings; the classroom with dematerialized boundaries, which widens towards connective spaces, formed by transparent walls, to share the activities that take place within it; that adapts to group work but that is not the main space for teaching. In micro-environments, all of equal dignity, you have to carry out the most diversified activities, even if only designated to rest, individual study or large meetings* "(«*scuola del futuro aperta al territorio e fatta di luoghi polifunzionali e di arredi flessibili; l'aula con i confini smaterializzati, che si amplia verso gli spazi connettivi, formata da pareti trasparenti, per condividere le attività che si svolgono al suo interno; che si adatta al lavoro di gruppo ma che non è il principale spazio per la didattica. In micro-ambienti, tutti di pari dignità, si devono svolgere le attività più diversificate, anche solo deputate al relax, allo studio individuale o alle grandi riunioni*.») [Linee guida interministeriali, aprile 2013].
Overall, the situation of Italian schools is critical both for the building and safety aspects, as well as for the regulatory and research aspects.

The Italian school architecture is lacking:

- the safety of school building;
- schools built without anti-seismic criteria;
- age of school building (more than a third of the school buildings were built between 1964 and1979);
- energy sustainability, which would save money;
- the lack of innovative learning spaces;
- both theoretically and conceptually, in the search for relationships between urban context and school architecture;

- the application of collaborative teaching methods and the design of suitable spaces;
- to consider the problem of educational spaces as a central element of public policy, to be part of a wider spatial planning programme.

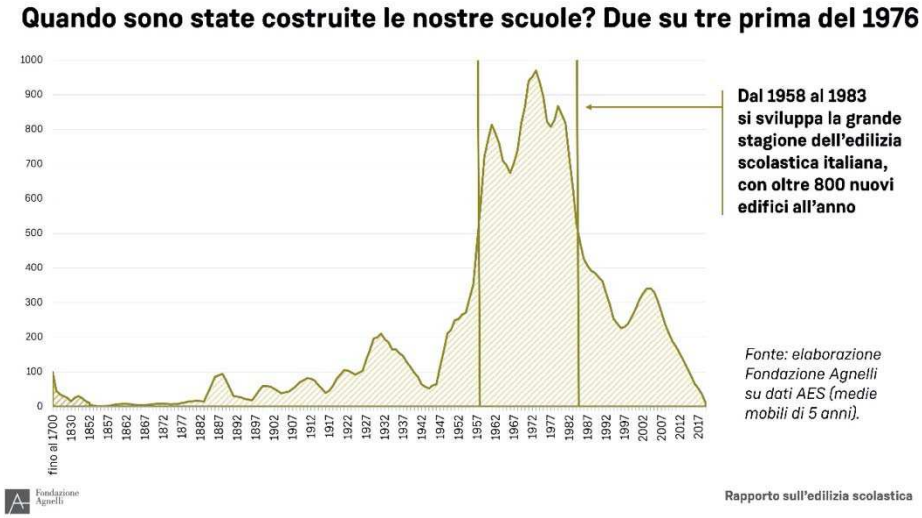


Fig. 1-22 Construction period of school buildings in Italy between 1830 and 2017. Source: La Stampa-Fondazione Agnelli [2019], Rapporto edilizia scolastica, Rassegna stampa, 27 novembre 2019, Fondazione Agnelli, p.5.

According to a recent study carried out by the Agnelli Foundation, 16% of school buildings have structural problems with floors and roofs, and about one school out of 3 that has environmental problems is located near large cities such as Rome, Milan, Naples and Turin. Noise pollution is also an uncomfortable factor, not only in large cities such as Rome, but also in medium-sized centers such as Livorno, Gorizia and La Spezia.

The schools with the worst conditions are middle schools, followed by technical and professional institutes. The conditions of kindergartens, elementary schools and high schools are less critical. [Agnelli Foundation Report, 2019].

There is a gap between the conditions of school construction between northern and southern Italy, with greater problems in the south and in the islands.

The following graphs show the average age of school buildings in different Italian regions, the main causes of pollution and disturbance for schools, and finally the changes in the number of classes in the different grades of schools starting from the 2018/19 school year up to the school year 2029/2030. Forecasts are made on the basis of the ISTAT projections of the resident population.

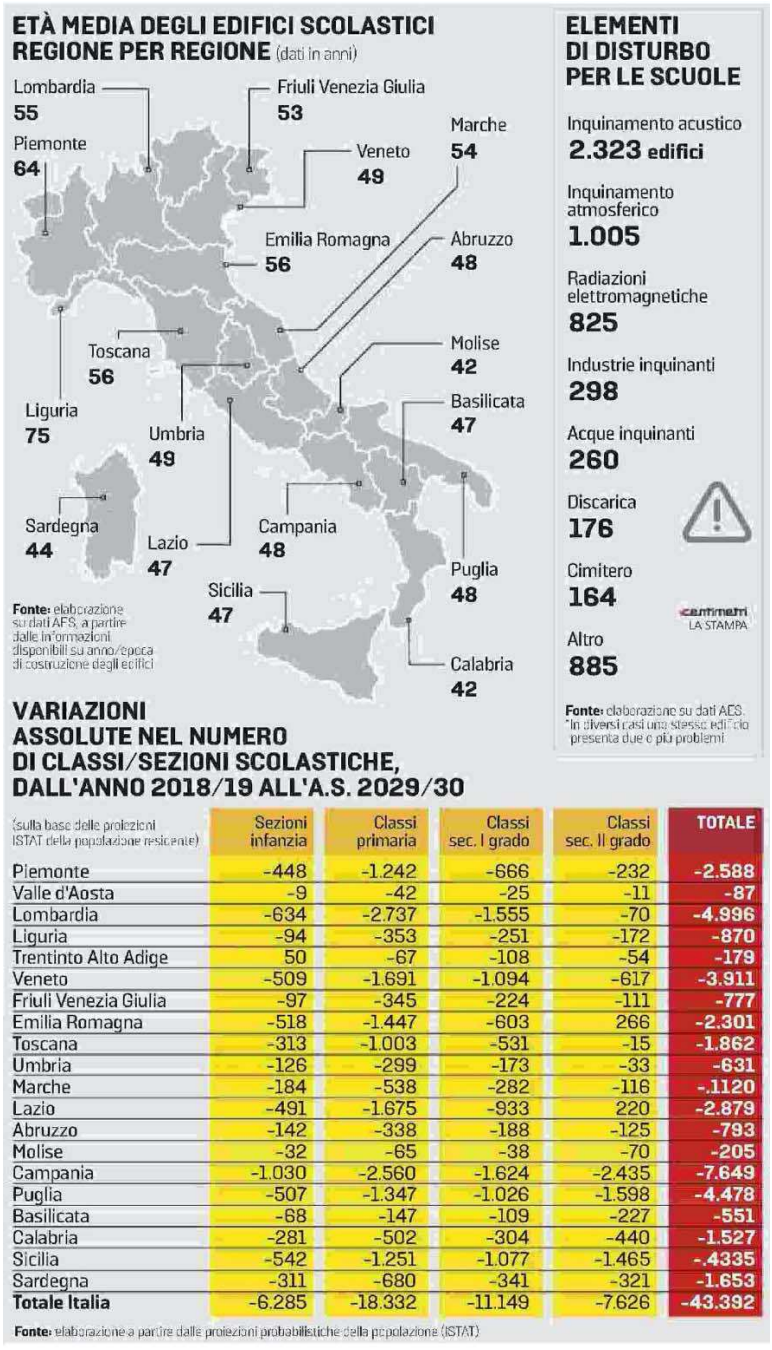


Fig. 1-23 Average age of school buildings on a regional basis; causes and percentages of school pollution; future changes in the number of classes in the different school grades. Source: La Sampa-Fondazione Agnelli [2019], Rapporto edilizia scolastica, Rassegna stampa, 27 novembre 2019, Fondazione Agnelli, p.8.

Europe, and in particular in the countries of northern Europe, the Netherlands, the United Kingdom and Germany, but also in Portugal, have made substantial investments in school construction in recent years. In addition, detailed programs were launched which included the various aspects concerning the school: from architecture to learning spaces to connections with the community.
The large gap between these countries and Italy with regard to the programmatic and economic commitment to school construction is also attributable to the difference in the birth rate, which sees Italy in a serious birth crisis.
The factors of change that are having and will have repercussions on school buildings in the future are closely linked to the demographic aspect.
Comparing the birth rates of European countries in recent years, it is clear that the countries of the Mediterranean, and in particular Italy, are the countries with a lower birth rate than those of northern Europe.

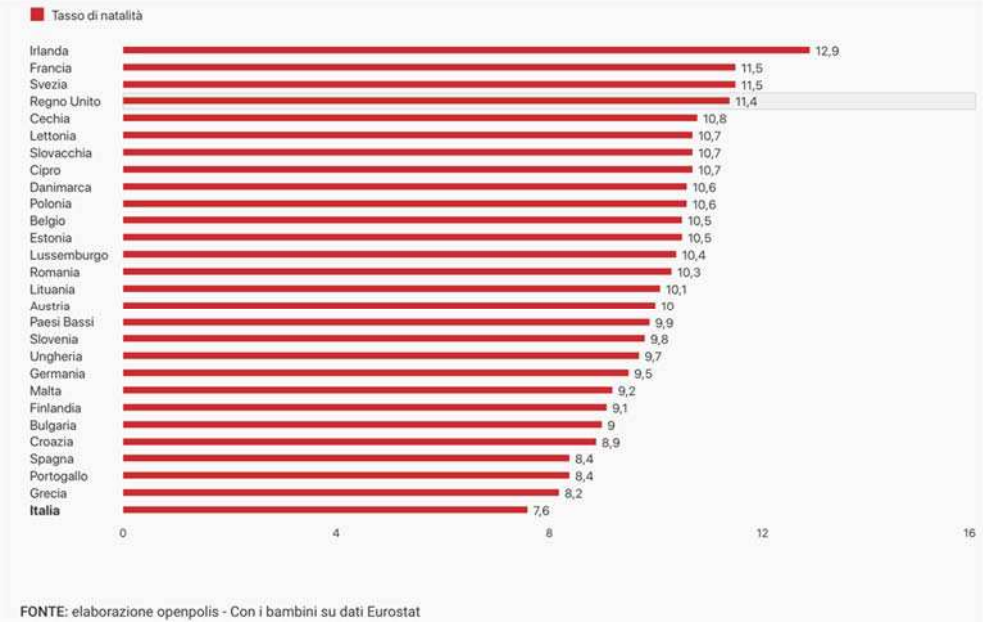


Fig. 1-24 https://www.openpolis.it/quanto-stanno-diminuendo-le-nascite-in-italia/ (visited on 08/02/2020)

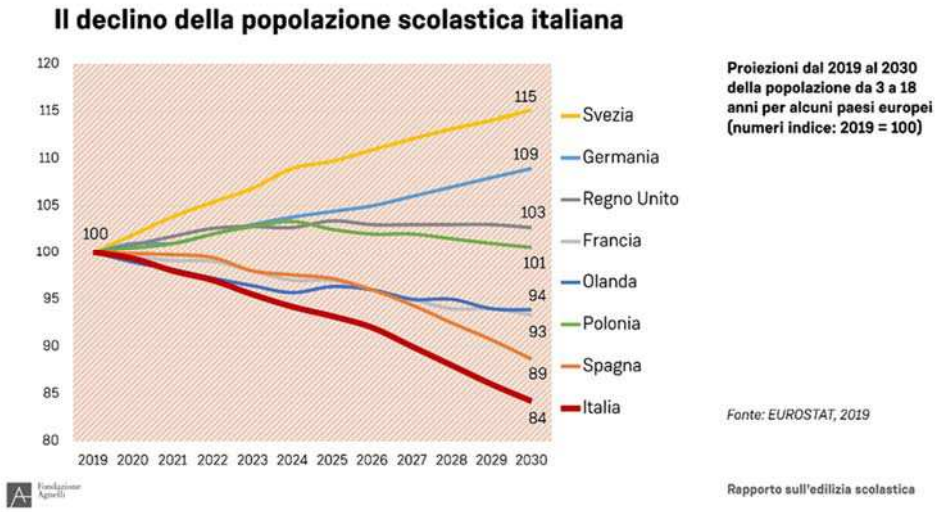


Fig. 1-25 Projection from 2019 to 2030 of the population aged 3 to 18 for some European countries. Source: La Stampa-Fondazione Agnelli [2019], Rapporto edilizia scolastica, Rassegna stampa, 27 novembre 2019, Fondazione Agnelli, p.12.

The drop in birth rates in recent years has led the government to invest more in the renovation of existing buildings rather than in the construction of new schools.

Meno studenti, meno classi, meno docenti

Nel 2030 in Italia avremo 1.100.000 studenti in meno

	Nord Ovest	Nord Est	Centro	Sud	Italia
sezioni infanzia	-1.185	-1.073	-1.113	-2.914	-6.285
classi primaria	-4.374	-3.551	- 3.516	-6.890	-18.332
classi sec I grado	-2.497	-2.028	-1.919	-4.706	-11.149
classi sec II grado	-486	-516	+56	-6.680	-7.626
Totale	-8.541	-7.167	-6.492	-21.191	-43.392

Variazioni assolute nel numero di classi/sezioni, dall'a.s. 2018/19 al 2029/30, per grado di scuola e circoscrizione

Fonte: Elaborazioni Fondazione Agnelli dalle proiezioni regionali Istat della popolazione residente (3-18 anni)

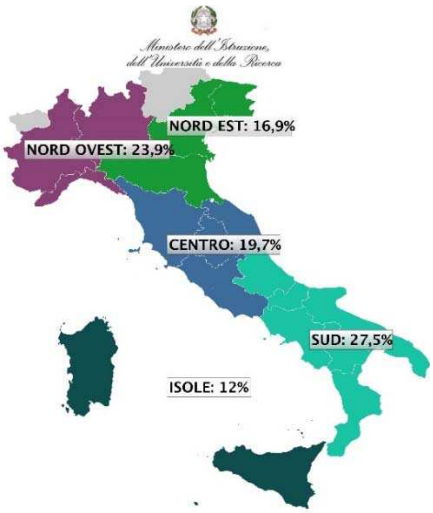
Rapporto sull'edilizia scolastica

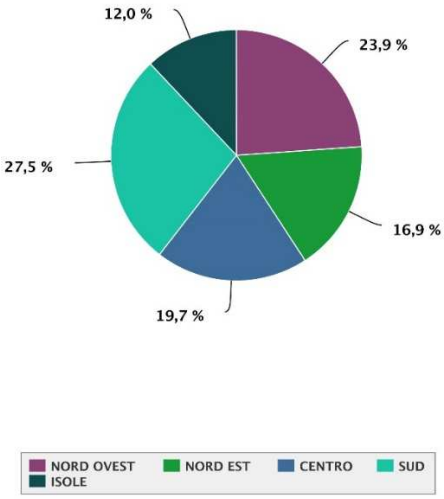
Fig. 1-26 Future changes in the number of classes in the different school grades in the north, center, south Italy and islands. Source: Fondazione Agnelli [2019], Rapporto edilizia scolastica, Rassegna stampa, 27 novembre 2019, Fondazione Agnelli, p.5.

1.2.2. Secondary school conditions in Italy today

In Italy, the construction of new schools has mainly affected the lower grades of education, particularly in kindergartens and primary schools, while it has been found from sector-specific literature that cases of newly constructed secondary schools are rare. It should be noted that under the name of "secondary school" are included first grade secondary schools, formerly called "middle schools" and second grade secondary schools, commonly called "high schools".
In the Italian school system these two school grades are clearly separated and housed in different buildings. In recent decades, first grade secondary schools have been merged, in some cases, with primary schools, going to form "comprehensive schools", where kindergartens are sometimes included.
Therefore, those architectures that host secondary schools are considered here, since they are characterized by specific learning environments for certain disciplines and activities.
The secondary school in Italy has undergone substantial changes with the "Gelmini Reform" [Ministry of Education, University and Research, Law October 30, 2008, no. 169].
The main points of the Reformation included:

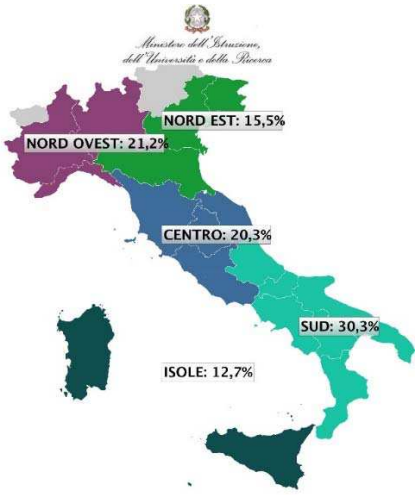
- new organization of high school curricula in six effective compulsory education high schools: Human Sciences High School, Artistic High School, Classical High School, Scientific High School, Linguistic High School, Musical and Coreutic High School;
- the technical institutes are divided into two main sectors, economic and technological, and 11 specific areas
- professional institutes are divided into two macro sectors, service sector, industry and craft sector, with 6 addresses. [Sole M., Crespi M. 2014].

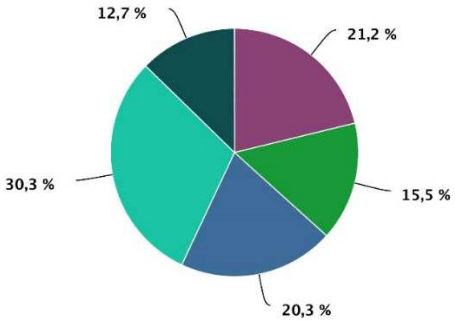




Zona	Valore	Percentuale
NORD OVEST	627.180	23,9%
NORD EST	442.188	16,9%
CENTRO	516.319	19,7%
SUD	721.428	27,5%
ISOLE	314.701	12%
TOTALE	2.621.816	100%

Fig. 1-27 Quantity and distribution of secondary school students on national territory Source:https://dati.istruzione.it/espscu/index.html?area=anagScu (Visited on 13-2-20).





Zona	Valore	Percentuale
NORD OVEST	591	21,2%
NORD EST	432	15,5%
CENTRO	564	20,3%
SUD	843	30,3%
ISOLE	354	12,7%
TOTALE	2.784	100%

Fig. 1-28 Quantity and distribution of secondary schools on national territory Source:https://dati.istruzione.it/espscu/index.html?area=anagScu (Visited on 13-2-20).

The Italian provinces manage about 2769 secondary school schools (high schools, technical institutes, professional institutes) spread over 5389 school buildings. The provinces have the main task of managing secondary schools, a role definitively sanctioned by law n.56 / 2014.

Specifically, the provinces deal with the building structures of schools and aspects related to safety and functionality. They can implement interventions for the construction of new schools, ordinary and extraordinary maintenance, making buildings safe and up to standard,

costs for electrical and telephone users and for furnishings, construction of sports facilities that can be used by several schools and by the local community [Unione Provinces of Italy, 2015].

The quality of secondary education and the impact on the world of work are two aspects that undoubtedly depend on the quality of school facilities. The quality and preparation of specific spaces such as classrooms, laboratories and gyms, as well as the provision of teaching materials and IT tools, play a decisive role in the preparation of students who are preparing for university or the world of work.

The school building interventions of the Italian secondary schools consist above all in renovations and fittings with new and flexible furnishings of the learning spaces. In rare cases, new first and second grade secondary schools have been created, mostly concentrated in richer areas of the country, and in some cases in areas with greater political autonomy, such as the province of Bolzano.

In particular, in the province of Bolzano in recent years two interesting projects of secondary schools of second grade have been carried out, both for the innovative aspect of the architecture, and for the appropriate insertion in the built and environmental context.

The "New Provincial Directives for the School Building of the Province of Bolzano" were issued with the Presidential Decree No. 10 of 23 February 2009, thus starting a season of substantial renewal of schools in urban and mountain areas.

The Directives suggested bringing pedagogical issues, the educational philosophy to which the school was inspired and user needs into the architectural project, in order to arrive at the design of functional and flexible spaces, open to local communities, thus also having the function of Community Center . [Province of Bolzano, 2009].

The "Savoy" Hotel Professional School has been expanded as part of a plan for the protection of a historic district of the garden city of Merano. The existing part of the school consists of an Art Nouveau building built in 1895 with the function of a hotel since 1900. In 1967 the autonomous province of Bolzano purchased the building which became a hotel school for about 600 students.

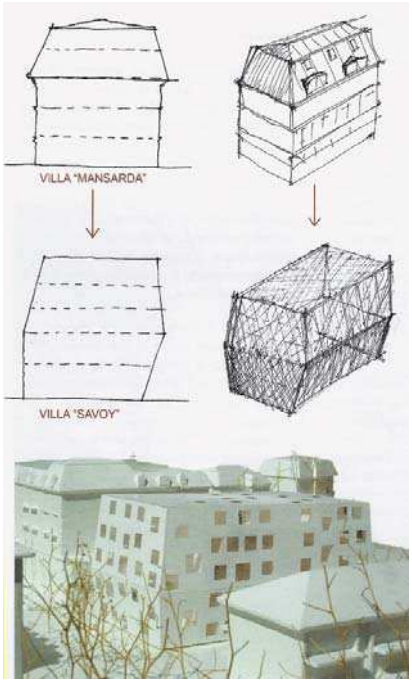


Fig. 1-29 - Professional Hospitality Training Institute "Savoy", Merano, province of Bolzano. External views, sketches and architectural model (Source: Pepe D., Rossetti M.[2016], Progetti di scuole innovative, Maggioli Editore, Sant'Arcangelo di Romagna (RN)), pp.46-49).

The project was carried out by Studio Stifter + Bachmann and architect Bachmann Angelika.

The new building and the old one are connected by a walkway with glass walls. The pre-existing building, compact and equipped with classic architectural elements, contrasts with the volume of the new building with inclined facades, which recall the characteristic mansard roofs.
The interior spaces designed to be flexible and multifunctional, respond to a precise pedagogical function that enhances communication between students, collaborative work in the preparation of food and sociability. The glass walls, the open connective spaces also used with didactic functions and the double heights favor the fluidity and connection of the spaces.
In the same province of Bolzano, in the municipality of Tesimo, the Technical school of home economics "Frankenberg" was renovated in two different phases, based on a project by architect Michael Tribus: in 2000 the main building located to the north was renovated, which it contains classrooms and spaces for teaching cooking arranged around a central space; from 2011 to 2014, the building that functions as a boarding school was renovated, consisting of four staggered floors arranged along the slope of the hill, characterized by terraces overlooking a mountain panorama.

Fig. 1-30 Technical school of home economics “Frankenberg”, Tesimo, province of Bolzano. External views, sketches and internal view (Source: Pepe D., Rossetti M.[2016], Progetti di scuole innovative, Maggioli Editore, Sant’Arcangelo di Romagna (RN)), pp.65-66).

A newly built school building consists of the Forestry School Latemar, designed by architect Stefan Gamper and built over the course of a year of work in 2006. The volume of the building recalls the two existing bodies, with a pitched roof and a architecture that reflects the characteristics of the local tradition. The new building, like the previous ones, is made of wood and has large rooms with flexibility inside, with large windows overlooking the natural landscape.

Fig. 1-31 Forestry School Latemar, Nova Levante – Passo di Carezza, province of Bolzano. External view, classroom and canteen (Source: Pepe D., Rossetti M.[2016], Progetti di scuole innovative, Maggioli Editore, Sant'Arcangelo di Romagna (RN)), pp.218-221).

The Forestry School Latemar was mainly built with natural materials: the load-bearing structure, the floors, the beams and the claddings are made of wood. For these characteristics of eco-sustainability it has obtained the "Best Climate House 2006" award.
Few secondary schools have also been built from scratch in recent years: the middle school of Isola Vicentina, in the province of Vicenza, is an example of a building with a spatial structure that expands in the environmental context in different directions, starting from from a single large double height multifunctional space with inclined cover.
The school, designed by TECO + Partner, architect Giovanna Ruggieri, and Nier Ingegneria, was built in environmentally friendly and ecological cellular concrete blocks providing the building with high performance in terms of resistance and insulation, functionality and comfort.
In the four functional blocks with a rectangular plan there are classrooms, common spaces, offices and utility rooms. The fronts are characterized by large glass surfaces that allow adequate internal lighting and a visual connection with the surrounding landscape.

Fig. 1-32 First Grade Secondary School in Isola Vicentina, Vallorcola Place, province of Vicenza. External and internal views, (Source: Arketipo [2017], *Scuola Secondaria di Primo Grado*, Architectural Magazine n.112/17, Istruzione/Education, New Business Media srl, Milano, pp.124-125).

Alongside these innovative examples, however, there are a large number of secondary schools built more than fifty years ago and still used without substantial restructuring and safety measures.

Most of the school buildings housing first and second grade secondary schools were built in the period from 1958 to 1983, and most of them in the early 70s of the 20th century. [Agnelli Foundation, 2019].

The most recent school building report shows that the demographic trend in Italy leads not to invest in new buildings but to focus on the renovation and refurbishment of existing buildings. [Fondazione Agnelli, 2019].

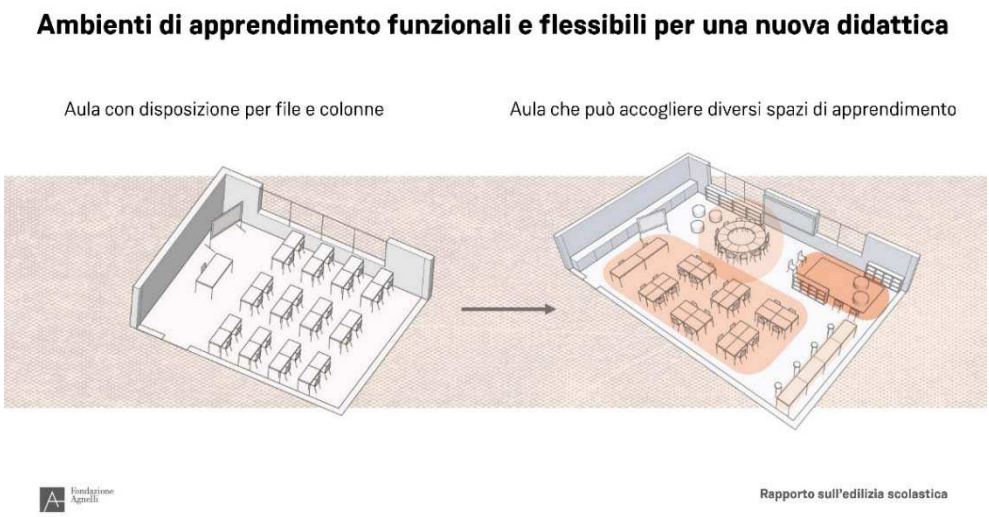


Fig. 1-33 Recommendations provided by the School Building Report of 2019 regarding the setting up of the classroom. Source: La Stampa-Fondazione Agnelli [2019], Rapporto edilizia scolastica, Rassegna stampa, 27 novembre 2019, Fondazione Agnelli, p.5.

Fig. 1-34 Italian secondary schools that have started a process of improving the interior spaces, setting up classrooms with flexible furnishings and mobile technological devices. The schools, documented with a couple of photos, from top to bottom are: "Ettore Majorana Institute" of Brindisi and "Enrico Fermi Institute" of Mantova. (Source: INDIRE; http://www.scuoleinnovative.it/quando-la-didattica-cambia-lo-spazio/(Visited on 14-9-2019).

Some secondary schools have started internal renovations since 2008, improving the quality of the learning spaces. In particular, the classrooms have been painted in bright colors and furnished with mobile benches and chairs, in order to allow different settings within the classroom.
In particular, the Fermi Institute of Mantua, in addition to the renovation of the spaces, in 2008 launched a computerization process of the school which also influenced teaching, with the use of digital books, the Moodle e-learning platform and the use of interactive multimedia boards.
Alongside these examples of secondary schools built from scratch or that have renewed the internal learning spaces, however, many old buildings, never renovated, are still widespread throughout the national territory, which have architectural values that can be considered monuments in the city, but which do not comply with current safety regulations, and even less with didactic needs.
Among the countless examples we can refer to some secondary schools in northern, central and southern Italy that still have the characteristics of the era in which they were built: the oldest scientific high school in Bologna, "Augusto Righi", founded in 1923; the classical high school "Vincenzo Lanza" of Foggia, designed by Marcello Piacentini, the main architect of the Fascist Regime, built in 1928; Scientific High School in Pesaro, designed by architect Carlo Aymonino in 1970/73.

Fig. 1-35 Italian secondary school that have not changed the learning spaces since the time it was built: Scientific High School “Augusto Righi” in Bologna, built in 1923.(©author’s photo).

Fig. 1-36 Classical High School “Vincenzo Lanza” in Foggia, designed by Marcello Piacentini, the main architect of the Fascist Regime, built in 1928. (©author’s photo).

Fig. 1-37 Scientific High School in Pesaro, designed by architect Carlo Aymonino in 1970/73. (photo © Giovanni Bellucci).

1.2.3. “Innovative School Program” of Ministry of Education University and Research (MIUR) in Italy

In 2014 the Prime Minister, Matteo Renzi, officially presented a plan for school construction composed of three categories of interventions:

1. “#scuolesicure”: to finance interventions for the safety of schools, extraordinary maintenance, for the adaptation of anti-seismic regulations and for eliminating architectural barriers;
2. “#scuolebelle”: to finance small maintenance interventions, make the school suitable and functional
3. “#scuolenuove”: to promote the new construction of school buildings and the complete renovation of existing ones. Particular attention had to be paid to the rules for seismic and fire safety, as well as asbestos removal. The new schools had to respond to the needs of innovative teaching. [MIUR, 2014, p.75].

Law no. 107/2015 concerning the programmatic document defined "La Buona Scuola" is approved; an implementing decree was also issued for the creation of "Innovative Schools".[Law n.107 of 13 July 2015].
Funding was therefore set aside for the construction of new schools which were to be built with innovative criteria on the level: architectural, plant engineering, technological, energy, anti-seismic, structural, and with innovative learning spaces.
An ideas competition was banned from the Italian government’s Ministry of Education, Universities and Research in 2015, open to European professionals, architects and engineers.
Some fundamental requests for the development of the project were to implement a participatory process and the preparation of environments in which to install technological tools.
Adam Wood, researcher UCL Institute of Education, in an article highlighted some points of the competition launched by the Italian government, with some aspects of the *Building School for the Future* program, which led to the construction of many schools in England.
Wood writes: *The idea of a competition and the way it is managed: Funding has been spread out to the regions in per capita share of their population. Practices/architects can submit only one project overall. The competition idea is interesting because with a winner and runner up for each region, that’s potentially a good opportunity to promote debate about school design & make that debate national through local contributions rather than national by the centre promoting particular designs. In Italy, especially, that’s an interesting way of doing things given its high level of cultural differentiation and very different geography, not to mention needs for seismic protection in some areas more than others. Further, the idea of limiting it to one chance per practice/architect should, in theory, put smaller practices on a more equal footing with larger ones. Giant contractors were a critique of England’s Building Schools for the Future (BSF). (…) The criteria they’re looking for: It strikes me that many of the design criteria are ones that are impossible in England’s currently impoverished*

vision of school architecture and school in general – impoverished that is by government rather than on the part of architects or educators. [Wood A., 2016].
The quality parameters for the evaluation of the proposed projects established by the competition were:

- security and accessibility;
- functionality and interaction between individual and collective intellectual activity, curricular and extracurricular and physical reference spaces;
- ease, amenity, the personalization feasibility;
- participatory process that could include all stakeholders of school (managers, local authorities, student committees, parents, architects) to school life;
- the integration of the school building into the surrounding environmental and social fabric;
- environmental protection and eco-sustainability of materials;
- welcoming spaces equipment;
- flexible learning spaces.

In 2014 a movement for the overall renovation of the school was established in Italy by INDIRE, the Italian Ministry of Education's oldest research organization. The movement is called "Avanguardie educative" (Educational Avant-garde) and set the goal of *create a network by identifying and supporting experiences that transcend limitations and inertia at educational, structural and organizational levels.* [INDIRE, 2016, p.1].
Among the main objectives of the manifesto are: improve technological and infrastructural resources, create environments with flexible and versatile furnishings to encourage collaborative study.
At the beginning of the movement, 22 schools had joined the initiative, reaching about 450 schools in 2016. A mapping of the participating schools was drawn up, and the Italian regions that have the most "innovative schools" are Lombardia, Lazio, Marche and Toscana.

Fig. 1-38 The interactive map shows the main methods used in the Italian school and the 28 schools that were most advanced, based on the parameters established by "Avanguardie Educative" movement. Source: https://www.thinglink.com/scene/783696500684226560 (Visited on 12-2-2020).

Second Chapter

2. Different concepts of school in different contexts in the 20th and 21st century

The project of an educational architecture, starting from the second half of the 1900s, required a broader approach, given by the tessellation of new perspectives, the architectural perspective, the educational perspective and that of construction planning (estates planning).
With the increase in the European population and the need for an increase in school facilities, on the one hand it was necessary to adopt a rigorous attitude in analyzing the needs of the student population, in order to provide functional responses to the different urban contexts, from the on the other hand, a flexibility regarding the idea of a school with a place and a public body that has acquired increasingly broader functions over time: from place with institutional function, deputy to teaching and learning, to social reference point for the community, place of encounter and comparison between individuals of different ages and social classes.
This hybrid vocation that the school has gradually acquired has also seen the dematerialization of certain sectoral subdivisions within educational activities, which have been enriched and diversified over time contextually with the proliferation of pedagogical theories and teaching tools, in particular those technology.
In many European contexts the school is really undergoing a process of transition and teaching and learning are increasingly defined as a collective practice. This has led, in some cases, to the dematerialization of the physical boundaries of places of learning and the very architecture of the school has become more permeable, where we have tried to open the school to the context understood in the meaning of "urban" and "social" ". The idea of adaptability of school architecture and usability by users, has led to build schools in very different places: in urban and suburban centers, in historical centers or suburbs, inserted in natural landscapes, close to watercourses or in mountain places.
Also the concept of learning space, as we have said, has undergone a notable transformation, going beyond (crossing, exceeding) the boundaries of the school space to look for new settings in open or closed spaces of the city.
Some school projects during the 1900s, but many more today, have tried to connect the physical spaces of the school with the surrounding ones, for the use of open and closed spaces without distinction for didactic and social purposes, and to try to establish a relationship between school space and community space.
In a contemporary educational perspective, a school architecture should set itself the ultimate goal of breaking down the distinction between closed space and open learning space, between formal and informal learning settings, between spaces delimited by the physical perimeter of the school and spaces in the neighborhood. of the city, between places of learning with physical boundaries and places of unlimited learning.

These are identifiable today with the definition of "Next Generation Learning Environments" [Fisher, Newton, 2014] which ones, as per Dussel, *are no longer called schools or classrooms, and are designed to meet the needs of the new learners and the emergent technologies* [Dussel, 2017, p.232].
The following chapter investigates the multiple and different ways in which schools and learning spaces change in relation to developments in education, carried out in different European contexts both in institutional places and in informal spaces of the city.
The schools and other learning contexts identified show how architecture *accommodates change through a process of continuation, moving into the future by finding its order in both the present and the past* [Gaines, 1980].
It is considered the different physical contexts in which a schools and educational facilities are located, such as the architectural context, the landscape context and other cultural contexts where education is practiced today, up to the street and the public spaces of the city.
According to Boys and Smith, the learning space design it is still a topic on which more extensive and accurate research should be carried out, since *there are an increasing number of innovative learning environments that incorporate ideas of informal rather than formal learning, suggesting that the new typology is already becoming part of the mainstream.* [Boys, Smith, 2011].
The school architecture of the 20th century, but especially that of the 21st century, is affected by a range of external influences that contribute to shaping it.
Making an excursus of different educational spaces in different contexts, it emerges that the learning spaces are today subjected to transformations derived from some main factors that contribute to shaping them:

- the educational practice and needs;
- the architectural and landscape context;
- the demands of inclusion of students and local communities.

In light of these factors we must consider a fundamental aspect for school architecture, which is that of the connections with the physical and social context in which it is inserted. This will influence not only the architectural aspect of the school but also the use of its spaces.
An architectural artifact, for whatever destination has been thought of, is the result of a complex process of urban and cultural morphological output derived from the user needs, and a result of many contextual directors. The urban contextual envelope is considered as an effective factor in the formation of architectural and urban planning products. [Abowardah, Elsayed, 2017, p.7043]
We want to make a critical analysis, through examples of architectures that fulfill educational functions, on how the urban and territorial context can affect the compositional and formal aspects of the school building. The context determines the architectural style, building material and site layout, which is very important in creating an

effective design. All these continuity between the building and its surroundings. [Abowardah, Elsayed, 2017, p.7043]
As summarized in the following diagram by Abowardah and Elsayed, three are fundamental parameters to consider in order to develop a context-oriented type of design: functionality, identity and environmental condition.

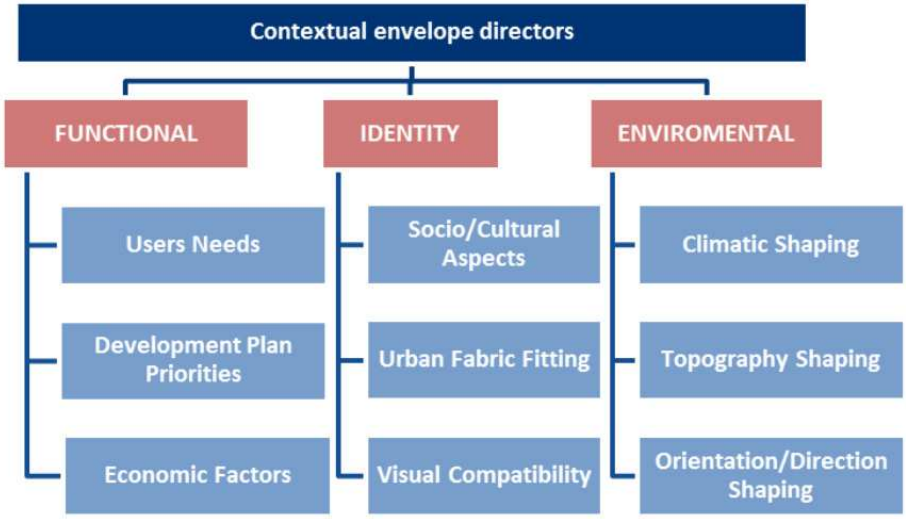


Fig. 2-1 Diagram on the factors that allow the integration of a building with the built context and with the environment. In Abowardah E.S., Elsayed H. A., Addressing the Urban Contextual Envelope: An Analytical Study in Architectural Design Studio, in International Journal of Applied Engineering Research ISSN 0973-4562 Volume 12, Number 18 (2017) pp. 7043-7051 © Research India Publications, p. 7044.

Referring to the school building as an architectural object, we want to outline how it dialogues with the context through specific typological choices or compositional experiments completely new with respect to the tradition of school construction of the past two centuries. In some cases the final result can be a building that is not easily assimilated to a school, but not for this reason less functional or appealing.
Children's space should be great space (…) The can be imaginative, inviting and exiting without any props or themes. Framing views, capturing the enchantment of the context such as rural landscape or urban scale through fenestration, is as essential as it free. It is the architecture that makes the space timeless and inspired. Architecture has the power to enchant, mystify, and inspire people of all ages. [Feinberg, Keller, 2010, p.79].
Therefore, The Twenty-First century school requires careful planning not only in interiors and furnishings, but it must start from the configuration of the volumes and their relationship with the urban and environmental surroundings. An issue increasingly considered in the design of new schools is the care of immediate and larger outdoor spaces, with a view to increasingly projecting the school universe towards the outside world and vice versa.
In the tradition of school architecture, the introverted approach prevailed by school designers, with the main goal of stimulating the sense of shared identity for students.

Pedagogical studies for over a century prove that the students' motivation and involvement is fostered by a correct environment.
The school architecture can impact learning when it is designed to be permeable to the community that lives in the immediate neighborhood and, in some cases, the wider community.
The school is today the setting of a student generation immersed in a globalized society.
The use of continuous connections with technological devices in communication requires an adjustment of physical connections between school spaces and community spaces.
Contemporary school architecture today requires a certain level of permeability with the community, in the perspective of an extroverted approach.
The idea of an extroverted school recalls for a further facet of the term context.
Stringer develops a conceptual framework about the school context in her publication "Capacity Building for school Improvement", according to which (…) *Context in itself is a multi-dimensional concept that requires deconstruction. Schools are embedded in external (macro) and internal (micro) contexts within which capacity building for improvement eventuates. Both external and internal determinants of context influence how the construct is conceived. For example, values, beliefs and norms of an external context, coupled with those of an internal context influence the development of a particular mindset and specific improvement outcomes. These determinants influence the making and taking of decisions to build capacity responsive of situated need.* [Stringer, 2013, pp.17-18].
In the world of school today the role of corporations, such as staff, students and parents, is influential in affecting school management choices in a global sense, in order to satisfy different needs and aspirations.
Stringer defines "Capacity Building for School Improvement" as a collective goal deriving from a vision shared by all stakeholders. Practices that promote the school vision improvement are the strategic plans focused on student centred learning, on improvement attitude, accountability and sense of community.
To implement these practices it is necessary to involve and interact with many stakeholders, with the aim of conceptualizing and transmitting a vision that foster the collective activity.
An updated view of the school requires regular reviews and changes to processes, structures and values depending on the variable internal and external conditions.
The school systems, processes and structures should be flexible elements and ready for change.
This is a central topic to promote capacity building for school improvement. The key to this vision is the key objective of promoting the ideal of student learning. [Stringer, 2013, pp.17-33].

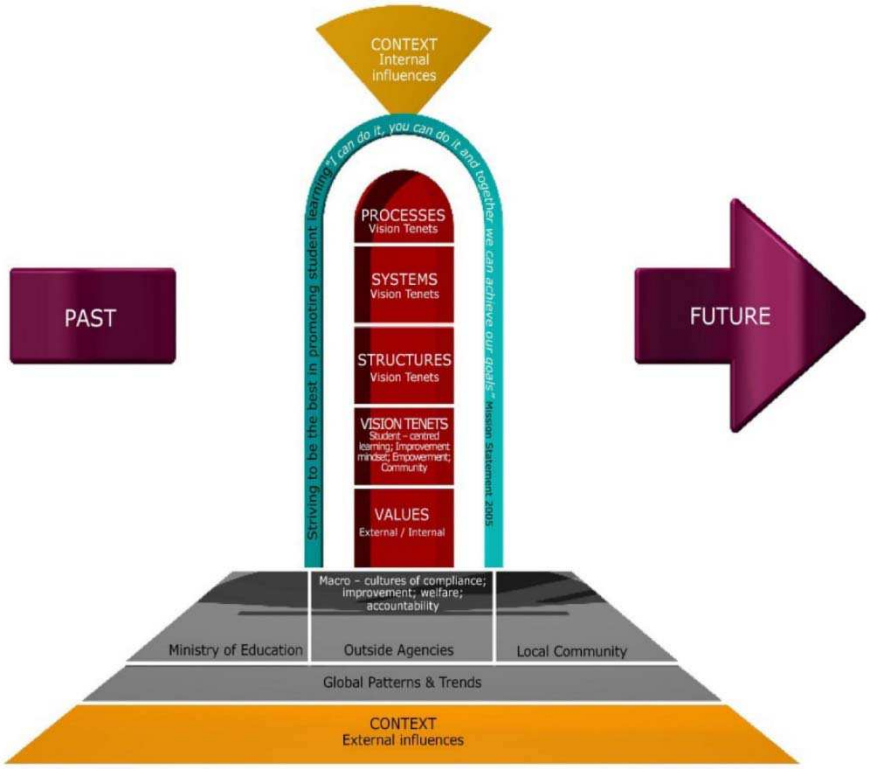


Fig. 2-2 Diagram illustrating the essential school attribute to promote the capacity building for school improvement. In Stringer P. [2013], Capacity Building for School Improvement, Sense Publishers, Rotterdam/Boston/Taipei, p.32.

The contemporary school is now required a great capacity for relationship with the various contexts, with the surrounding public spaces and the residential quarter, through a flexible plan, spatial complexity, ease of access to the outside and permeability.

Fig. 2-3 Internal and external views of International School The Hague. (© atelier PRO)

The International School The Hague (ISH), on the western coast of the Netherlands, reflects this vision, with its over a thousand students from early childhood to 18 years of age from sixty different nationalities.
It's a multi-scale educational architecture that offers a variety of learning spaces: from the central square,
the heart of the complex, to the large balconies used as connectives and for collaborative study.

The house system is used, as a method of scanning spaces to offer personalized environments according to the different ages and learning needs. These spaces are classified into Playgroup, a Primary, a Middle and Lower and an Upper-House.

The international vocation of the school is also attested by its openness to the community, as it hosts cultural events, courses and international manifestations. [Mellegers, 2008].

In the light of these considerations we can say that the school today is not only a city architecture but is itself a small city, with different spaces for different uses and users, in a dense network of relations with the city.

2.1. Educational architecture in urban and landscapes context

During the 20th. and 21st. centuries, the design and style of school architecture has continued to be of great interest, and has produced buildings considered exemplary both for the quality of their construction, and because they provide suitable physical and social models in specific urban contexts.

At the turn of the century, the theme of education, including its various accompanying aspects and subtopics, has assumed primary importance in cultural debate internationally.

There is a wide range of literature on the architecture, treating such subjects as the relation between aspects of architecture and sub-topics such as pedagogy, the history of school architecture in connection with school reform, as also a wide repertory of new school architecture by more or less well known architects.

In the light of research so far, a sector in need of further study, in particular in the Italian scientific area, is that concerning the relations between school spaces and urban and extra-urban areas.

In particular, this study examines practice concerning the development of school buildings and learning areas in relation to their urban and landscape contexts. Some good practice in various European countries provides a valid model for Italian architects, who may refer to such models when drawing up plans of quality for both methodological programmes and in architectural terms for the final designs.

Although this research examines examples of interest in countries in their specific contexts outside Europe, such as Eastern countries, America and Australia, the main focus is on designs for schools in European contexts, such urban spaces and landscapes being more similar to those in Italy and thus more easily adopted as good practice.

Northern Europe, in particular the United Kingdom, Holland, Germany, Spain and Portugal, offers valid examples.

With a view to analysing the way contemporary school buildings are placed in their surroundings, reference is made to schools designed by architects in Europe illustrating a variety of solutions to problems of space, design and style.

Of particular interest is the compositional layout understood as the design and construction of a school building in relation to the design and construction of the town, its character and layout past and present.

The attempt here is thus to select designs offering suitable solutions not only to the functions within the building, but also to the needs of the quarters housing these schools and in some cases those of the whole town.

The accent will be on school architecture which is not self-referential, but which invites interrelations with a pre-existing environment, thereby placing architecture and the processes of landscape transformation side by side.

As in Durbiano and Robiglio, the idea of the landscape is taken as a field in which there is no gap between architectural objects and their surroundings, nor between operational fields such as town planning, urban sociology, pedagogy and applied physiology (a science which studies the human ability to integrate with the environment). In line with thoughts on the subject in the Italian debate, landscape is not meant as an isolated technical and

professional discipline, as in the British tradition of *landscape*, but rather is characterised by a *value of design, which anchors the landscape to its own products, and in which architecture is irrevocably juxtaposed to history and environment as landscape.* [Durbiano, Robiglio, 2003, p.6-8]

In the Italian debate on historic centres and the protection of towns as they are, the landscape has a unifying function. It is a complex of spaces which accrue meaning in virtue of the relations between their separate parts. The lack of continuity and articulation of the landscape interpreted as a crisis in the *"links with the past" imposing a new formulation of the relation between the parts and the whole of the territory.* [Durbiano, Robiglio, 2003, p.27]

Contemporary school architecture stands in relation to the landscape in very different ways. In some cases it is conceived in continuity with an extremely historical context, while in others it is an attempt to create new relations through forms and spaces which burst into the pre-existent. In many cases, however, schools are built outside urban centres, establishing a strong relationship with their environmental context.

This research moves towards a sounding of the relations between the built-up space of the school and the empty space surrounding it. The best designs are those in which surrounding space becomes a connecting link between the building and the total landscape, a unity of the natural and orographic, architecture and streets.

Here school architecture will be identified, keeping in mind the specific sites for which it was thought and on which built, following criteria of awareness of the town and the meaning of the value of the context.

Starting a design from context is a classic theme in architectural literature. An attempt will be made to discuss this subject with specific reference to school "context" and the influence this has or does not have on the architectural design.

Focus on context in architecture, especially in the American literature, is a theme associated with three areas: formal models, models of activity and climate models [Gaines, 1980].

In this research, attention is focused on formal contextual models, since this is the sphere closest to the work of an architect, and hence most applicable.

(*Specifically, these patterns are space, shape, scale, mass and proportion, pieces and details, and material, texture and color. They constitute identifiable micro and macro physical characteristics within the environment-the elements of building, sites, and setting. It is through the continuation of one or more of these variables that designers seek visually to unite their work with the surroundings.)* [Gaines, 1980]

In Brent Brolin's introduction to his "Architecture in Context" he outlines the basic ways of designing new buildings by adhering to the character of those surrounding it: the architectural elements of the surroundings can be reproduced literally, or new forms can be used to evoke or even emphasise the character of existing buildings: *on the one hand one may literally copy architectural elements from surroundings; on the other, one may use totally new forms to evoke, perhaps even to enhance, the visual flavour of existing buildings.)* [Brolin, 1980, p.5]

The author analyses the visual problems facing designers when they design new buildings in urban areas containing historic buildings. He does not aim to assess the aesthetic quality

of the design in absolute, or the architectural success of the new building based on the function for which it is designed, or its relationship to nature: *He looks only at the visual problems which designers face when trying to fit new buildings with old. He does not try to measure the absolute beauty of these designs, their success in performing the assigned functions or their relationship to nature*

Bolin's study outlines methods and good practice which create a coherent and congenial visual relationship between buildings. Of particular interest for strategies of research and interpretative models are the examples he categorises as: "*New Buildings with Other New Buildings*" and *"The Modernist point of View: Contrasting New with Old".*

While considering modernist architecture the answer to functional and economic needs, Brolin points out how modernist architects have not often accounted for the impact a new building has on a context of pre-existing buildings, a problem often held to be anachronistic. Brolin's comment on this is sarcastic: *To the enthusiastic modernist, indeed, it was essential that a building stand out from its neighbors, as a symbol of the future. This visual incongruity was literally not seen as a problem. Modernists looked beyond these visual facts to an ideal future when older buildings would no longer crowd in on their dreams. They, and those who shared their reveries, ignored the visually inadequate past and present in their quest for a grander future).* [Brolin, 1980, p.11]

According to Brolin, designing a building to fit well in context does not mean imitating the surrounding architecture. For an architect, it means using creativity and skill.

Of interest is the passage in which the architectural solutions are defined as "links" establishing a physical connection between old and new buildings through the use of connecting structures. [Brolin, 1980, p.45]

According to Brolin, in using such volumes architects attempt to resolve the conflict, not always wholly successfully, by using contemporary forms. In many cases, in an effort to respect the identity of the old and bridge the gap between old and new buildings, sufficient, though unsophisticated, solutions are sought.

Bolin gives numerous examples of educational buildings in Great Britain and America from the 1960s and '70s, such as the Portsmouth Library in New Hampshire and some spaces in the Vassar College Centre at Poughkeepsie, New York, where attempts to link old and new architecture using linear solutions and a proportioned stairway are visible from both within and without.

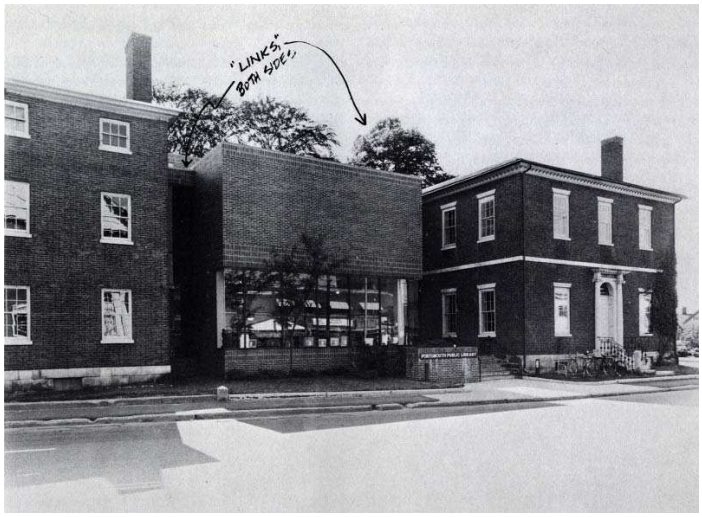
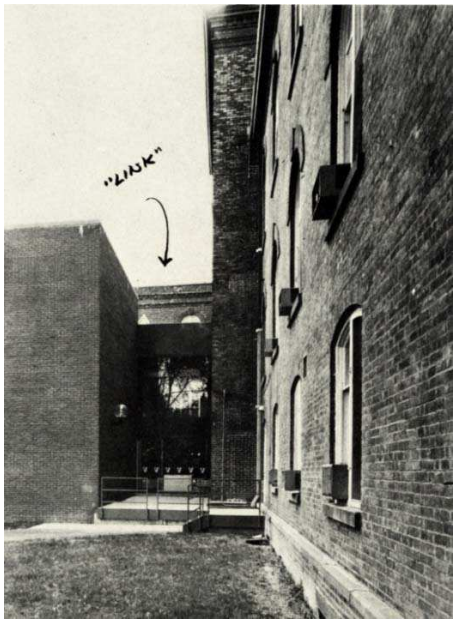


Fig. 2-4 Portsmouth Library and Addition, Portsmouth, New Hampshire. Original building by Charles Bulfinch (1806), addition by Stahl-Bennet (1975). In Brolin B.C. [1980], Architecture in context. Fitting new buildings with old, Published by Van Nostrand Reinhold Company, New York Cincinnati Toronto London Melbourne, p.69.



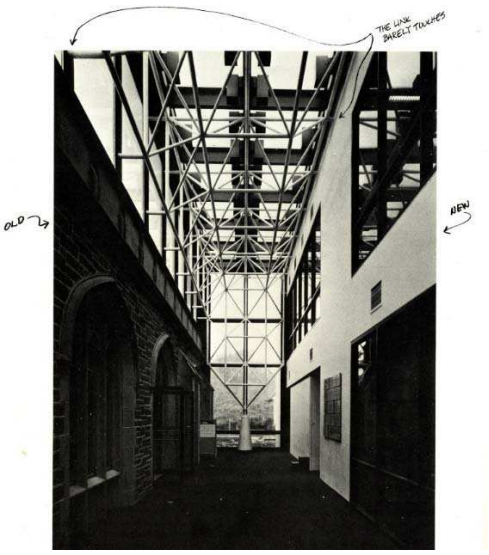


Fig. 2-5 (1) "Link" between the Main Building, James Renwick (1865) and the Vassar College Center (1977). The Main Building is in the French II Empire Style. Addition by Shelpey Bulfinch Richardson and Abbot. In Brolin B.C. [1980], Architecture in context. Fitting new buildings with old, Published by Van Nostrand Reinhold Company, New York Cincinnati Toronto London Melbourne, p.47.
(2) Interior view of "link" connecting the Helen D. Lockwood Library and its addition; Hellmuth, Obata & Kassabaum, Vassar College, Poughkeepsie, New York (1976). In Brolin B.C. [1980], Architecture in context. Fitting new buildings with old, Published by Van Nostrand Reinhold Company, New York Cincinnati Toronto London Melbourne, p.46.

Fig. 2-6 (1) Vassar College Center, Vassar College, Poughkeepsie, New York; Shepley Bulfinch Richardson and Abbot (1977) and the Main Building; James Renwick (1865). In Brolin B.C. [1980], Architecture in context. Fitting new buildings with old, Published by Van Nostrand Reinhold Company, New York Cincinnati Toronto London Melbourne, p.56.
(2) Interior of College Center, showing the old wing of the Main Building, around which is built. In Brolin B.C. [1980], Architecture in context. Fitting new buildings with old, Published by Van Nostrand Reinhold Company, New York Cincinnati Toronto London Melbourne, p.56.

Some contemporary school buildings are similarly analysed, focusing on this relationship and on the quality of individual structures suitably adapted to the buildings nearest the school, the quarter and the town. School buildings should also be considered in relation to more rarefied surroundings, with fewer buildings or within a natural landscape.
21st. century school architecture offers a variety of examples of extended school buildings juxtaposed to new buildings.
Holland has a rich tradition of learning spaces and a multiplicity of buildings of quality which respect both the functions of the school and its links with the urban surroundings.
For the extension and renewal of the Liceo Metis Montessori in Amsterdam, designed by the Dutch office Atelier PRO, particular attention to the pre-existing school building was necessary; indeed, the local Bureau of Monuments and Archeology (BMA) is engaged in the project.
The original school lies along Amsterdam's Oosterpark, and is a courtyard closed on three sides, the central space being planted with trees.

Fig. 2-7 (1) Areal photo (© Peter Elenbaas). (1) North facade patio with the monumental plane tree (photo © atelier PRO)

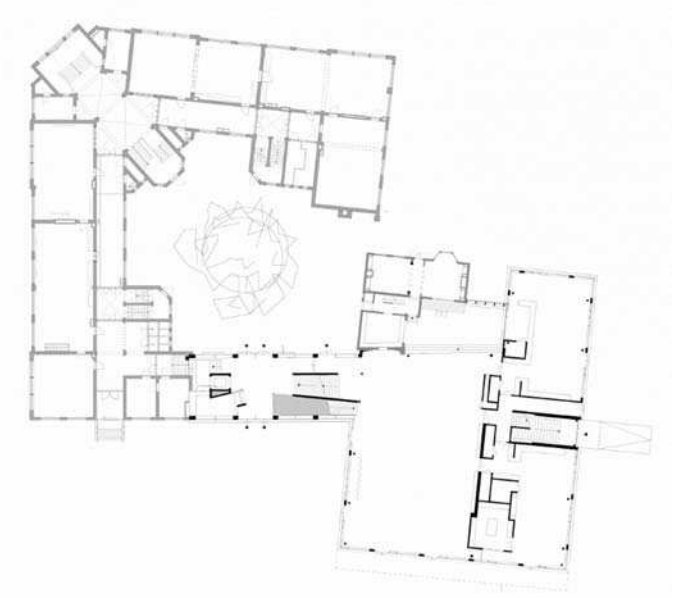


Fig. 2-8 Ground floor existing and new building (© atelier PRO)

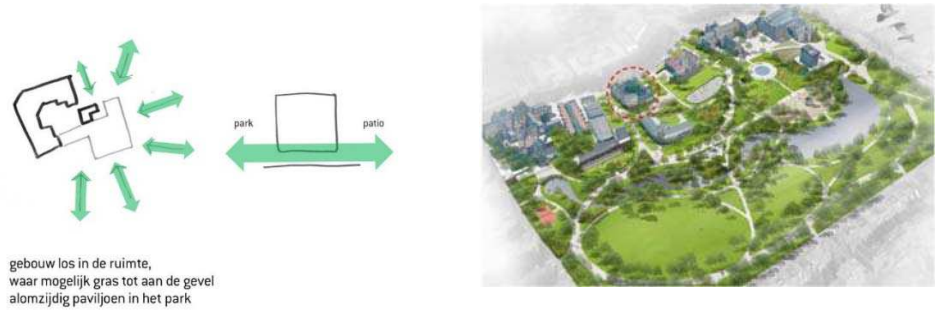


Fig. 2-9 (1) Sketch of the relationship between the new building and the context (© atelier PRO).
(2) Project of the park by Buro Sant en Co

The secondary school, called Hoogere Burgerschool (HBS) dating back to 1904, had room for up to 700 students. When extended in 2018, its capacity rose to 900.
Atelier PRO designers also worked on the interior renovation of the old school, transforming it into a light, open learning-space, in accordance with the pedagogic precepts of the Montessori method.

Fig. 2-10 (1) The connector, connection between new construction and old building (photo © atelier PRO)
(2) Multipurpose area and view on pre-existing building (photo © atelier PRO)

In none of the designs is there any attempt to pick out the vertical partitioning of the fronts, nor is there any sign of revival or suggestion of continuity through the use of similar materials. On the contrary, the juxtaposition of the covering perforated black panels to the bricks of the old building produces a contrast in colour and materials.
The proportions of the extension of the Ecole Elementaire d'Application are commensurate with the previous school building on the corner of Rue du Pére Brottier and Avenue Boudon in Paris.
Along the pedestrian-friendly streets in the quarter near the Villa Montmorency area, the more recent addition of a wing to the old school with white walls and mansard roofs in Rue

du Pére Brottier is obvious: a metal and glass corridor connecting the old school building to the new.



Fig. 2-11 (1) Perspective view of the Ecole Elementaire d'Application in Avenue Boudon, Paris. (© author's photo).
(2) Aerial view of the Ecole Elementaire d'Application in Avenue Boudon, Paris. (Google Maps - 3D)
(3) Perspective view of the connecting point between the pre-existing building and the extension of the Ecole Elementaire d'Application in Avenue Boudon, Paris. (Google Street View – Screen shot).
(4) Metal epigraph on the surrounding wall of the Ecole Elementaire d'Application. (© author's photo)

In this case too, the new design shows a similar approach to the previous one. The architectural characteristics are a far cry from 19th. century forms and rhythms - the style is contemporary in the purity of its volumes and technology of materials.
A school is one of the most important public buildings in a town, and as such is a member of the triad "town – public building – house" which according to Christian Norberg-Schulz makes up the total environment.
It is in constant relation to nature, which in the area of studies on architecture is given by the "landscape". For Norberg-Schulz: *living means becoming friends with a natural place. When inhabitation is complete, the human aspiration to belong and participate has been achieved. We can also say that living consists in orientation and identification. We have to find out where we are and who we are for our existence to acquire meaning. Orientation and identification are achieved through organised space and built form, that is through architecture.*

*(*Original text: *abitare significa fare amicizia con un luogo naturale. Quando l'abitare è compiuto, l'aspirazione umana all'appartenenza e alla partecipazione è raggiunta. Possiamo anche dire che l'abitare consiste di orientamento e identificazione. Dobbiamo scoprire dove siamo e chi siamo, affinché la nostra esistenza acquisti di significato. Orientamento e identificazione si raggiungono tramite lo spazio organizzato e la forma costruita, cioè, tramite l'architettura).* [Norberg-Schulz, 1984, p.7].

The ideas carried forward in this research concern ways in which school architecture can enhance the identification of children, young students and their families with the learning environment of school, and the environment created by quarter, town and landscape.

Identifying with a place means realising that one belongs to that place; this happens when a connection is established between humans and their environment.

The school as a public building recalls Morberg-Schulz's ideas on collective living and public living, where a public building interprets a series of shared values and objectives, thus laying the foundations for a community or a society. [Norberg-Schulz, 1984, p.13].

2.1.1. School architecture and landscape

The site on which a school is built is of basic importance. It can determine both the character of the architecture and the practical uses of the building.
The choice of past and present school sites tends to be based on functional criteria underpinning human settlements and social requirements.
A school building may be considered educative architecture when designed not only as a functional container, but also when the project includes quality.
Of the qualities making the difference between building and architecture are the cultural, historic and physical qualities of a place. These should be considered essential architectural objectives.
The link between architectural artefact and place is a recurrent leitmotiv in the writings of Norman Schulz, who defines: *the architectural image as an image of the place. It is precisely as "art of the place" that architecture can help mend the fracture between thought and feeling which, after all, derives from the history of the Modern Movement* [Norberg-Schulz, 1996, p.11].
Norberg Schulz' thoughts on architecture and place do not assess architecture as artefact. Rather, his interest lies in the manifestation of the cultural character and building tradition of a specific place, in as far as architecture has been the "art of the place" through history.
He maintains that local architecture is that which best reveals an 'image of the world'. As it reflects the environment in the most concrete and tangible way, it communicates a universal value. By the term environment he does not mean a "space", but a specific place where people carry on their lives.
In order to analyse the close relation between the environment and traditional architecture, and examine how the latter has become a lesson for modern and contemporary architecture, some 20th. century school buildings in sparsely inhabited areas will be examined, even in some cases in the heart of the country.
The Modern Movement considered that because local architectural methods were based on manual and artisan techniques, and thus close to reality, they could be handed down, their variability over time and dependence on local conditions imbuing them with universal value.
According to Norbert Schulz modern architecture was moved to overcome the dichotomy between thought and feeling, and between the scientific approach to architecture, as in the saying "form follows function", and the process of artistic creation. [Norberg-Schulz, 1996, p.105].
The link between the tectonics of a building, the functional quality of its architecture and its relation to place is evident in the works of such architects as Frank Lloyd Wright e Sverre Fehn.
Both consider essential the adaptation of project to site, and the use of natural materials relating to the surrounding environment.

Connection to place in Wright and Fehn's works is not expressed solely by the disposition of volumes in space, but also through metrical surfaces harking back to traditional local materials.

In Fehn's works the link with place and the basic poetics of the architecture are essential elements in his designs, as also his personality. These characteristics are expressed by Glenn Marcutt, who studied them and personally experimented with the ideas behind Fehn's architecture: *Fehn was a man of his land. A man of immense integrity. An emotional, determined, upright human being. His architecture is some of the most sublime and powerful work of the 20th century. […] Le Corbusier and Alvar Aalto were of course remarkable, but Fehn had a connection to place, materials, light, history, all synthesised into an architecture that belongs to where it is. […] He was rooted in his land, as a thinker and as a practitioner; he understood place, technology and appropriate architecture of our time. He was a proud Norwegian man.* [Murcutt, 2009, p.28].

In his design for Oslo's Skadalen School (1969-1975), the architect combines the poetic and the rational, thus allowing the creation of architecture closely related to the landscape, including the romantic aspects. The school was designed for the rehabilitation of deaf children, which made it unique in Scandinavia in the mid-1970s.

The school complex includes nursery, primary and secondary schools, dormitories, and spaces for administration and sports. The buildings are scattered over a slope; the school thus follows the natural contours of the terrain. The design is open-plan to allow for student mobility, causing movement from living quarters to school areas and thereby enhancing students' awareness of space and developing their sense of orientation.

Fehn also comments on the pedagogy of school architecture, declaring that: "*The architect has to recognise your physical size. […] You cannot accept a point of view that says the structure has to stand and wait, expecting you to grow and reach twenty-one years of age before you fit into the world. […] No pedagogy can reach the child if the architecture does not recognise the child's dimensions".* [Fehn, 2009, p.36].

The close connection between building and environment is emphasised by the solid character of the architecture which lacks formalism: simple, geometric volumes anchored to the landscape. The body of the buildings is adapted to the landscape, the volumes inside and out are on different levels connected by stairs, which are not only service areas but also elements of design.

The architecture lacks formalism or sculptural tendencies due to the figurative choices: straight geometric lines and curves, with parallelepiped, polygonal and circular volumes. The traditional building materials such as exposed brickwork and reinforced concrete on large surfaces, and wood for external parapets and inside handrails, also contribute to the simplicity of the building.

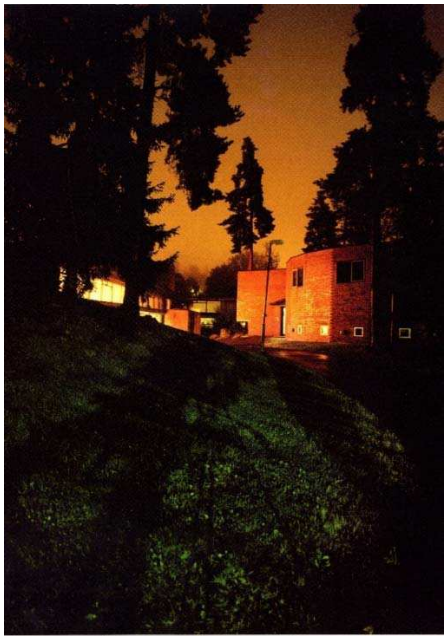
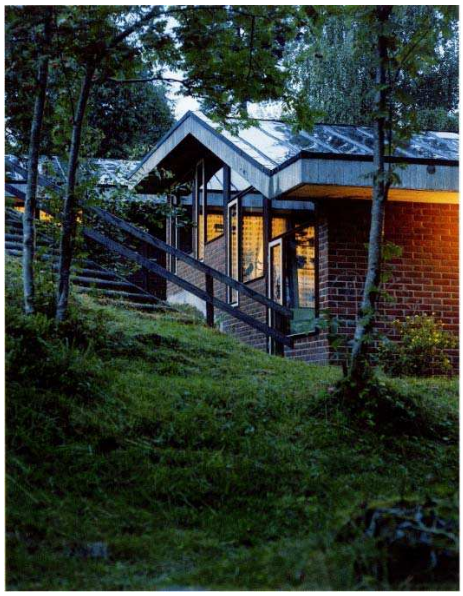


Fig. 2-12 (1) Skadalen school, view from the approach (photo Ivan Brodey). (2) Location plan, Skadalen school, 1975.



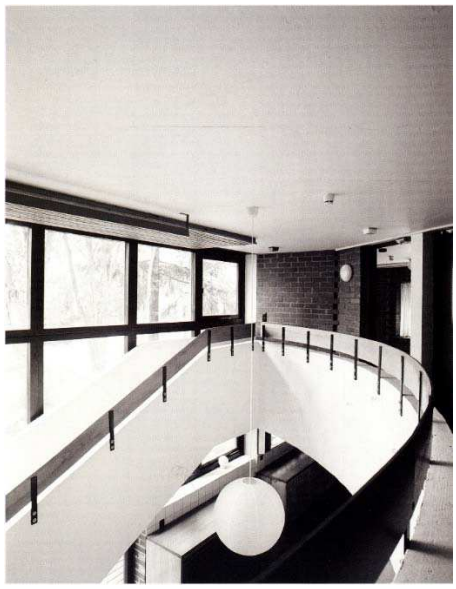


Fig. 2-13 (1) Skadalen school, view of the children's dormitory (photo Ivan Brodey). (2) Skadalen school, central stairwell in the observation wing (photo Ivan Brodey).

The children's dormitories are staggered, dropping down with the terrain. The older children's dormitories are rectangular with a small central courtyard roofed by a series

of concrete wagon vaults. The administrative areas, consisting of a long linear building, to which is attached another shorter and transversal, run parallel to the dormitories.
These buildings are on a higher level than the main entrance, through which the Nursery School, activities and observation wings are accessed. A playing field forms the hub around which range the main volumes of the complex, including the swimming pool.
Talking of Norwegian architecture, and in particular the work of Fehn, the landscape architect Ola Berrum says: "*The meeting between landscape and building is at its best when the resistance of the site has been turned into an inspiration, so place and proposal play together, producing unexpected qualities. […]The work of Sverre Fehn takes obvious and unique position in Norwegian post-war architecture. Hardly any other architect has shown such sensitivity to the qualities of the landscape, both to the larger scale and to the typical Norwegian site, rough and knotted as it is* " [Bettum, 2009, p.88].

Fig. 2-14 (1) Skadalen school, view of the teenagers' dormitory (photo Ivan Brodey). (2) Skadalen school, entrance to the activity building (photo Ivan Brodey).

The landscape round Fehn's school is the building's main interlocutor. It projects the environmental qualities into his design.
The human scale of the school and the strong rapport with the landscape and even the materials used suggest a parallelism between Fehn's designs and those of De Carlo in Urbino.
Although these are not truly school architecture, they are none the less spaces for education, in that they house university student residences, as well as conference rooms and individual and group study spaces. In his Urbino *Collegi* De Carlo centres his design on the relation between space and users, architecture as urban artefact and use. According to him, the role of the architect should be to examine the cultural and social

context, involving the inhabitants in a process of participation, and translating the requirements of the territory and its inhabitants into an architectural project.
In all his architecture, and in particular his work in Urbino, he establishes a close tie with the natural surrounding space. According to De Carlo, architecture and town planning are inseparable, a principle evident in his designs which create close contact with both territory and *genius loci*.

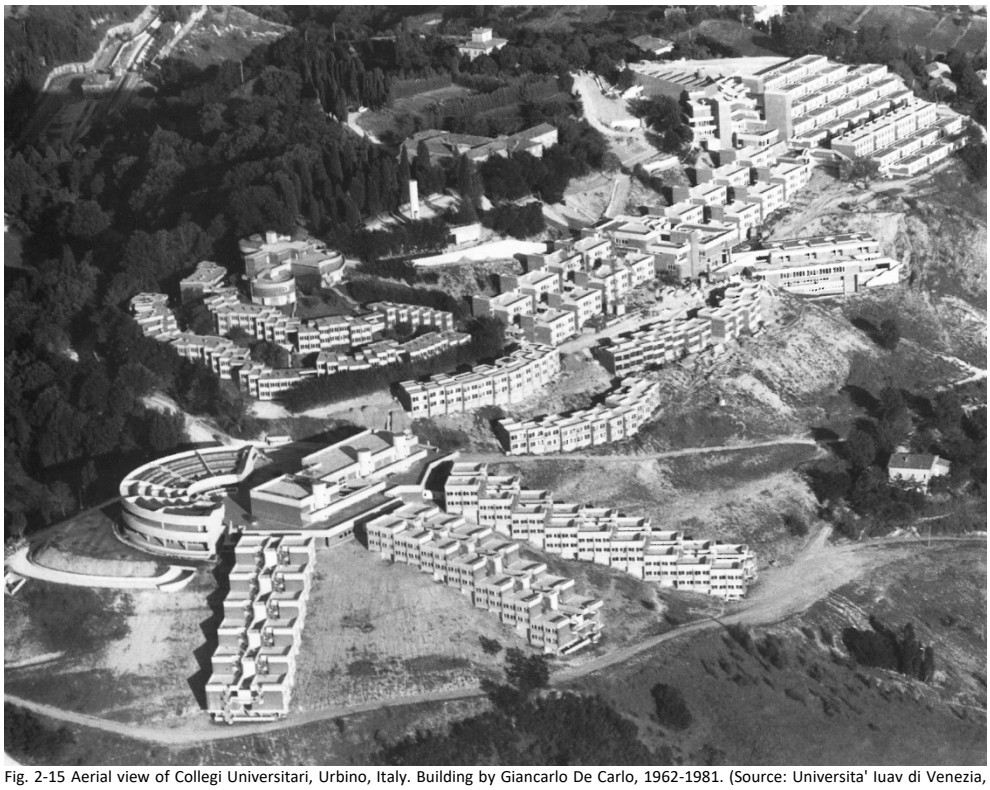


Fig. 2-15 Aerial view of Collegi Universitari, Urbino, Italy. Building by Giancarlo De Carlo, 1962-1981. (Source: Universita' Iuav di Venezia, Archivio Progetti, Fondo De Carlo).

Fig. 2-16 (1) Collegio Aquilone-Serpentine, Urbino, Italy. Building by Giancarlo De Carlo, 1973-1981 (photo © Giovanni Bellucci).
(2) View of Collegio del Colle, Urbino, Italy. Building by Giancarlo De Carlo, 1962-1966 (©author's photo).

In the University *Collegi* in Urbino, as in the case of Fehn's Skadalen School, the main entrance is at the top, while the students' living quarters follow the terrain in steps downwards, facing the panorama.

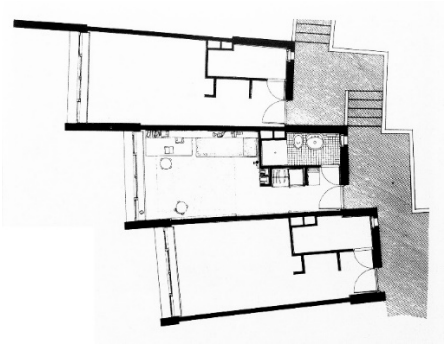


Fig. 2-17 (1) Plan of the rooms in Collegio del Colle, Urbino, Italy. Building by Giancarlo De Carlo.
(2) Photo of room interior in Collegio del Colle (©author's photo).

When emphasising the influence of the physical and social context and the historic town of Urbino on De Carlo's designs, in the words of Henry Plummer: "De Carlo's intention was not to reproduce the original forms of a bygone age, but to learn from the way in which a multiplicity of paths harmonise with timeless human action, and then translate this energy into a contemporary idiom. However typically modern in form and character, the *Collegio* has a place among many other buildings, retracing the design and model of the pedestrian paths which spread across the steep slopes of Urbino." [Plummer, 2016, p.151]

Among De Carlo's work in Urbino there is also a secondary school, the *Istituto d'Arte* (1970-82), formerly the *Scuola del Libro*. This building, in an expanding area north of the town outside the historic centre, stands in visual relation to nature on a hillside physically facing the countryside. [De Carlo, 1947].

The completed building is not an exact replica of the architect's original design, since only two of the four lots originally intended by De Carlo were built. Added to this, insufficient maintenance is causing widespread criticism, including that of Vittorio Sgarbi [Ottaviani, 2014].

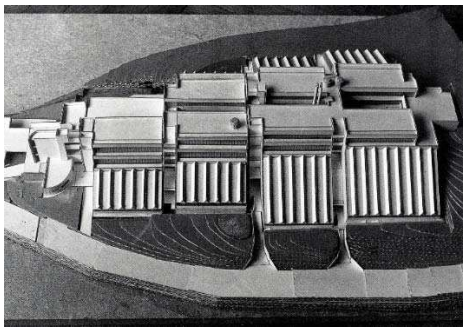


Fig. 2-18 (1) Istituto d'Arte of Urbino, maquette. Project by Giancarlo De Carlo. View of Istituto d'Arte of Urbino.
(2) Building by Giancarlo De Carlo (photo © Giovanni Bellucci).

Fig. 2-19 Interior view of Istituto d'Arte of Urbino. Building by Giancarlo De Carlo (photo © Giovanni Bellucci).

The interior of the *Istituto d'Arte* reinterprets the pyramidal form of the exterior, especially in the laboratory areas, large areas on the ground floor with a series of sloping galleries connected by helicoid stairs, on which the lessons are held.
De Carlo expressed his thoughts on school and on its connection with the territorial and social context in an article entitled *La scuola e l'urbanistica* (The School and Town Planning) published in a monograph number of 'Domus' (1947), under the editor Nathan Rogers, entirely dedicated to architecture for education.
De Carlo mentions some avant-garde school architecture built in Switzerland, Holland, England and the United States during the first half of the 20th. century, countries where social and environmental requirements are considered of great importance, as are the links between school and town, examples in which the school becomes the nucleus of social life, connected to the life of the urban community. [De Carlo, 1947].
Moving in Rogers' cultural sphere was another architect interested in the theme of schools, starting with questions concerning the historical, and physical qualities of the places, and a detailed analysis of the landscape and local building traditions.
Enrico Mantero's designs for schools, following on from the rationalist tradition of Como, has a place among the works of architects of so-called "educated professionalism" (*professionismo colto)* in 20th. century Italy.

In Mantero's school architecture in Lombardy in the mid-sixties of the last century, the line of continuity with the architecture of Terragni and Cattaneo can be traced, but each time with the intention of redefining the compositional matrix, based on the given contingencies of place and use [Ferrari, 2016, p.69].
Enrico Mantero designed numerous schools in the area of Como: the junior secondary schools (scuole medie) in Albate, Lipomo, Bregnano, Lomazzo; the elementary schools in Olgiate Comasco, Tavernerio, Merone, Rebbio, Cernobbio, Porlezza; the professional school Enfapi in Lurate Caccivio and Erba.
The Junior Secondary School of Lipomo and the Technical Institute for Surveyors in Lecco are of particular interest in analysing the rapport with the natural context.

Fig. 2-20 (1) Middle school in Lipomo (Como), Italy.
(2) Building by Enrico Mantero, 1980-84 (photos ©Francesco Pavan- ©Stefano Topuntoli).
(3) Middle school in Lipomo (Como), Italy. View of the school set in the landscape.
(4) View of the landscape from a classroom (photos ©Francesco Pavan).

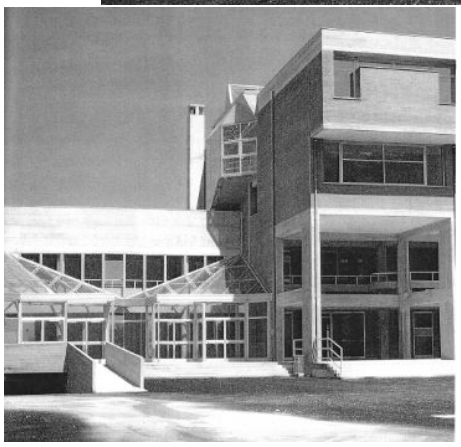
Fig. 2-21 Technical institute for surveyors “Bovara” a Lecco, Italy. Building by Enrico Mantero, 1970 (©Francesco Pavan)

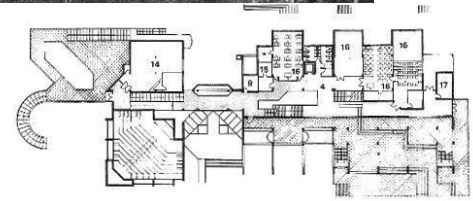
Enrico Mantero and his father, the engineer Gianni Mantero, are two important exponents of Lariano rationalism. The father was friends with Giuseppe Terragni and Pietro Lingeri. With them he shared the same cultural approach to architecture inherited by his son.

In all his schools, as in all his designs, Enrico Mantero finds a link with the historic town or the physical environment to produce simple structures of harmonious volumes.

Compositional research and technological experiment are of constant interest in the school of Lipomo, as can be seen in the use of light prefabrication and raw concrete, following the example of Le Corbusier, a constant point of reference for Mantero.
This gift for synthesis in design is also evident in the Istituto Tecnico Statale per Geometri (surveyors) “Bovara” in Lecco (1970), built entirely of cast in situ and prefabricated concrete, with a “V” shaped distribution plan: one wing for the gym and the other for classrooms, service areas and offices. The classrooms slot into a grid structure, over which is an unusual roof illuminating the art rooms from above. [Dell’Oro, 1997, p.467].
Mantero takes great care of the functional and compositional aspects of his designs, deriving from university teaching, when he searched for a balance between architectural and technological solutions.
Awareness of and search for physical and visual connections with the context of landscape is particularly marked in the Lipomo and Lecco schools. The Lipomo school consists of parallel longitudinal volumes that follow the slope of the land on shallow terraced steps. The layout of the school, which takes in the sweeping Comasco valley, echoes some of the traditional buildings in this frontier territory, such as dry stone walls and terraces, and the xenodochia along the Via Francigena.
The surveyors’ institute in Lecco condenses references to brutalist architecture in the squared volumes and the use of exposed reinforced concrete and Lombard Romanesque, of which Mantero said that he was constantly inspired by its complex ground plans and sections. The school is near steelworks in the outskirts, the prospects of which are reflected in the school architecture, where great pillars alternate with wide gaps in cement and glass blocks.
Although the building is in a productive urban area, the Lecco school relates to the natural surroundings very evocatively. The building stands at the foot of the Mountain of San Martino, a scenic backdrop to the architecture of the school visible from the classroom windows, and a constant presence for the students.
While researching school architecture with a particular connection to the landscape, a choice has been made to present lesser known designs, the work of architects who have in any case left their mark in the cultural context in which they worked.
It is the case of the numerous architects of schools working at Interstudio, a group of technical professionals still working in the province of Pesaro Urbino in the Italian Marche. The group includes the architects Yasuo Watanabe and Antonio Vecchi, and the engineers Carlo Ripanti and Ernesto Olmeda. The influence of Giancarlo De Carlo can be detected in their attention to the use of spaces and placement in the physical context and in the composition of volumes and the way materials are used.
Two of the group, Vecchi e Watanabe, collaborated with De Carlo while he was working on the *collegi* for Urbino University. This experience must have influenced the methods of design for learning areas used by Interstudio, since the theme of school building was to predominate in their work.
The school designed by Interstudio in particular relationship with its hilly surroundings is the Technical and Commercial Institute (Istituto Superiore ad indirizzo Tecnico

Commerciale) in Cagli, a small inland town in the Marche along the Via Flaminia connecting Rome to Fano on the Adroatic coast.
The school, which is outside the central inhabited area, is not easily reached on foot.
The architects of the design take the landscape as privileged interlocutor, using the topography as their point of departure to shape the plan.
The choice of building types is also in relation to the natural physical context, in that the distribution of spaces, passages and views aims to create a balance between nature and architecture.
The school at Cagli is designed to follow the movement of the terrain, visibly enveloping the landscape in the manifold views from different points in the interior, and physically embracing nature with trees close to the portico on the main front.
Architecture can establish a dialectic with context, in part submitting, in part dominating, as new architecture begins a process of constant transformation of landscape and territory [Cao, 1995, p.153].
The Cagli school is designed to mediate between functionality and flexibity of the spaces.
The building develops along a central axis which is not merely a connecting passage, but also a social area where students meet during break times. The various spaces lead off this central corridor in differing rhythms and groups, depending on their functions.





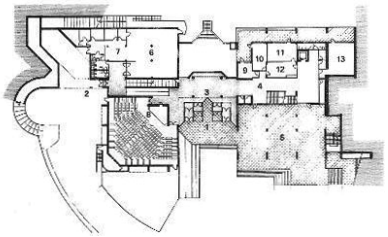


Fig. 2-22 (1) Commercial and Technical High School in Cagli (Pesaro-Urbino) Italy.
(2) Building by Interstudio. Views of the mail façade, with entrance to the school.
(3) Third floor plan and second floor plan (Source: A+U Magazine n. 187/1986. Interstudio Archive).

Fig. 2-23 (1) Commercial and Technical High School in Cagli (Pesaro-Urbino) Italy.
(2) (3) (4) External views of the building and central atrium space (©author's photo).

The main entrance divides the two groups: areas for communal activities, such as the auditorium and library are on the left, on the right are the classrooms for regular teaching and spaces for administration.
The architecture of this school is typologically and stylistically complex both in the organisation of the layout, which varies considerably on the different floors, and in the varying heights of the spaces.
The compositional choices are also dynamic in the play of filled and empty volumes, staircases and oblique walkways connecting corridors to the classrooms.

The view of the landscape is particularly fine seen from a poly-functional open space several levels up, on the southern side of the school.
The architect Watanabe's design is evidently intended to enable a view of the picturesque old centre from the interior of the school, in order to reinforce students' sense of identity with and pride in the small centre of Cagli, to which such notable designers as Francesco di Giorgio Martini once contributed. [Watanabe, 1 986, p.71].
Europe can boast numerous examples of school architecture on hilly and mountainous sites. A synthetic choice of schools is presented here, prevalently 20th. century and post-2000 Italian and European, considered interesting because built on sites in landscapes with which they relate in different ways: schools on the flat but near mountains; schools on hilly sites to which the architecture is adapted to the lie of the land; schools in flat countryside at times near watercourses.
The Jean Moulin High School at Revin, in France, designed by Duncan Lewis Scape Architecture, integrates with the landscape in that the new 2016 buildings, extensions of the original Modernist school building of the 1960s, are terraced and have green grass rooves.
The main entrance is accessed along a driveway at the lowest point. Leading off the foyer and following the lie of the land are long parallel blocks of classrooms. The beauty of the view is visible through the large windows.

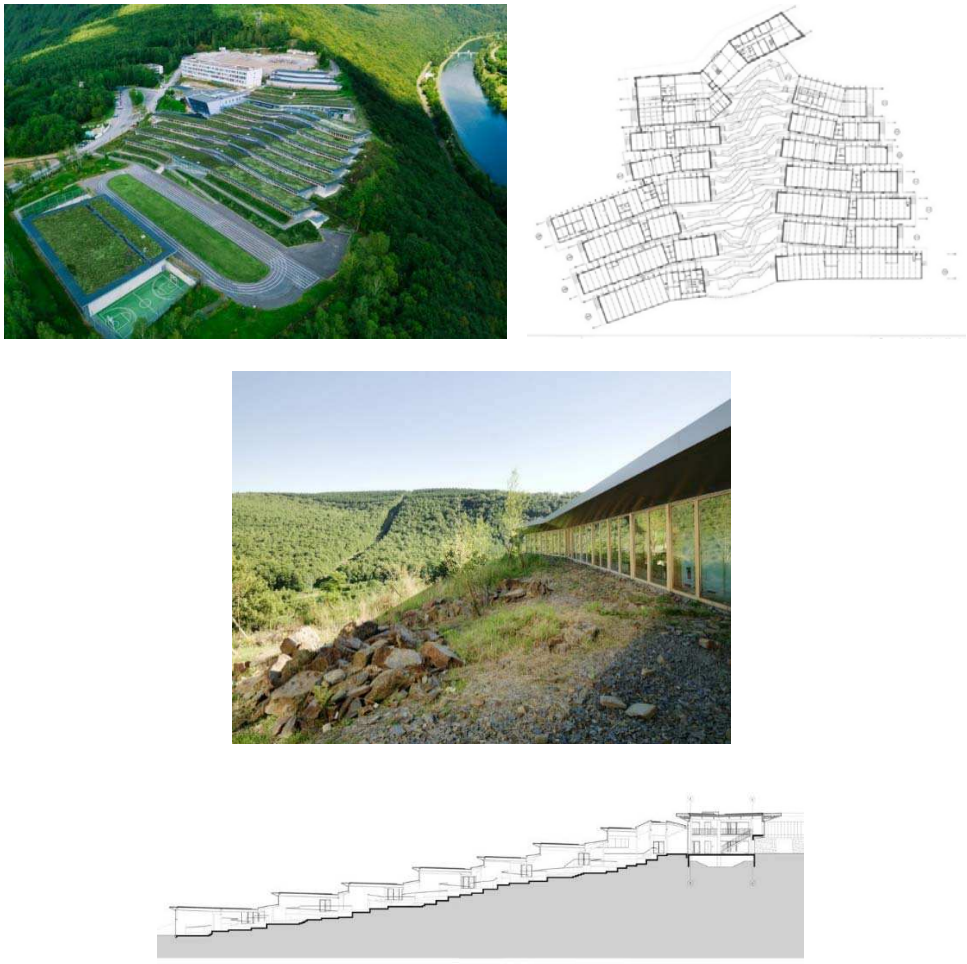


Fig. 2-24 (1) Jean Moulin High School. Building by Duncan Lewis Scape Architecture, Revin, France, 2016 (Photo ©Cyrelle Weiner).
(2) Drawing: ground floor and section by Duncan Lewis Scape Architecture Studio.

The open character of the school is apparent both from outside, it has no gates and is in harmony with the territory, and from inside, where there are great connecting areas for students to move around.
The infant school of Silandro, Province of Bolzano, by the architects Christian Kapeller and Stephan Marx, 2010 - '12, though smaller, relates similarly to the landscape. The school is built outside the village, near Monte Tramontana, in natural surroundings of stone terraces and ancient chestnut trees. The building is adapted to its surroundings not only for technical, but also pedagogic reasons: the children can use the space outside.

The outside areas are at the different levels of the land, and are organised according to Montessori disposition. The furniture is moveable in order to create flexible spaces suited to the various activities. The irregular shape of the building was dictated by the ancient chestnut trees, which have been preserved to create a reciprocal relation between architecture and nature.

Fig. 2-25 Kindergarten at Silandro (Bolzano), Italy. Building by Christian Kapeller and Stephan Marx. (Photo ©Rene Riller and Christian Kapeller).

The pedagogists Beate Weyland e Sandy Attia interviewed the school co-ordinator and the architect in order to analyse relations between the educational and architectural aspects of the school at Silandro.

The didactic orientation of the school is in "closed sections", the language is German. In order to have the architecture correspond to teaching requirements, the teachers were involved in the planning process of the building. School co-ordinator Elke Kofler explained:

We were able to take considerable part in the planning process. The architecture had to accommodate the fundamental aspects of our pedagogic approach. (…) We are for relatively open sections, a choice adopted in the architecture to. We want to give the children the stability they need, some, in fact, need a long time to get to know the environment, others want to explore it right away. We are divided in four sections, each unit is like a small apartment: there's a cloakroom, which is a room in itself, a group classroom, a lavatory and a utility room. The structure even takes account of acoustics, we can close the door and get on with what we're doing.

We are able to meet up with the other groups in chosen spaces, or for specific projects every day. There is also a large open space on the upper floor where we generally all have our snacks and lunch together. (…). We have a large area where we collect the Montessori material in the morning, which will rotate to each group (…) while during the afternoon (…) it is open to the other children. The Montessori approach was particularly important in planning the exterior which is all relatively unstructured and free. We like it very much (…) [Attia, Weyland, 2015, pp.132-135].

Koefler points out that architects do not often take into account the difference between open and closed spaces in pedagogy, nor how necessary it is to realise what the areas are to be used for, in order to get their dimensions and access to open spaces right. According to Koefler, the fixtures and fittings should also be carefully designed during

the planning stage not only to be practical and aesthetic, but also to correspond to their pedagogic functions. As co-ordinator of the Silandro school, her advice to architects is, before designing a school, to observe carefully how the teachers work.
The link with the landscape is visual, seen through the great frameless windows which make the front extremely fine looking, as does the choice of natural materials used for cladding, like the front in natural oak, thus integrating the building and the typical landscape of the Val Venosta.

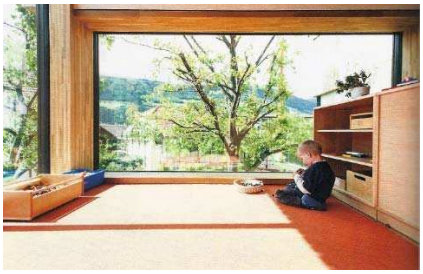


Fig. 2-26 Kindergarten at Silandro (Bolzano), Italy. Building by Christian Kapeller and Stephan Marx. Photo in Attia S., Weyland B. [2015], Progettare scuole tra pedagogia e architettura, Guerini scientifica, Milano, pp.133-138.

In the European context, a variety of projects, both in the 1900s and in more recent years, show the connections and juxtapositions that school architecture establishes with different landscapes.

An interesting project from the 1980s of the 1900s could be mentioned, which was recently renovated in the access area and foyer.

The Lehrbauhof, a professional school building, was designed and completed in Salzburg in 1989 by the Swiss architect Michael Alder, Architects BSA, with the partner Hanspeter Muller, Architects HTL.

The project of the original building demonstrates the artisan solidity and the expertise of an architect who, according to Loos's aphorism, is a mason who studied Latin. [Kapfinger, 1990, p.26].

The building is related to the context on both a physical and functional level, as it contains workshops and classrooms for students and for adult retraining.

In the meantime, it is a place where the sphere of education and the economic sphere come into contact, since the spaces of the schools are open to the local construction companies.

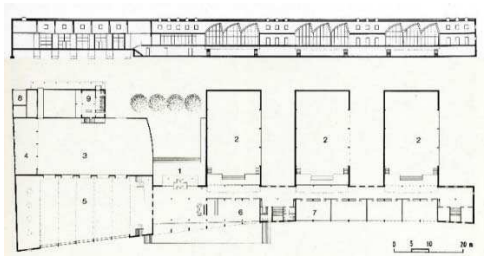


Fig. 2-27 (1) Leihbaunhof in Salzburg, Austria. Building designed by architect Michael Alder in 1989.
(2) Longittudinal section and plan of the ground floor. Aerial view (Photo ©Lore Kelly).
(3) Overall view from the north (Photo ©Margherita Krischanitz).
(4) Interior view of the corridor in double height (Photo ©Lore Kelly).

The composition of the built volumes is clear and respects the conditions of the place. A long wing of 140 meters oriented from east to west contains the classrooms, seminar rooms and offices. The wings arranged like a comb facing north contain the laboratories, while in the west end of the school building there are an all-purpose room, a service courtyard and storage.
The building eschews the mannerisms of fashion: the purity of volumes is given by the prevalent use of concrete as the main building material, both cast in situ, and in prefabricated elements, as in the curved beams of sheds.
The building has two floors and both the classroom zone and the laboratories are connected with the corridor in double height that allows the physical connection of the interior spaces and a visual connection between inside and outside, in addition to the surrounding mountainscape.

Over the years, the Lehrbauhof school has increasingly opened up to theatrical cultural events, such as the Salzburg Festival and Salzburg Landestheater. The school spaces that have been transformed are a hall and the entire access area.

Fig. 2-28 Leihbaunhof in Salzburg, Austria. Entrance renovation by Soma Architects in 2012. (Photos © Florian Hafele).
Source :https://www.nextroom.at/building.php?id=35573

In order to create a representative entrance with a different impact and building envelope, in 2012 Soma Architects designed the new hall, characterized by a sculptural covering in reinforced concrete, inspired by vegetative free forms.
Designed by a computer-aided method the new covering become a device through which architects sought an element of relationship with the landscape and its natural elements.
In the evocative landscape of Corse-du-Sud rises the Groupe Scolaire à Strega, designed in 2018 by the French architects Amelia Tavella Architects. The site, near the village of Sainte-Marie-Sicché, was previously used for horse riding and is surrounded by woods and grasslands.
The building dialogues relates to the context through the arrangement of architectural volumes and transparent surfaces that frame the landscape in different views.
For a harmonious inclusion of the school in the rural landscape, the architects used natural materials, traditionally used for local building, such as stone, timber and granite recovered from old houses.

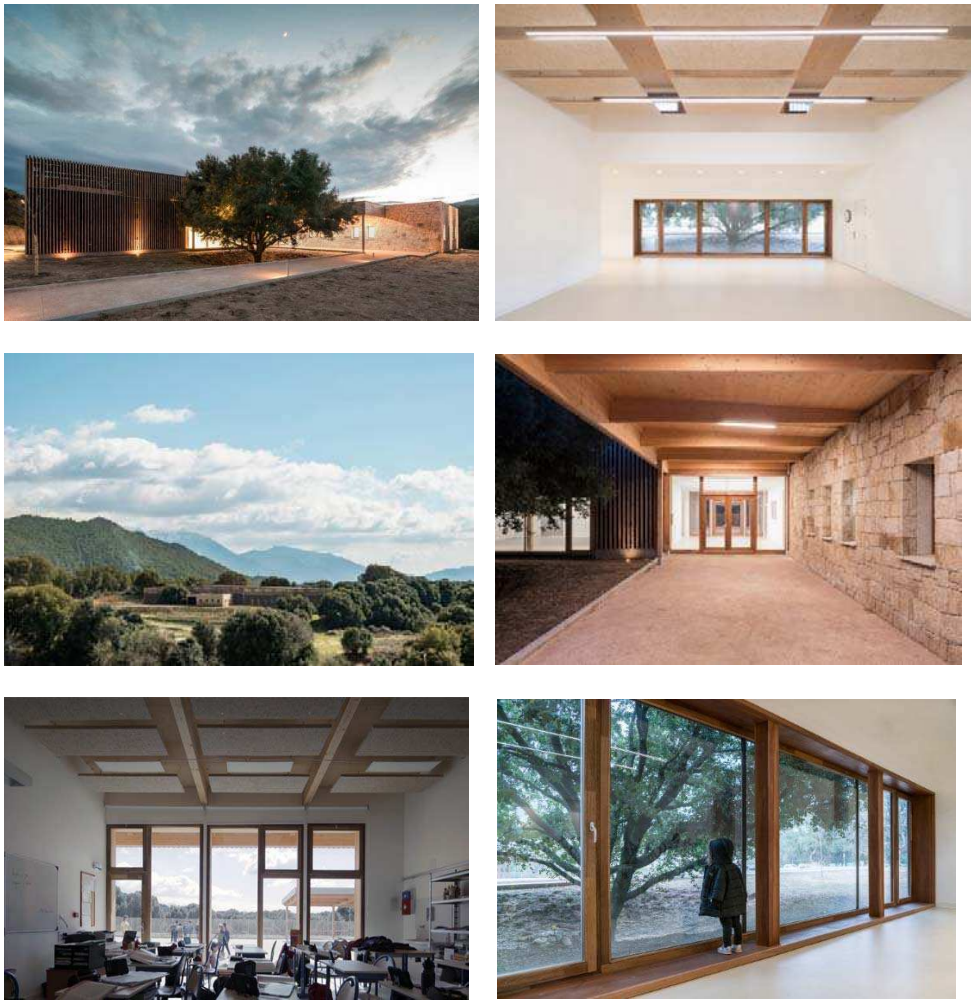


Fig. 2-29 The Groupe Scolaire à Strega school in Corsica. External and internal views. (Photos©We Are Contents).

The elementary and middle school spaces have been arranged in such a way as to integrate the building with the local vegetation, specifically with the centuries-old oak trees located near the entrance, the canteen and the playground.
The school building consists of three volumes: the main one cladded in vertical pine battens, with east-west orientation, including classrooms, a multipurpose hall, reception, office and cafeteria; another two smaller blocks are arranged perpendicularly in relation to the main body.
The school architecture in the municipal district of Cardo-Torgia, in central Corsica, becomes an element that contributes to shape the identity of the place, to which it refers in the raised profile of the roof, in the use of natural materials and in the chromatic choices.

2.1.2. The school building as “Urban Monument”

The public school building needs to be recognized within the urban fabric as a space destined for the community, without any type of discriminant, and as a physical asset of the city.
Defining the school as an "urban monument" means attributing a precise physical and symbolic identity to the school architecture.
The physical identity is determined when the school assumes a particular architectural character that differentiates it from the housing fabric or from the building having another function, attributing it a strategic importance in the neighborhood and in the city. The school and its adjoining spaces become a systematic meeting point for the inhabitants of an urban area, who gravitate around them even at different times of the day.
The symbolic identity consists in an overall system of meaning, beyond the formal aspect of the building, which the school encloses. It springs from the interrelation between the criteria of built space and the meanings of life attributed to it. The school is the first agency (body, agency) of education, outside the family, it contains the values of welcoming, training and education of the young generations.
These two identities that the school building contains are both placed in contextual relation with the environment in which it arises, interpreting its human needs and the physical signs present in the territory.
The study that we intend to carry out concerns the architectural artefact, but has the objective of considering the complexity of the meanings that the scholastic architecture contains.
On the monumentality of architecture, and in particular that of the school, schools of thought have been written and formulated that led to the construction of buildings, considered in some cases symbolic, in the context of architectural criticism.
In the text The Architectures of Childhood we talk about school projects as monuments of modernism, to outline an approach centered on the architectural project, which characterizes most of the literature starting from the middle of the '900. *In these studies, what is of significance is the architectural merit of the object. Even in studies of building typologies specific to children such as schools or playgrounds, objects are chosen primarily for their monumental status as exemplars of a style or an architectural approach. Such studies often accept at face value progressive conceptions of needs of children, and use them to valorize the architecture that is identified with them* [Kozlovsky, 2013, p.3].
The monumentality in this sense is given by the architectural qualities of the school buildings, considered in the perspective of the different cultural and geographical contexts.
In the European context of contemporary architecture, school buildings are linked to the idea of building renewal, representativeness through an image of high aesthetic profile, efficiency of spaces for flexible teaching.
The school buildings are inserted in the urban fabric taking into account or not the plot or the typological issues. Most contemporary school architectures represent a variant in the planimetric plot of the city and provide an often alternative image of elevations within a street.

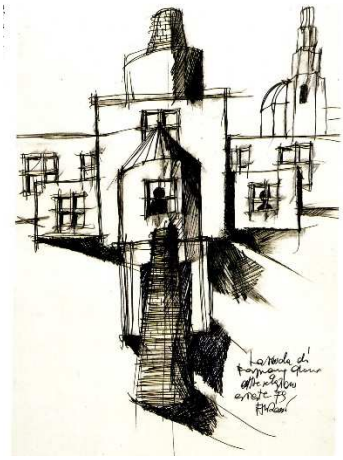
In these projects the focus is on the creation of diversified spaces, external or internal, the use of integrated technological solutions, from the more traditional masonry to those in steel and glass, and sometimes the experimental use of materials to obtain constructive results innovative.
In recent years, many schools have been built in Europe according to these criteria, and have allowed the publication of numerous books and magazines on the subject of school, giving a very diversified image of international school buildings.
The new schools provide the idea of building renewal to which the idea of educational renewal and social practices that revolve around a school must correspond.
A majestic example of school building redevelopment has affected Marlborough Primary School designed by Dixon Jones in the Chelsea district, in central area of London, characterized by building density.

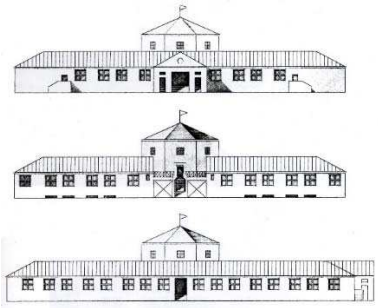
Fig. 2-30 Marlborough Primary School, Draycott Ave, Chelsea, London. Drawing, plan and external views (photos© Paul Riddle).

The new building replaces an earlier Victorian school built in 1878. The project aim was to obtain a substantial increment of spaces within the same area of 3200 square meters in a constrained urban site. [Dixon, 2018. Source: www.dixonjones.co.uk].
The scheme arises from a considerable exchange of ideas between designers and the Local Planning Authority. To ensure a proper inclusion in the local context, the layout of the building in the plan reflects a mediation between innovation and interpretation of the urban pattern.

The building's masonry, interspersed with stone bands, combines the new school with the surrounding buildings and mentions the original school.
Within the historic local context, the school plays an important civic role, as it holds in addition to the primary school with wide external play areas, also offices, commercial spaces, and a pedestrian passage.
Unlike the previous school building, the new school occupies the whole lot and has no gates unlike the previous school building, the new school occupies the whole block and has no gates, thus putting the school's entrance in direct connection with the public space of the street.
The monumentality of the Victorian building, in this case gives way to a representative building within the London metropolitan context, as it develops in height with a terraced layout, incorporating outdoor learning and play spaces within its perimeter.
In speaking of monumentality, one cannot help but refer to part of the Italian architectural tradition and to the work of some masters active mainly between the 1950s and 1990s of the '900.
In 1952 Ernesto Nathan Rogers held a course in Stylistic and constructive character of monuments at the Politecnico di Milano, in which he asked students to study a monument or a set of monuments.
In Rogers' vision the monument represents not only the memory or admonition but also constitutes the archetype of a series of facts deriving from it as it has the peculiarity of being exceptional.
For Rogers any architectural phenomenon that reconciles the useful with beauty and aesthetics with ethics is to be considered a "monument", so it can be considered not only the temple or the palace, but also the house of man [Rogers, 1952].
The attendance of Rogers' course by Aldo Rossi, an important exponent of the Italian architectural panorama, has a great impact on the development of his poetry and on the first projects.
The influence of Rogers on Rossi, according to Lampariello, can be found above all in the conception of history as a "process" in which the "old" and the "new" are reconciled in a dialectical continuity, together with the definition of the monument as an architectural phenomenon charged with social issues [Lampariello, 2017, p.33].
(According to Rossi, "*architecture is collective by its nature*" and the construction of the city is given by the combination of the collective and private dimensions (Rossi,2011).
He identifies in urban monuments, the "*signs of collective will*" that preserve the characteristics of permanence and constitute fixed points of urban dynamics (Rossi,2011).
The idea of monument is closely linked to the idea of construction made by the community and a fixed point for the community.
In Rossi the city is a unique architectural artifact and the monument is the exemplary architecture of the city.
The school can therefore be considered a monument that par excellence becomes a symbol of culture and in which it is handed down to the community [Campagnoli, 2007, p.50].

Numerous are the scholastic projects of Rossi in northern Italy that show his theoretical speculations in practice, indeed the latter derive from a consolidated constructive practice he worked in different urban contexts and on different project themes.





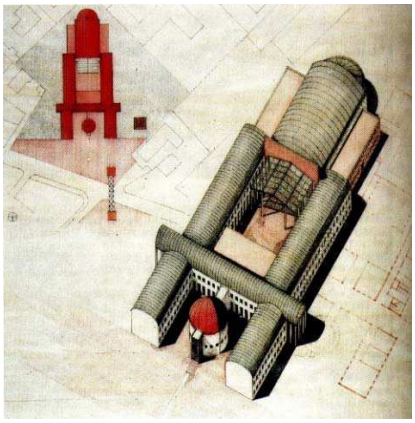


Fig. 2-31 (1) Elementary school in Fagnano Olona, in the province of Varese (Italy).
(2) View of the inner courtyard toward the library. Middle school in Broni, in the province of Pavia (Italy).
(3)View toward the main entrance and architect's drawing of elevations. Designed by Aldo Rossi (1979).
(4) Middle school in Cantù, in the province of Como (Italy). View of one of the long sides, axonometric projection and plan of the school. Designed by Aldo Rossi (1986).

A recurring element in Rossi's school projects is the distribution of the spaces around the courtyard.
The idea of monument in these projects is represented by shapes and volumes that have fixed characters as an expression of absolute and timeless values.
In the Elementary school in Fagnano Olona the classrooms are arranged along the wings perpendicular to the central courtyard, inside which there is a cylindrical library.
The Middle School in Broni has a layout of the spaces based on a typology of a courtyard with an internal garden. In the central point of the court is located the theatre- auditorium, also used for external cultural events.
The Middle School in Cantù is part of a wider project to reorganize part of a neighborhood. The general project includes a state middle school, the existing elementary school and other buildings for public cultural and sport activities: auditorium, music school, gymnasium and sports hall.
The project provides a connection with the public spaces through a bridge that links the square in front of the school with an area for public and private transport. outdoor spaces such as piazzas, pathways and fountains are also designed.
The Middle school is arranged longitudinally, with two parallel buildings holding the classrooms.
In the central part there is a rectangular courtyard in front of the gym; on the opposite side of the court is located the special classrooms and the library. [Ferlenga, 2001].
The concept of the monument's fixity in space and time is taken up by the thought of Giorgio Grassi, who writes that monumentality means a condition of concrete and lasting witness, it is proper to architecture. [Grassi, 1982, p.156].
In Grassi's vision, the aesthetic qualities of architecture are correlated to the adequacy of forms with respect to uses, therefore to the composition of volumes and the use of a well recognizable and shared figurative language.
In this sense monumentality becomes the expression of a collective interest and a precise identity of the places. The architect who provides a monumental character to the school building aims at recognizing the school as a reference architecture in the collective imagination for the inhabitants of a neighborhood and for the city in general.
In the early 1960s, Grassi and Rossi's research focused on genesis and urban growth through its building types. In 1962 the two architects, with Giovanna Gavazzeni e Luca Meda, present at a competition a project for a nursery school for children with psycho-motor problems, whose slogan was “Peter Pan”, to be placed in the park of the Villa Reale in Monza.
The project reflects the idea of “order”, with clear references to rationalist architecture, but that derives from the layout of the city. According to the designers' intentions, the regularity of the school building's texture can dominate the architecture and convey a sense of safety to the children [Gavazzeni G., Grassi G., Meda L., Rossi A., 1962].

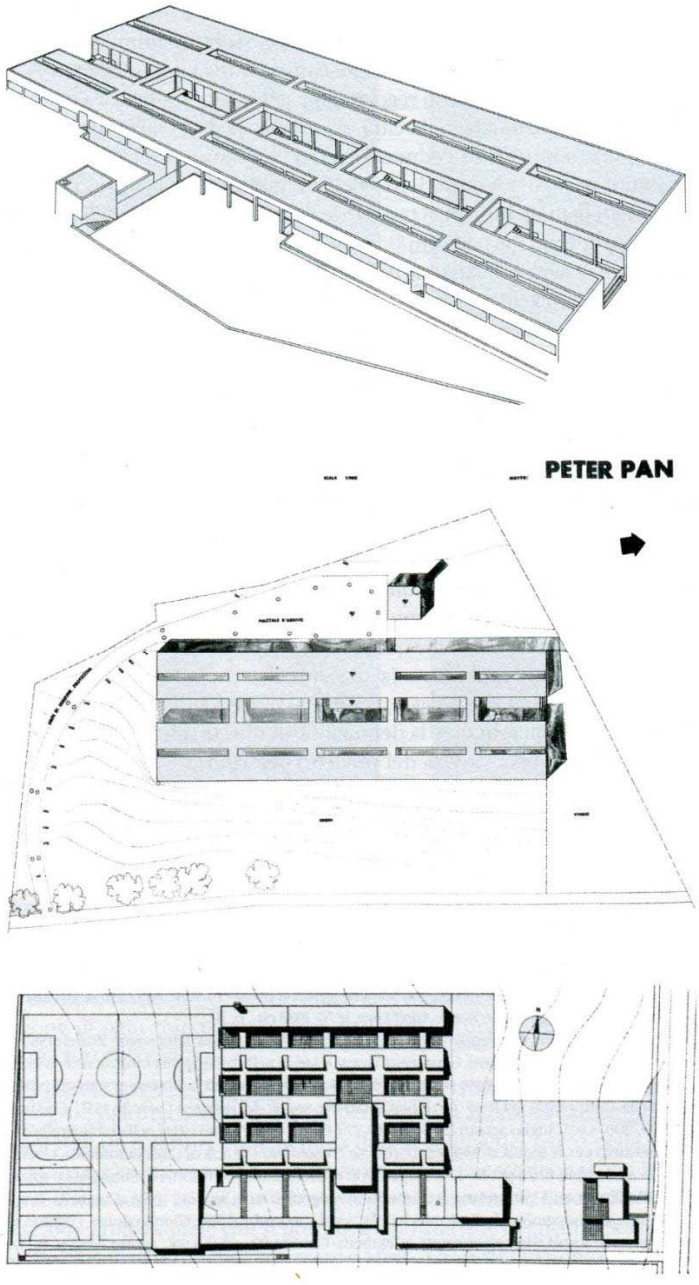


Fig. 2-32 (1) Nursery school project, whit slogan “Peter Pan”, to be placed in the park of the Villa Reale in Monza.
(2) Axonometric projection and planivolumetric. Munkegaard school at Gentofte, near Copenhagen, designed by Arne Jacobsen (1951-54)

The school is a single-storey grid, inspired by the urban texture, in which classrooms and offices are arranged in long parallel volumes. These are spaced out with open spaces and connected to each other by corridors.
The project is inspired by the Munkegaard school at Gentofte, near Copenhagen, designed by Arne Jacobsen (1951-54), which inspires Italian architects in the formulation of the idea of a "blocked school" [Gavazzeni G., Grassi G., Meda L., Rossi A., 1962].

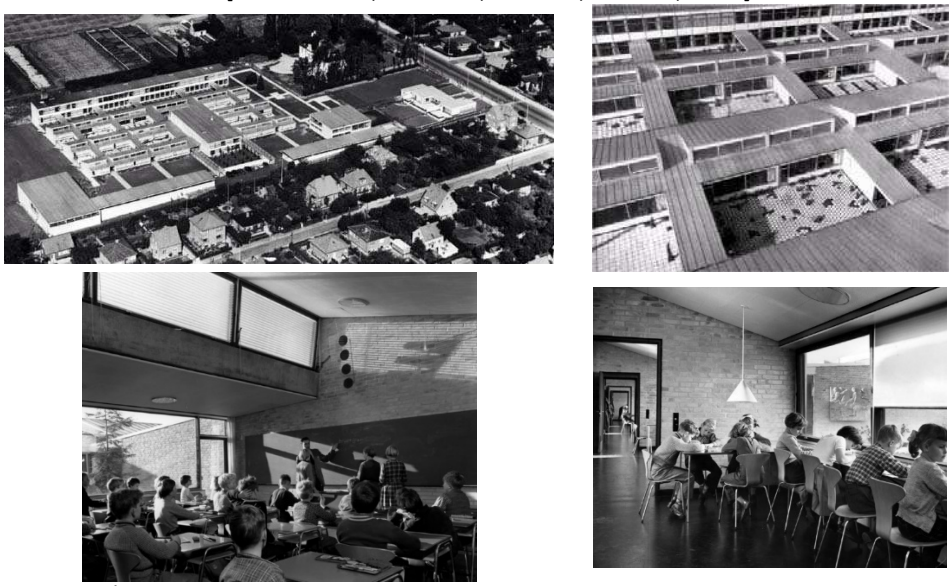


Fig. 2-33 Munkegård School, near Copenhagen, designed by Arne Jacobsen (1951-54). Top views and interior views.(Autor: circA RQ, Source: https://circarq.wordpress.com/2015/02/09/munkegard-school-la-escuela-de-jacobsen-1951-1958/)

Jacobsen's project becomes a model in the field of school architecture and through the configuration of the spaces and the dialogue with the context and the city, he wants to propose the idea of a democratic school and pedagogical renewal.
For many twentieth-century Italian architects the design of a school is part of the idea of the dialectical relationship that the new building establishes with the historic city. Fundamental for them is the knowledge of the urban form understood as an articulated system, in which a new building must fit in trying to establish a balance between the specificity of the project for that particular place and the relationship with the general layout of the city.
They are characterized by the composition of architectural types, which are grafted into a structured and circumscribed urban situation and which refer to city ideas, underlining a clear desire to define a complete and recognizable urban form, in which the urban, collective space constitutes the very reason for the problem of the construction of residential buildings [Malacarne, 2018, p.50].
And it is precisely from the need to create social points of reference that lead to the epic school projects of Guido Canella in the Milanese hinterland, carried out between the late 1960s and the 1980s.

The Canella schools are "monuments of the suburbs" as they are clearly distinguished in the building fabric due to the complexity of the system and volumes.Rispetto ai progetti di Rossi, quelli di Canella dimostrano una *concezione più strutturale dell'architettura* che nasce dall'attenzione verso le abitudini e le esigenze umane, da cui derivano le scelte tipologiche [Bordogna, 1987, p.16].

The Canella schools, in different projects, are included in impressive complexes, showing the characters of social inclusiveness and openness to the neighborhood and becoming a meeting place for the inhabitants of suburban areas, thanks to the creation of diversified spaces and meeting points for the community .

These are often architectural interventions on an urban scale that integrate school buildings of different degrees with public buildings for the community. These buildings are connected to each other and to the neighborhood by a system of open spaces for socialization, such as squares and pedestrian paths at ground level and at high altitude.

To this scope belong Canella's projects for the Incis village of Pieve Emanuele (1968-82), and, on a smaller scale, the projects for the Mirasole Noverasco village of Opera (1974-76) and for Monaca di Cesano Boscone (1975- 82).

In Pieve Emanuele, in a single multi-purpose complex, a nursery and primary school is merged, a shopping center, a multi-purpose building and a parish center, connected to a stepped piazza that constitutes the meeting space of the collective, contrasting the tendency to segregation typical of the suburbs.

Fig. 2-34 Primary school and public service center at INCIS village in Pieve Emanuele (Mi). Drawing and picture. Designed by Guido Canella (1968-73).

The school becomes representative of those characters of social inclusiveness and openness to the neighborhood, such as to attribute in some cases the role of "collective monument", a reference and meeting place, sometimes equipped with diversified spaces designed to accommodate various functions.

2.2. Learning spaces and public spaces

The space generated by the architecture and development of the city constitutes the physical setting of human interaction, and the latter attributes meaning and identity to space.
The passage from space to place is given precisely by these qualities which it assumes following its uses, which give it an affective dimension and a social value. [Alexander, 1977].
The space in the sphere of the learning context takes on the value of relational space and didactic space, characterized by a strong social value.
Louis Khan in the 1960 text entitled "Form and Design" outlines the original learning environment in a poetic way, providing the idea that the teaching activity was not a tiring practice, carried out in a coercive environment, but a pleasant and spontaneous occupation, originally carried out in a natural environment.
"[...] Schools started with a man under a tree, who didn't know he was a teacher, and who exposed what he understood to some others, who didn't know they were students. The students reflected on the exchanges of ideas that took place between them and thought it was nice to be in the presence of that man. " [Bonaiti M, 2002].
The tendency of man to settle over time in urban agglomerations, where most of the population is concentrated today, has increasingly confined teaching and learning practices to specific places, first of all school.
However, by analyzing social practices, urban planners and sociologists have shown how children and young people prefer open spaces such as parks, streets and residual spaces in cities.

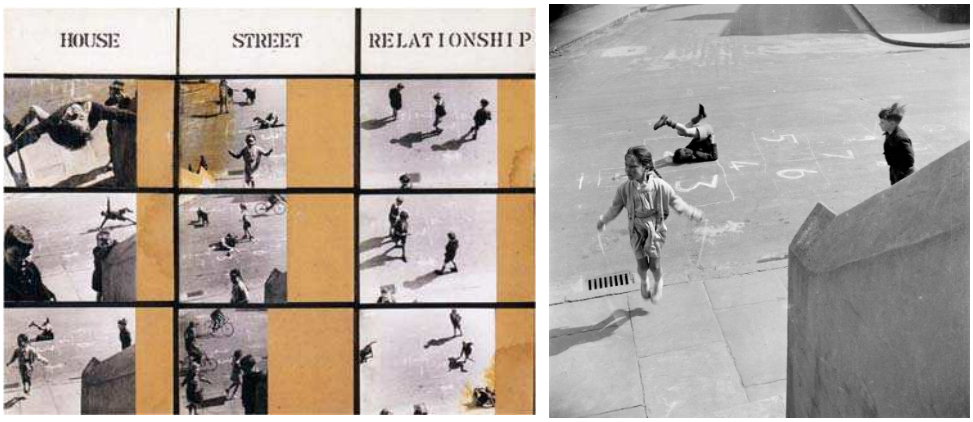


Fig. 2-35 Urban Re-identification Grille by Alison and Peter Smithson, presented at CIAM Congress of 1953 Aix -en-Provence, , photos by Nigel Henderson. Source: The NAI keeps a reproduction of this work. Repository of the original grid: Centre Pompidou, Paris.
Sociologist Judith Stephen develops research on patterns of association in the East Ends area of London and her husband, Nigel Henderson, photographs children playing on the street. Source: https://www.tate.org.uk/art/archive/items/tga-201011-3-1-144-3/henderson-photograph-of-children-playing-on-chisenhale-road-london(Visited on 22-3-2019).

The spaces of the city have always been considered a privileged place to make experiences for children and young people, because they favor the innate aptitude to explore ever wider

spaces and allow you to freely experience the social relationship with individuals of age, social background and sometimes different culture.
Colin Ward, British architect and urban planner of anarchist tradition, dealt with man's use and transformation of places after the Second World War, and in particular in his book "The Child in the City", published in 1978, he criticized the transformations of the city that made the urban environment hostile to the life of children.
The impossibility for children to move freely in the city and to be able to play especially in spaces that Ward defines as "*unmake*", that is, not designed, has led urban society since the second half of the nineteenth century *to imprison children in homes and in schools. [...] The city is considered by Colin Ward as "an educational machine", developing a Mumfordian intuition, and "street work" as a fundamental learning and growth strategy.* [Paba, Perrone, 2004, p.9].
In a previous book by Ward, “Streetwork. The Exploding School ", he imagines that the school exploded in the city and the urban space became like a large outdoor classroom.
He yearns for an alternative model of education in which the learning environment coincides with the spaces of the city rather than with a building, to promote children's awareness and sense of independence.
The contemporary city has increasingly limited the spaces within which children can move and live freely, building physical protection barriers and control mechanisms.
The spaces of the city are fragmented and increasingly focused on specific functions, with physical boundaries such as gated walls that surround them. Most of the parks, schools, sports facilities and places frequented by children are equipped with these "protective barriers".
Ward claims the freedom to play and learn independently in the city, as he claims *The city is in itself an environmental education, and can be used to provide one, wheter we are thinking of learning through the city, learning about the city, learning to use the city, to control the city or to change the city* [Ward, 1978, p.176].

Fig. 2-36 Children had to wrap up warm in gloves, scarves and wool hats at an open air school in the Netherlands, 1918. The first open air school in England was built in Bostall Wood, London in 1907 and New York's first outdoor school launched in 1908 on an abandoned ferry (pictured: A class being taught at the Charlton Park Open Air School in Charlton Park, London, circa 1910). Source: https://www.dailymail.co.uk/femail/article-4795438/Photos-Britain-used-FRESH-AIR-halt-TB-crisis.html.(Visited on 22-4-2018)

Also in Italy since the beginning of the 21st century, initiatives have started to encourage the idea of widespread school, where teaching and learning activities move from classrooms to spaces in the city. In the text “The educating city. Manifesto of widespread

education "by Paolo Mottana, professor of education philosophy, and Giuseppe Campagnoli, architect, secondary school teacher and then school principal, claim the need to create educating communities in places in the city, such as squares, courtyards, arcades, markets, through promoting social and cultural cohesion. Making school in the city, according to Mottana and Campagnoli, therefore becomes exploration, discovery, play and "community research".
An idea of school free from physical, bureaucratic constraints and school schedules similar to those of the company is outlined, to arrive at an idea of "art schools" [Campagnoli, Mottana, 2016].

Fig. 2-37 Widespread education practices in city spaces and small fair-trade shops: example of initiative which has joined a school in Ostia, called "Piccola Polis": the lesson was held in Piazza Navona in Rome. Source: https://comune-info.net/disegnare-insieme-la-citta-educante/ (Visited on 2-6-2019)

From investigations conducted by House of Commons and Education and Skills Committee of London in 2005, about the education outside the classroom, it is noticed (…) *that education outside the classroom can be of significant benefit to students,* (…) *Outdoor education gives depth to the curriculum and makes an important contribution to students' physical, personal and social education.*
(…) *We also recognise the cross-curricular nature of out-of-classroom learning. Outdoor education contributes to learning in a range of areas, including:*

- *science and geography fieldwork;*
- *physical education;*
- *learning through outdoor play, particularly in the early years;*
- *history and citizenship, through visits to museums and heritage sites;*
- *art and design, through visits to galleries and experiences of the built environment;*

- *environmental and countryside education, and education for sustainable development;*
- *practical or vocational skills that cannot be practised in a classroom environment;*
- *group activities that build self-confidence and social skills; these may include*
- *adventurous activities that teach students how to deal with an element of risk;*
- *the use of the environment as a tool to enrich the curriculum across subject areas.*
- *[House of Commons, Education and Skills Committee, 2005, p.8-9].*

A recent publication entitled "Fluid Space and Transformational Learning" by Tsoukala analyze the connections between school environment, social structure, educational theories and the psychology of child perception from the 90s of the 900 to 2010.
Specifically it explores the child's relationship with the architectural and urban environment during the period of globalisation, late capitalism and hyper-modernity.
In particular, it considers the changes in the school environment in the contemporary society, in which the *descholing the educational process into differentiated and constantly changing learning landscapes*. (Tsoukala 2017, p.26].
Starting from the idea that architecture reflects a value systems and behaviour models distinctive of its social context, proposes a vision of architecture which is not limited only to technical or aesthetic issues, but which includes social and cultural conditions.
Tsoukala analyzes the concept of learning space with a view to physical space, its social organization, starting from the school building to the neighbourhood and, finally, to the public space of the city.
The teacher-centered education is associated to a closed spatial model. On the contrary, student-centered education fosters the children's independent self-activity and group-work Environments that develop this type of learning in contemporary society, according to the author, are defined "Fluid space", "activated space", "intermediate-transitional space", "space of play", "flexible, convertible space".
In educational practices of the contemporary society it is appropriate aim to a "stimulative learning" in which the affective emotional-experience lived in the contemporary public space can affect the education of children to a greater extent than formal education within school architecture.

Third Chapter

3. Innovative European schools in the contemporary city

In last years in Europe, the architecture of education has been the subject of considerable interest, for all school grades, from kindergartens to universities, from the private sector and to the public one.
The common themes that inspire today the design of learning spaces are: the demand for flexibility, the integration of e-learning, the necessity of strategic long-term planning and the need for adequate and dynamic use of space.
The building of an educational institution play a large part in encouraging pride in students, staff, and the wider community, and the quality of the environment can have a profound effect on the educational standards provided. A central challenge to designers is to produce buildings and spaces that inspire users while working within tight budgets and timeframes. (Architects Design Partnership, 2007, p.33)
The radical changes compared to the past in the way of life of children and young people led to rethink the architecture of the spaces in which they live.
In the city of the 21st century, the education of the new generations does not materialize (impart) only in the school building but takes place in the city, in the territory, and in virtual learning environments to enter the sphere of connectivity, through the web.
Architecture requires a multidisciplinary and multiscalar approach, with an increasingly open and attentive look at the different phenomena that concern the promotion of learning and training, from that imparted in traditional forms and ways to more innovative forms of learning.
These aspects, as well as that of the multifunctionality of school buildings and the conception of the school as a small-scale city, at the same time connected with the concrete (or external) city in which it stands, is found in many experiences of contemporary architectural design Northern Europe. In England, for example, the architecture firm Scott Brownrigg engaged in the *"imagining and realizing future physical and virtual learning environments"* (Brownrigg, 2017, p.22), proposes a school model called "High Density Schools - a new typology of school in the city ”which seeks to provide an effective response to the need for learning spaces in overcrowded and globalized cities.
The key elements of this project that favor the relationship with the context are the idea of an inclusive design in terms of accessibility and offer of services, the ability to interact and integrate with the community and the creation of "learning neighborhoods".
The Brownrigg studio imagines a vertical school model, with flexible learning spaces, which foster a sense of community within the building and with the immediate urban context.
The project for the SHaW Futures Academy in Bromley, in an area south-east of London, proposes itself in the role of "landmark building" both for the scale of the multi-storey building and for the ability to accommodate diversified learning spaces, incorporating a scientific high school, laboratories and spaces with specific destinations on view and spread in different points of the complex.

At the same time, the replacement of the previous building, lacking the architectural qualities and spaces suitable for the educational purposes of the current generations, would contribute to the regeneration of the area, providing a design response in terms of new uses and connections for the neighborhood. Its architecture fits into an area where vertically developed commercial buildings and low residential units coexist.

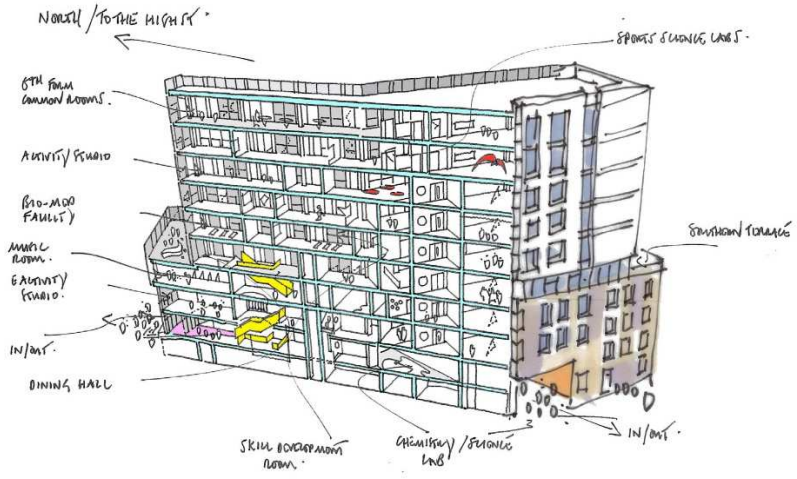


Fig. 3-1 SHaW Futures Academy in Bromley, London. Sketches and rendering (image courtesy of Wates).

The building responds to the needs of the contemporary city of multifunctionality, being composed at the bottom of a volume defined as a "podium" of four floors which houses a large hall and spaces for study, changing rooms and shops.
The teaching spaces are located in the "podium" in a perimeter position, in order to take advantage of natural lighting, in the six-storey volume located above and on the roof.
The classrooms are characterized by a variety of dimensions for a collaborative and diversified use of spaces, depending on the schedule of the activities. Upstream of the project there is the analysis of the flows of people and the physical an visual connection with the spaces of contiguity with the surroundings, such as main entrances, cafeteria at the entrance, main hall and exposed laboratories, with the objective of integrating educational spaces and urban spaces.
An avantgarde school, on the architectural point of view is the Evelyn Grace Academy secondary school designed by Zaha Hadid. The school is part of Building School for the Future Programme and it has been built in the multicultural neighborhood of Brixton in London, characterized by social difficulties.
The new school architecture offers new educational spaces to students coming by disadvantaged families and at the same time it contributes to urban neighborhood regeneration.
The Evelyn Grace School is a complex in which are grouped four schools having common spaces encouraging *social communication with aggregation nodes that weave together the extensive accommodation schedule* [Jodidio P. 2016 p. 63].
In the complex are also integrated sports facilities visible from the school interior which motivate the physical and intellectual formation of the students.

Fig. 3-2 External pictures of Evelyn Grace Academy in Birxton district, London (@author's photo)

Fig. 3-3 Student lesson in the School Hall at Evelyn Grace Academy in Birxton district, London. Source: http://www.arch2o.com/evelyn-grace-academy-zaha-hadid/arch2o-evelyn-grace-academy-35/

The complex hosting at its internal the Educative Park Ezinge, is structured in five integrated departments designed by Atelier PRO.
The departments spaces are organized by fixed and mobile furniture providing a cohesion characterized by different colors conferring an unique character.
Furniture design has been studied to provide flexibility for individual and collective learning. Indeed each student has his own desk that can be moved at convenience to be organized in neither in rows or in a circle or groups. Also the classrooms have been designed to be converted in a bigger space by opening the frontal panels.
Learning spaces stands among the classrooms and between the classrooms and public space of the hall. There are eight learning spaces, two by floor, developed by a composition of mobile furniture.

Fig. 3-4 Pictures of external and internal common spaces (Educative Park Ezinge). Source: https://www.atelierpro.nl/nl/projects/194/onderwijspark-ezinge-interieur#.W_fMkuhKjIU

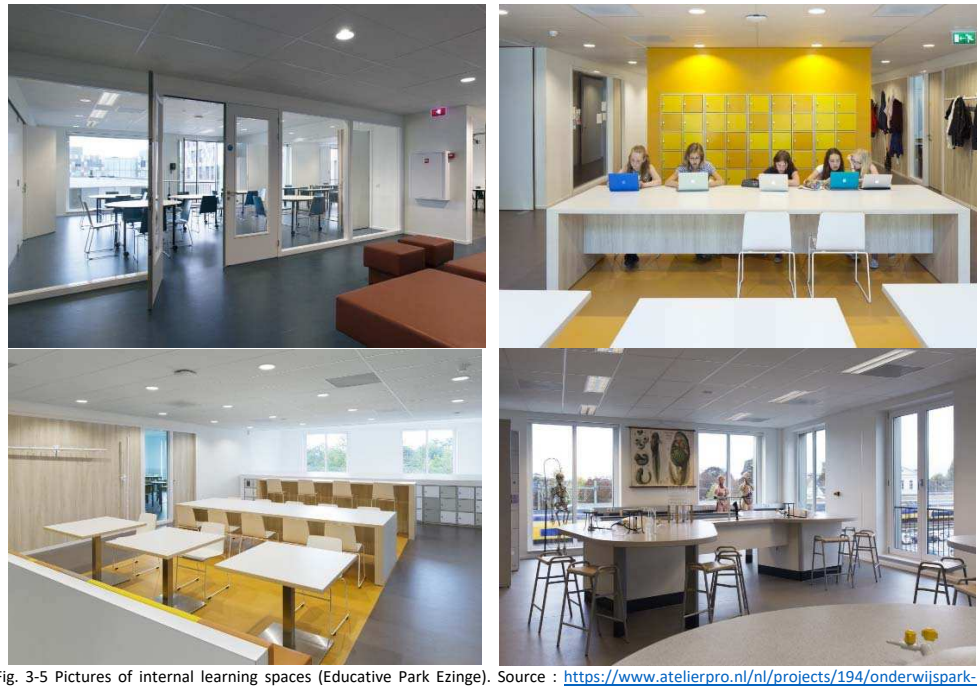


Fig. 3-5 Pictures of internal learning spaces (Educative Park Ezinge). Source : https://www.atelierpro.nl/nl/projects/194/onderwijspark-ezinge-interieur#.W_fMkuhKjIU

3.1. The school in the context of 21st century city

In the contemporary European school scenario, a large number of schools include various school orders, so it is necessary to broaden the vision of the school as a context formed by different connected and integrated places, where macro and micro-environments converge.
In the contemporary European school scenario, a large number of schools include various school orders, so it is necessary to broaden the vision of the school as a context formed by different connected and integrated places, where macro and micro-environments converge.
The book "Cities and training" highlights the close relationship between cities and educational paths, how training environments can acquire an urban dimension and the city has a training vocation. The concept, within the text, is strengthened by Mumford's theories, according to which a city is a *concentrated social environment, in which administrators and animators, assimilators and creators, can react on each other, in a common environment. A community that does not design and build the buildings necessary for life in common will remain permanently hampered and delayed.* [Mumford, 1953, ed. 2007, p.469].
Since the urban and social context of the 21st century is subject to constant changes, the school must also be thought of as an organism that places itself in a changing relationship with the city.
In the contemporary historical context, it is difficult to give a single definition of city, since the images and the shape of the city undergo ever more sudden changes.
Italo Calvino, in his fundamental text entitled "The invisible cities" had outlined the implications of the changes of the city over time: *Sometimes different cities follow one another on the same soil and under the same name, they are born and die without knowing each other, communicable between their. At other times also the names of the inhabitants remain the same, and the accent of the voices, and even the features of the faces; but the gods who live under the names and over the places have gone away without saying anything and in their place foreign gods have nestled.* [Calvin, 1993].
Research carried out by the United Nations reports that in the coming decades there will be an increase in the world population concentrated in cities, with a prevalence of older people. This phenomenon will also require an adjustment of public policies, which will have to respond to social needs for citizens of all age groups, within increasingly complex cities. In the countries of the European Community, the challenge in the coming years is to plan initiatives that encourage social cohesion and the use of educational and welfare services by the entire urban population. [Savio, Bosia, Thiebat, Zhang, 2017].
The planning process of the contemporary school should include provision for different communities of learners, ensuring the sense of well-being for students of different social backgrounds and with different intellectual skills. School design should shape and take shape from inclusion practices to reflect inclusive design values. [Porter, 2019, p.167].

Fig. 3-6 External and internal view of Vittra International Schools in Stockholm. (photo © Kim Wendt).

Vittra Telefonplan School in Stockholm is reported by the Italian Ministry of Education, University and Research as an innovative school model. The learning environment must align with the progress of society with the presence of many spaces for sharing and self-managed learning.

The school was designed by architect Rosan Bosh in 2011 in a former Ericson carpentry, where mobile phones were produced.

The property is located in a former industrial area of the city. Externally, the school maintains the appearance of a factory, while inside it presents multifunctional and technological environments. [Sola, 2014].

3.2. New teaching and didactic spaces

In recent decades, many research both in the field of architecture and of pedagogy have focused on the conception and design of new learning spaces in an attempt to conveniently include all the elements that today should compete in an effective learning process.
Among the main elements we have pedagogy, the technological tools applied in teaching, the need for flexibility and adaptability of educational spaces in the different urban and social contexts that the city and contemporary society present.
What is the role of contemporary architecture in rethinking learning spaces? Can it influence learning processes or should it support pedagogical needs?
According to Gislason, most of the studies show that the changes introduced in the last two centuries in the field of teaching and learning have influenced the school architecture and the classroom design.
He outlines two main transformations in the relationship between school design and school culture in western countries: the transition from single-grade classroom to multi-grade school-room and the diffusion (spread) of innovative educational practices, as an alternative to frontal lessons, such as cooperative education and informal learning activities [Gislason, 2011].
These variations have required a rethinking of learning spaces, involving space design experts and paving the way for interactions between the pedagogy and architecture sectors.
In the different European contexts, lately, it has become widespread practice on the part of school designers, to ask teachers and students about the needs of new spaces, in an attempt to implement participatory planning.
Nevertheless, the link between architecture and the educational community is still characterized by distances and criticalities and the term architecture is little used in the context of contemporary educational theories. In educational environments it is preferred to refer to the building in its entirety, calling it "structure", or to specific elements of the learning environment, such as the tools used daily in teaching, called resources [Dudek, 2019].
A critical element is the difficulty on the part of teachers to design and implement non-traditional didactics, adequately using the tools and spaces designed for active and collaborative teaching.
Another open question (issue) is the difficulty of communication and mutual understanding between the world of architecture and that of education.
Teachers' requests regarding the preparation of spaces for the creation of functional learning environments and psychologically comfortable for students, are not always interpreted and rendered adequately into architectural spaces.
The influence of social media and digital technologies is also a relevant factor at the base of radical changes in the 21st century learning environment.

Since the 1980s, Meyrowitz illustrated that television and electronic media were altering

social and communicative behavior, dematerializing the boundaries between childhood and adulthood and between private and public space [Meyrowitz, 1985].
The aptitude in the use of social media and the portability of smartphones by students contributed to break down the barriers between adults and children, determining the idea of *deterritorialization and disembodiment of space in the digital landscape* [Castells, 2000].
The space of traditional classes is considered more and more porous and precarious, due to the ease and speed of sharing information between inside and outside the school. [Dussel, 2017, p.235].
The instances of the twentieth century of child-centered pedagogy and of diversification and personalization of learning, in addition to the use of visual technologies *are altering the experience and aspirations of learners.* [JISC, 2006].
The research focused on investigating how the configuration of contemporary educational spaces performs to the changing educational needs considering together pedagogical viewpoint with a architectural approach.

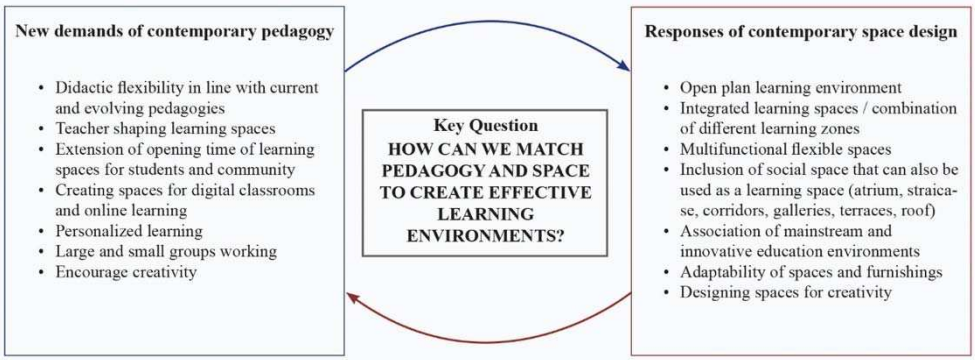


Fig. 3-7 The diagram summarizes some recent requests in school education framework towards the architecture of learning environments (author's diagram).

The space in which teaching is traditionally carried out is the classroom, the subject of various experimentations over time, but there is a recent trend in contemporary European schools to expand the educational space to the entire school building, including closed and open spaces, pre-existing school buildings and new built spaces.
The connective spaces also tend to be considered suitable places for teaching, so much so that the tendency to a hybrid use of learning spaces is spreading more and more, such as those occupied by a wide staircase, used in multiple ways, as a space for taught class or collaborative class, as a lecture theatre for conference and meeting or simply as a socialization space for students.
In the current scenario of school architecture there is a need to expand the physical learning space to include a variety of informal and social areas. [Mirchandani, Wright, 2016, p.88].

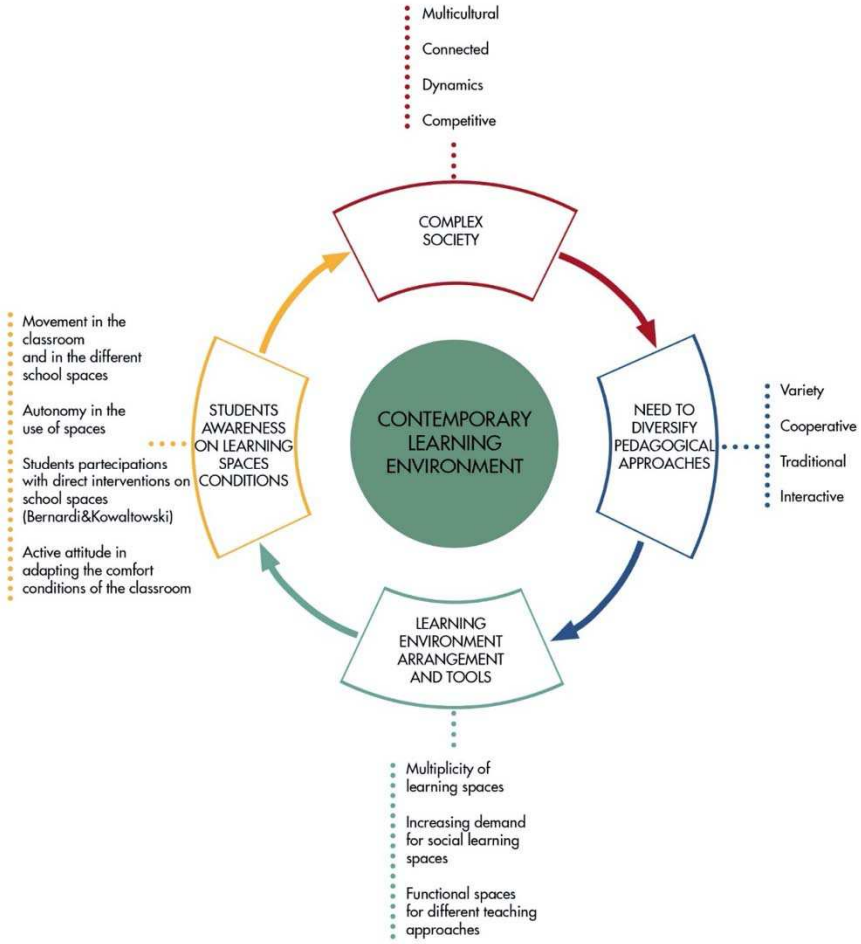


Fig. 3-8 The diagram summarizes author's idea about "Contemporary Learning Environment" (author's diagram).

3.2.1. Reuse and extension of school buildings

The lack of free building area in many urban contexts of European cities has led to the spreading of the practice of restoring and remodelling existing schools, sometimes adding new built volumes or changing the intended use of original building, transforming them into school architecture.
New learning spaces, in specific contexts with high urban density, are obtained on the roofs of existing buildings. This occurs when the school cannot expand horizontally, or in areas where there is not enough space to build schools. *The architecture of vertical school expansions is emerging as a distinct and intriguing subtype* [Logan, 2019, p.99].
An example is the Berlin Metropolitan School extension, by Sauerbruch Hutton architects, characterized by a sloping copper roof, located on the top of an existing building with ceramic tiles facade.

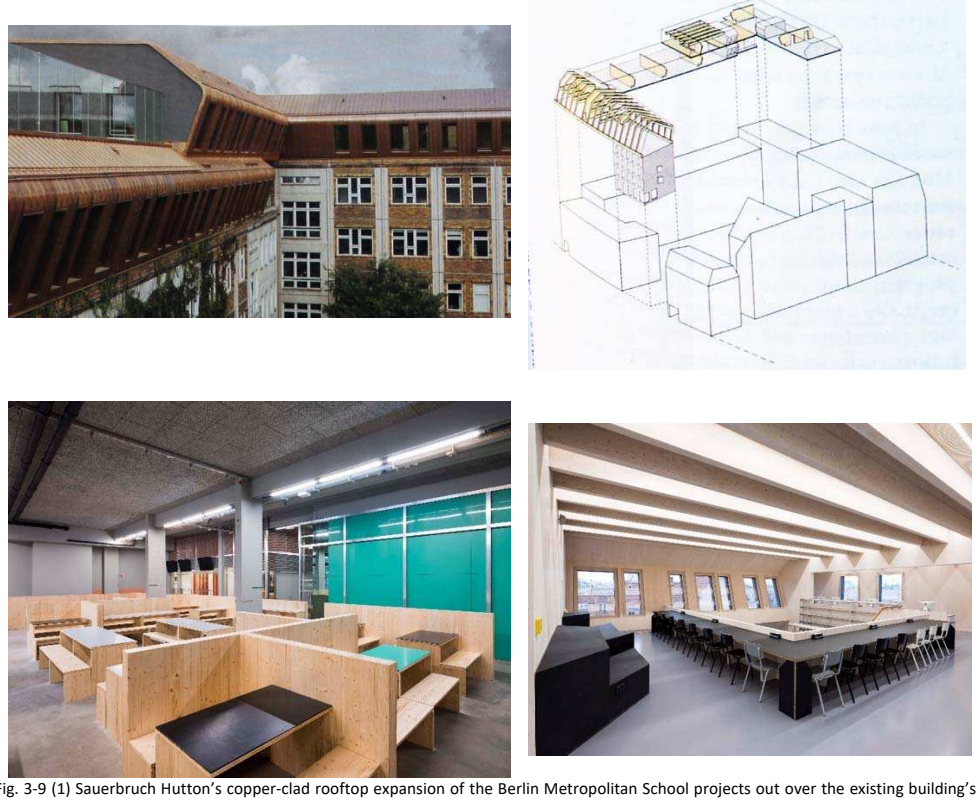


Fig. 3-9 (1) Sauerbruch Hutton's copper-clad rooftop expansion of the Berlin Metropolitan School projects out over the existing building's courtyard. (2) External view and axonometry (Source: © Architectural Record, Schools of the 21st Century, n.1, January 2019, p.99). (3 -4) Internal views.
Source: https://ganter-group.com/en/references/commercial/berlin-metropolitan-school/. (Visited on 22-3-2019).

The Berlin Metropolitan School was built in 1987, organized in four building sections of four to seven stories around a courtyard playground. In 2010s, with the increase in students and broaden of the programs, it was necessary to expand the school spaces.
The site did not allow the building to be expanded in adjacent areas, nor in courtyard, leading to the construction of three building wings on the roof, with one and two levels.
To harmonize the building's façades, the architects keep the rhythm of the vertical elements of the existing façade. The construction was carried out with a prefabricated system and consist of cross-laminated timber panels and roof in glulam-timber trusses.
This new extension includes a variety of learning environments such as flexible learning spaces, independent study spaces, classrooms, music rooms and community spaces.
In addition there are many collateral spaces like a theatre with 420 seats, a split level-library, a community cafè for students, teachers and parents.
In Netherlands Atelier PRO architectural firm designed a compact high school building to accommodate sport and games environments, outdoor learning spaces and green areas.

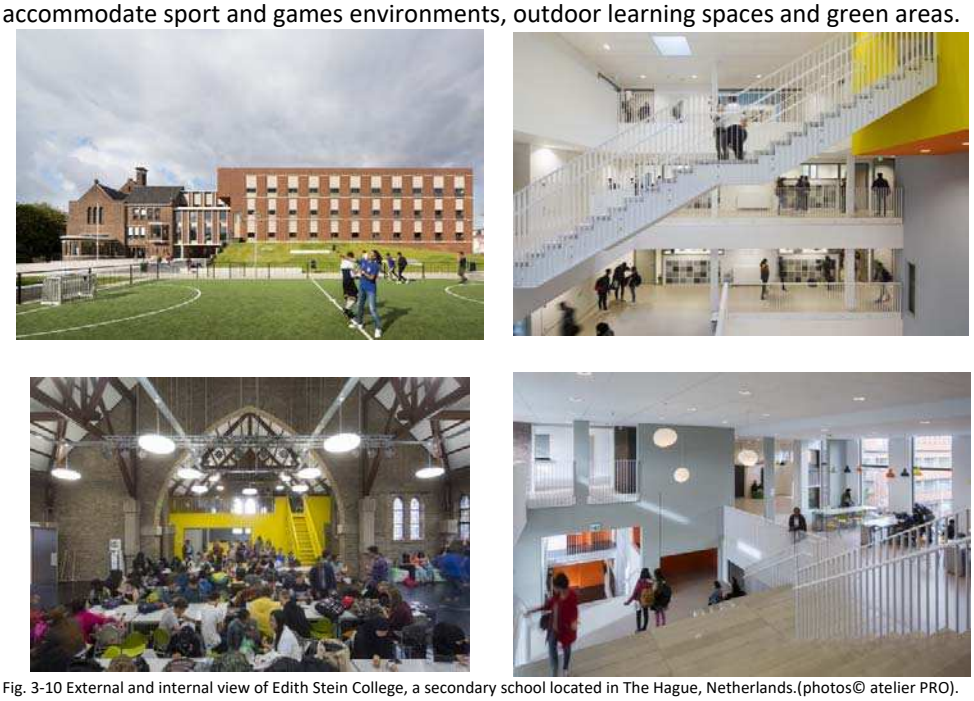


Fig. 3-10 External and internal view of Edith Stein College, a secondary school located in The Hague, Netherlands.(photos© atelier PRO).

The classrooms are distributed within the departments around a central space. There are several common areas on the different floors for study and socialization, connected with large corridors.
The new volumes are made of brick, in order to integrate the new building with the pre-existing buildings of the place, with the aim of giving a contemporary interpretation to the local building tradition.

3.2.2. Design flexible spaces

Recent projects of different grade schools and university spaces show design solutions of this kind and the possibility of a flexible use of spaces both vertically and horizontally.
The spaces management and the furnishings arrangement are indicators of the educational experience as they favour or hinder social interaction.

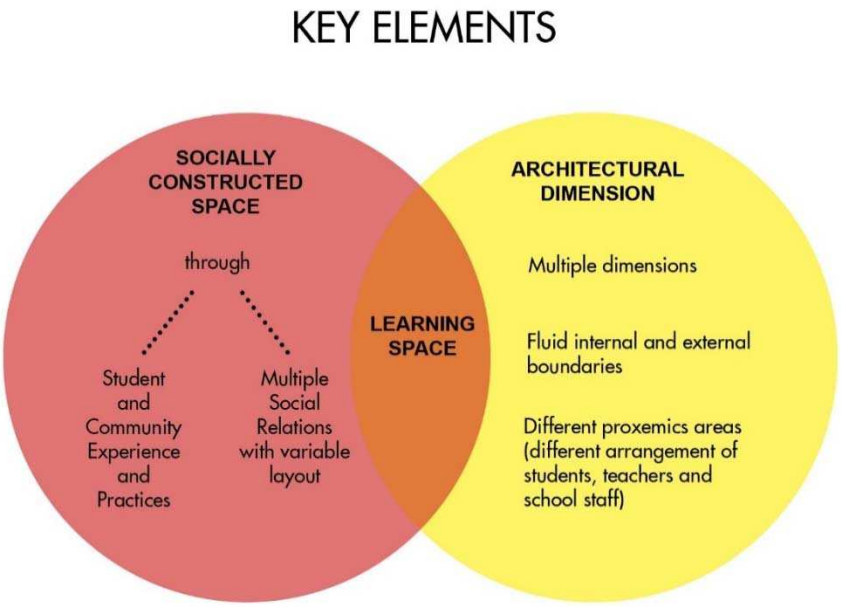


Fig. 3-11 The diagram outline author's idea about "Learning space".

In Lorentz School, located in Leiden, Netherland, and designed by atelier PRO architectural firm, the auditorium space in addition to its traditional function become a multipurpose space, performing a variety of functions such as documentation centre and library and space for computer lessons, as workstations are installed. [OECD, 2011].

Fig. 3-12 (1) The documentation centre also used for computer lessons in Lorentz School, Leiden, Netherlands (photo: Jannes Linders).
(2) The auditorium used for performance in Lorentz School (photo: Jannes Linders).
(3) Mediatheek on the stairs in Lorentz School (photo: Jannes Linders).

A field of experimentation for different learning spaces is the Bartlett Real Estate Institute (BREI), a new Centre for Learning Environments of University College London (UCL) located at Here East university campus in East London, in a converted multifunctional building established (sited) for London 2012 Olympic Games.

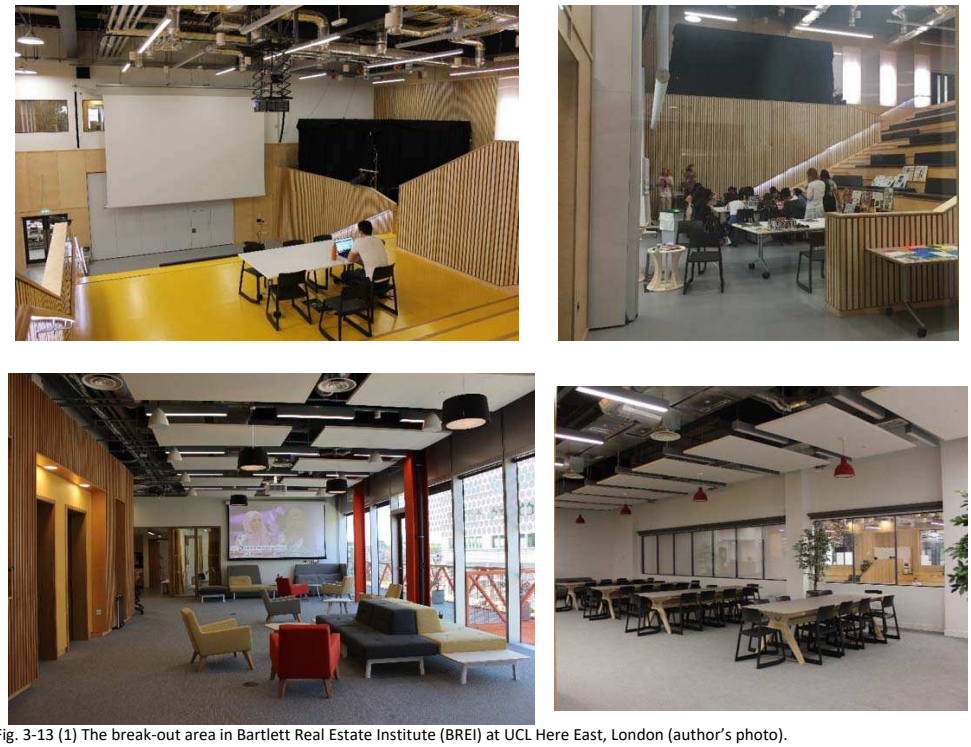


Fig. 3-13 (1) The break-out area in Bartlett Real Estate Institute (BREI) at UCL Here East, London (author's photo).
(2) The lounge in BREI (author's photo).
(3) The auditorium at ground floor of UCL Here East (author's photo).
(4) The auditorium used by secondary school students (author's photo).

The variety of learning spaces is arranged on the basis of holistic vision, to provide a 21st century collaborative and inclusive environment for students, academics, designers and professionals involved in space investigation and design. Besides open space areas for panel debates and networking equipped with a display screen, there are seminar rooms, lecture theatres and private study booths.

At ground floor wide spaces support flexible functions, such as the auditorium space, used for conferences and events, as an individual and group study space for university students, as a laboratory space for high school students for the summer school.

A project of learning and study spaces, of excellent design, which achieved a BREEAM (Building Research Establishment Environmental Assessment Method) "Outstanding" for its qualities of environmental, social and economic sustainability performance, is the UCL Student Center, created by University College London.

It was opened in February 2019 and is located at the core of university quarter of London, Bloomsbury, near the different faculties of the university.

The focus of the project is the creation of new study spaces designed for continuous and varied use by UCL students. The structure, in fact, is open 24 hours a day, seven days a week.

The building, built from scratch, provides about a thousand new spaces for the study and interaction of students.
The Student Center rise in height around a full-height space. On the ground floor all have free access, both from Gordon Street and from South Quad, an inner courtyard of the university campus.

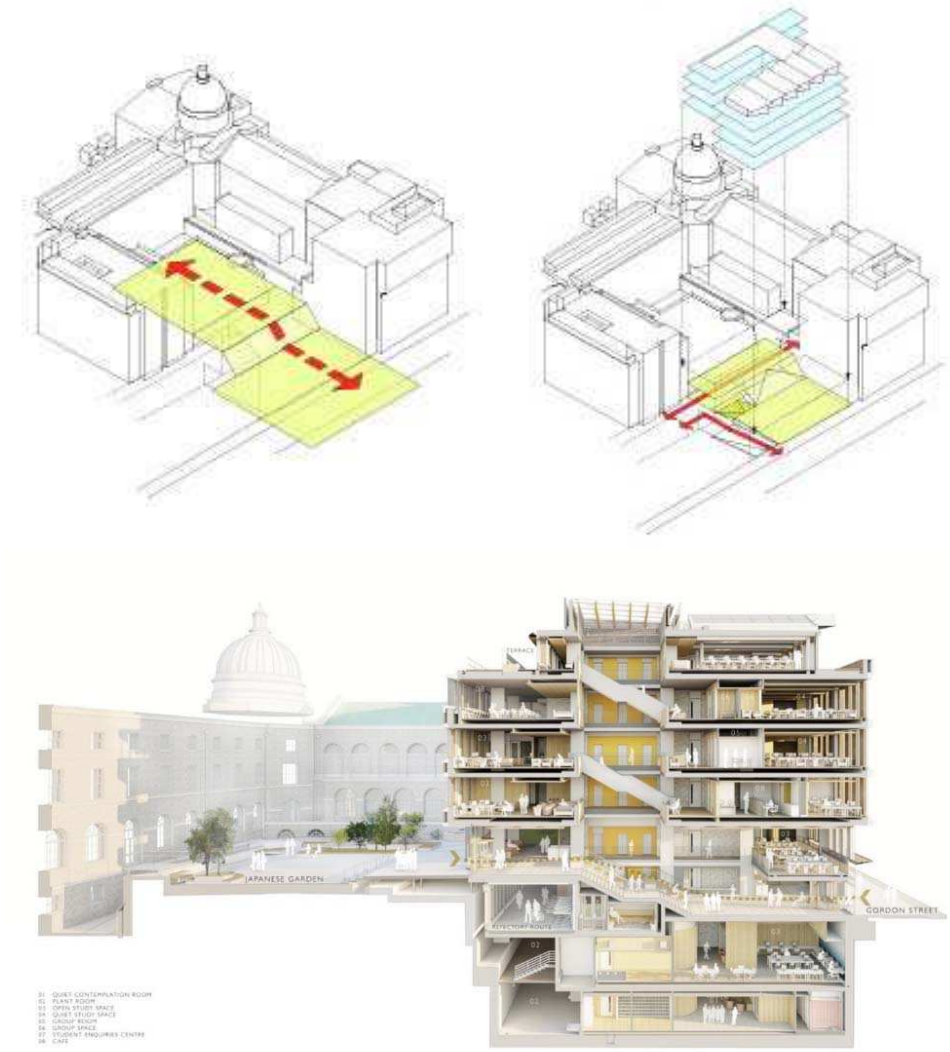


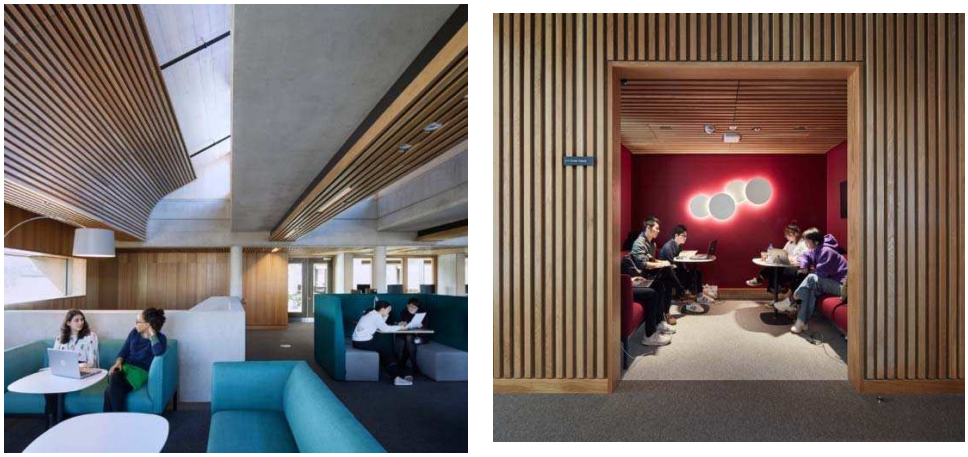
Fig. 3-14 UCL the new Student Center concept and section drawings . (© Nicholas Hare Architects)

Entering from Gordon street, opens up to a view a great aesthetic impact space, with a big steps detached in two sectors, with two different heights and tread of the step.
The left part has the function of ascent, the right one allows to sit and stay.

In this way a multi-functional space is set up where one can exchange study ideas, chat or contemplate the entire building simply by looking up.

Fig. 3-15 UCL Student Centre designed by Nicholas Hare Architects. Internal views (© author's photo).

Inside the building contains a variety of spaces for study, such as quiet study rooms, group rooms, social study rooms and open study space.
Also included are different areas for prayer and meditation, intended for different cults. This denotes the multicultural and inclusive vocation that should characterize every learning space project.
The learning spaces have been appropriately designed to offer high quality standards, with areas dedicated to research work, collaborative study and peer learning. They are set up with facilities as networked computer and desk space.



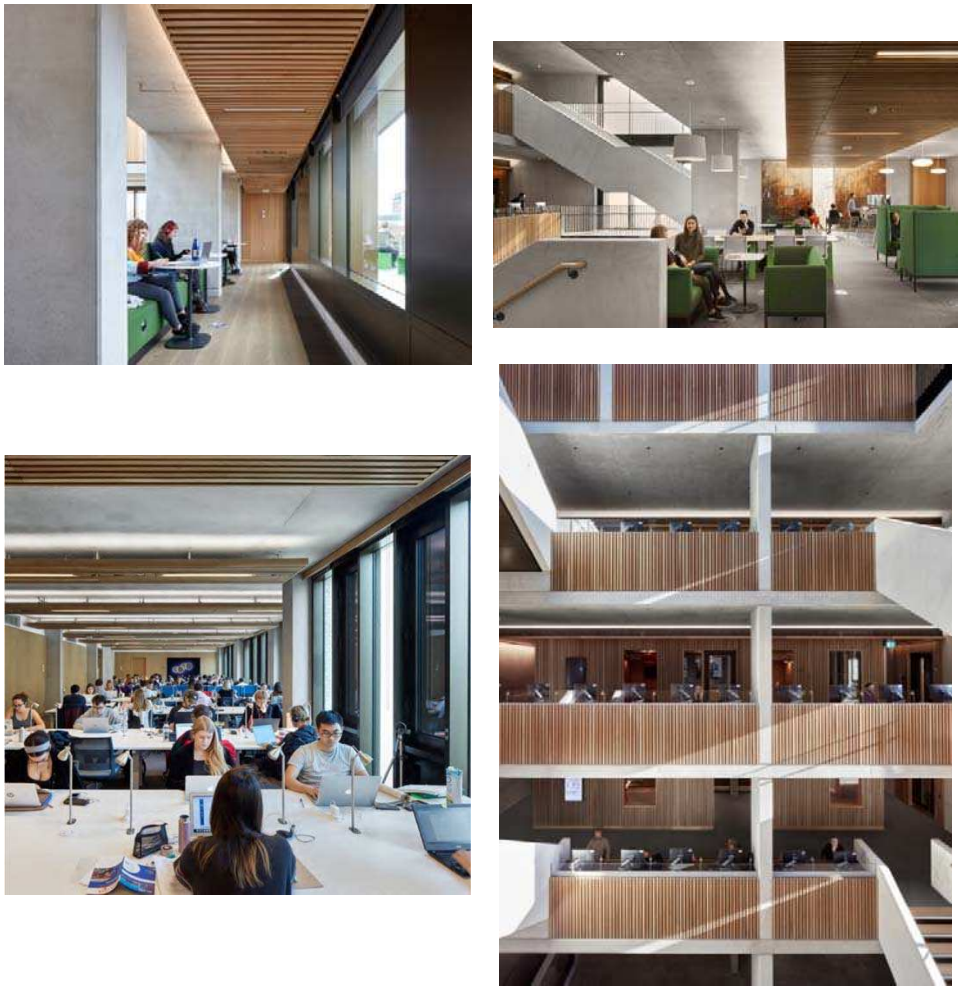


Fig. 3-16 UCL Student Centre designed by Nicholas Hare Architects. Internal views (photos© Nicholas Hare Architects).

The regular structure of the building allows a diversification in the preparation of the learning spaces, from the more open ones, to the more reserved ones.
The flexibility of spaces is the basis of the project, that will be versatile to the variable needs of the University in the future, to satisfy any requests for changes to the academic teaching space.
The architectural quality of the project and its opportune insertion in the urban context known as a university district for excellence in the central London, ensure the Student Center can be considered
a truly student focused building providing an exceptional environment for informal learning. [Hare, 2019].

The projects of school and university spaces presented denote a flexible and creative approach with which architecture attempts to provide benefits to the need of 21st Century education.

3.2.3. Innovative school in multifunctional architecture

In the contemporary city, buildings that can host different functions are increasingly popular: from the residential one combined with the commercial one or the welfare one with the playful one, to give some examples.

The combination of functions in the sense f multifunctionality is playing an increasingly important role in school architecture today. It is common for school buildings be multifunctional facilities in which several functions are brought together under one roof rather than monofunctional entities. Multifunctionality can mean something else as well. Areas can be used multifunctionally, such as a corridor than can be used for individual study or for traffic, or an assembly hall that can also be used as a theatre.

There is a recent tendency for schools to fulfil a function for the community as well.

[Broekhuizen, 2008, p.25].

The idea of creating multifunctional buildings or having flexible spaces to adapt for different activities had already been expressed in 1953 by the Ministry of Education in the Netherlands, which proposed to create school buildings suitable not only for educational activities for children but that were open to community.

In the 1970s in Netherland the first Multifunctional centres (MFC) and Multifunctional complexes (MFA) were designed. A known example is constituted by architect Frank van Klingeren, the MFA 't Karregat.

Fig. 3-17 MFA 't Karregat is one of the first multifunctional centres in the Netherlands. In 2015 the building was renovated with the functions of the school, childcare and community center. Source: https://www.architecten-en-en.nl/project/mfa-t-karregat/ (Visited on 10-6-2019).

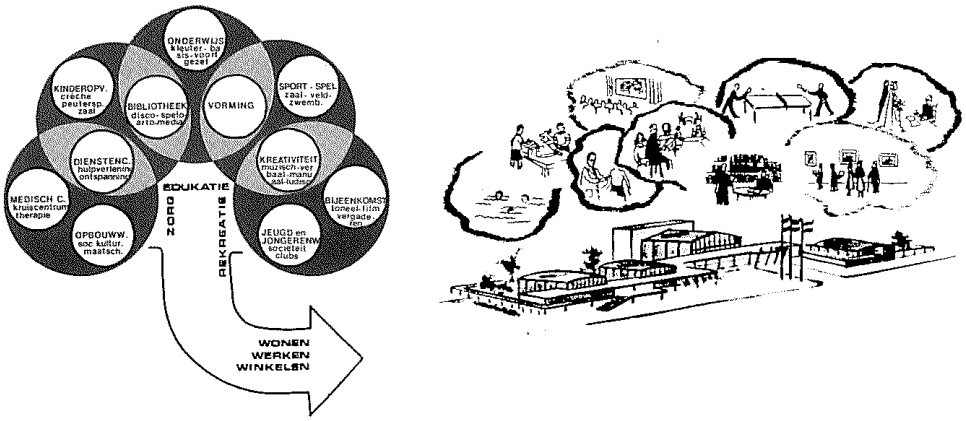


Fig. 3-18 Diagram multifunctional centre (MFC) by National School Archutecture Team (1974). On the right: A communal centre sketch. Source: Broekhuizen D.[2008], Contemporary Dutch School Architecture: A Tradition of Change, NAi Publishers/Staro, p.25.

The Multifunctional Centre were designed for new neighborhoods, with the aim of creating a civic and educational centre for the inhabitants that included gym rooms, study rooms, courses for adults and different kinds of school.

The idea of the composition of the neighbourohood in the 1940s and 1950s was originated from a sociological concept developed in the US before the war of the neighbourought cohesiveness.

The Multifunctional Community School Huis van de Heuvel located in Breda, Netherlands, is an interesting restoration and extension work of a Romanesque Revival church by Atelier Pro architectural firm, carried out in 2012.

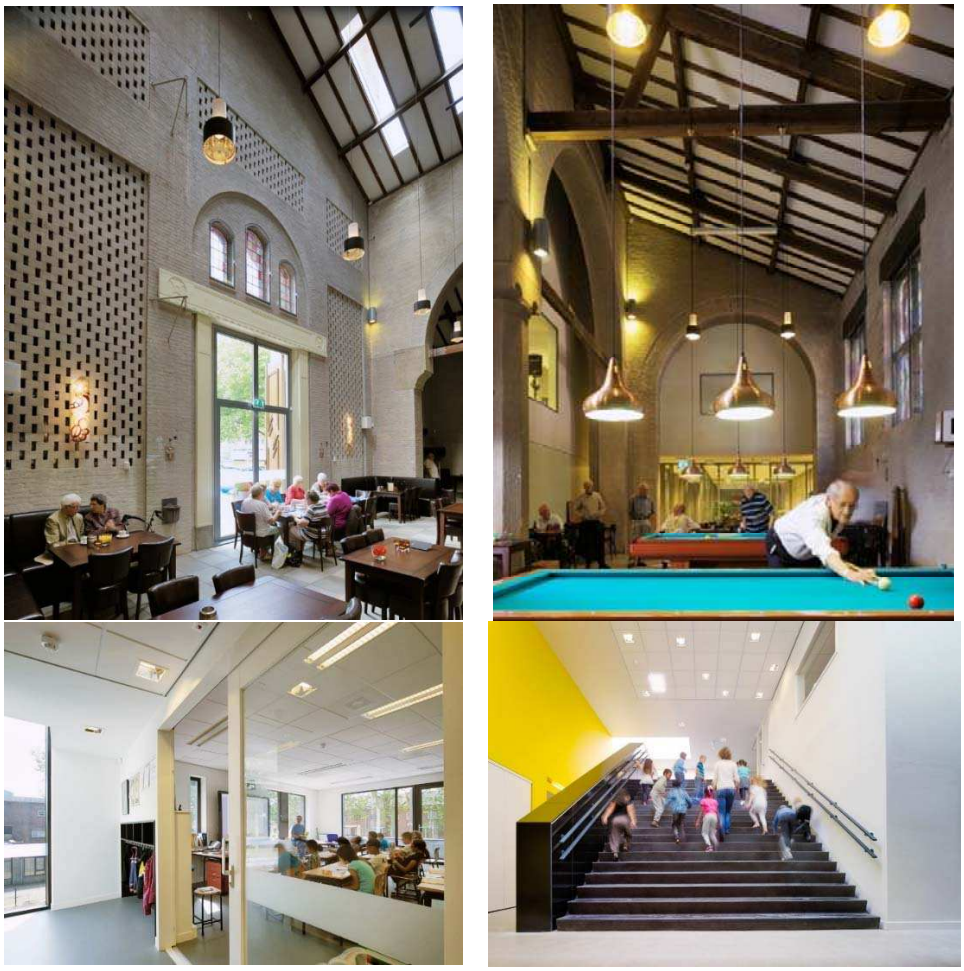


Fig. 3-19 Different spaces of the Multifunctional Community School Huis van de Heuvel in Breda: the canteen in former church, the play billiards room, classroom, stairs in school. (photo © atelier PRO).

The existing part of the building accommodates a socio-cultural centre, a playgroup and a care centre independent from the school. The new building accommodates a catholic and public primary school, a gymnastics hall, a community worker and two care centres, for families and children.

The multifunctional complexes and broad primary and secondary schools are increasingly taking over the tasks of educating and bringing up children that used to be carried out by parents, friends and the neighbourhood. This is in line with a trend that has been called increasing "socialisation through school". [Broekhuizen, 2008, p.27].

A strongly social and educational connotation is carried out by the new build and refurbishment project by Penoyre & Prasad Architectural firm and located on a tight central London site near King's Cross: The Anna Freud Centre & The Family School.

Fig. 3-20 External view and sketch of The Anna Freud Centre & The Family School (London). (photo © Penoyre & Prasad).

The building contains a workspace, a research and training facilities, a teaching space for the family school and a special school for children with mental health problems.
The project is inspired by a social and welfare vision, as it aims to promote knowledge on recent scientific discoveries about mental health and to offer assistance services to the community in this area.

Fourth Chapter

4. The English experience of school architecture in the 21st Century

In England, as other European countries, since the beginning of the 21st century, the design of school buildings became the subject of public debate.
Despite the political changes, there is a great interest to the educational population needs, through detailed sector studies, development programs and investment in school estate.
The reforms of the local educational system in England are subject to the decisions of the Local Councils, and, in the specific case of the capital, of the London Councils.
The London Council annually produces detailed model to assess the number of state school places needed to meet the demand in London city.
In London from 2010 to 2019 the overall number of pupils has increased compared to the other regions of England and more rapidly.

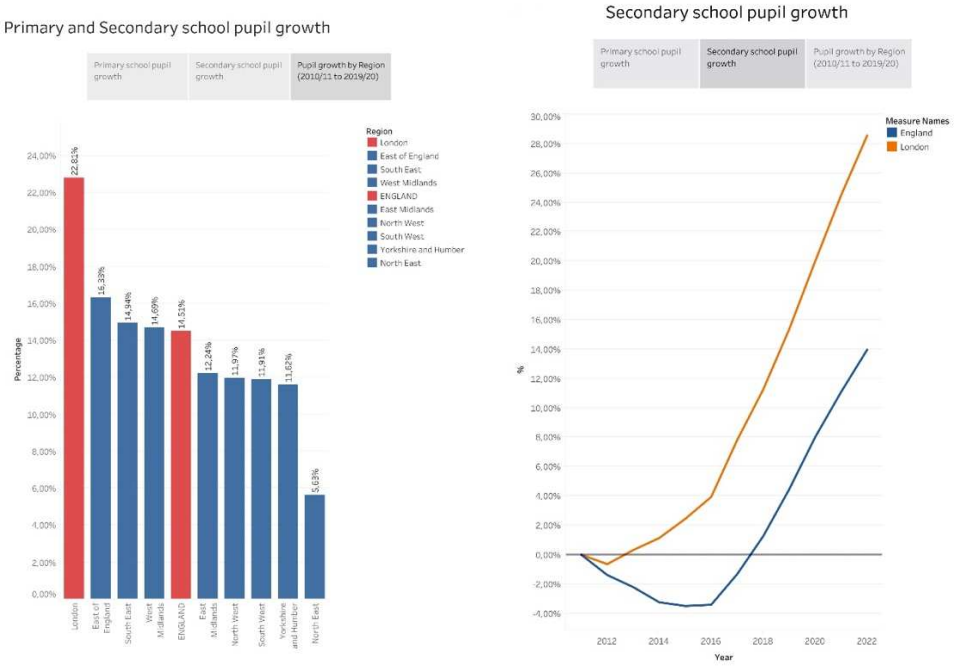


Fig. 4-1 Data on the Pupil growth by Region from 2010/11 to 2019/20.
Data on the Secondary School pupil growth in London and England from 2012 onwards by the London Council.
Source URL: https://www.londoncouncils.gov.uk/our-key-themes/children-and-young-people/education-and-school-places/do-maths-2017/shortfall (Last access 8-8-2019).

As evident from the diagram, in the city of London from 2012 onwards there has been a continuous growth in the number of secondary school students, and that from 2016

onwards the number of pupils at secondary level has had a remarkable increase, and it is expected that it will continue to grow more consistently over the next few years than the rest of England.
With the increase in population in the school age group, it was necessary to plan an increase in places for students in mainstream schools.
The laws that regulated the standards of the maintained schools in England and Wales between the end of the 20th century and the beginning of the 21st century are: the Education Act 1996 and The School Premise Regulations 2012 (SPRs). The Education Act 2002 prescribes standards also for the independent schools, Academies and Free Schools. [Department for Education, 2015, p.4]
In 2004 the labour government started an ambitious renewal program for all secondary schools with the intent to renovate and build all secondary schools in the country over 10-15 years.
Building school for the Future it aims to improve not only school buildings but also to implement new forms of management and improve pedagogical and collaboration aspects with communities and local authorities.
Labour government embarks on a new trend in the English school building tradition in which education and design are brought together.
The Department for Education and Skills (DfES), a government department responsible for the education system in United Kingdom between 2001 and 2007, has compiled a series of guidance on space standards for primary and secondary school design and for special schools.
About the secondary schools, the Education Funding Agency (EFA) drafted a Baseline designs guidance for schools to fulfil the recommendation in the Review of Education Capital in 2011.
A series of drawings and regulations that can be used for different educational facilities have been elaborated. Examples of projects that meet the specifications of the school building program are reported, respecting costs and area allowances.
With previous and recent publications, the Department provide a design guidance about the main topics such as technical guidance on building construction, adjacencies between spaces, designing individual spaces, finishes of furniture and equipment, health and safety, environmental design and services. [EFA, *Guidance Primary and secondary school design*, 2014].
Between 2010 and 2015 the Coalition Government led by Cameron with Clegg as Deputy Prime Minister, (members of both the Conservative Party and the Liberal Democrats), spent almost £18 billion on school buildings. Of these funds, approximately £5,6 billion. Of these funds, about 5 million, were allocated for the improvement of school buildings.
In London, in addition to the request for school places, there was an increase in construction costs and lack of available land. In most districts there is a pressing need to find the funds to provide school places for pupils.
At the same time it was necessary to consider the educational perspective, since, according to C.P. John [London Council, et al., 2015, p.2] London's children grow in a complex reality

and, at the end of school education, they will have to face a competitive working environment consisting of highly qualified people from all over the world.
In the last thirty years the London state education system, and in particular that of secondary schools, has considerably improved performance thanks to the transfer of educational responsibility from Inner London Education Authority to the boroughs.
All stakeholders in London's education, the boroughs, businesses, parents, teachers, the Mayor of London and central government, are involved in the process of improving London's schools so that these become suitable environments to form young people who will live in a complex and competitive society.

4.1. Public and private education system in the UK and Italy

International public policy has always treated the subject of education as a relevant matter, considering it as one of the cornerstones of the various political reforms, with which the objectives of the educational institution are redefined, the responsibilities and roles of the various bodies that they must manage it are reconsider.
Having analysed three English schools as case studies, it is considered appropriate to compare the Italian and the English school system, in order to outline which are the competent bodies that manage the public education system in the various areas, from that of the didactic organization to the management of school staff, up to the management of school facilities.
The Italian education system is predominantly public, in which most schools are owned by the state or local authorities (Regions, Provinces and Municipalities), but at the same time there is a system of private schools run by religious bodies or private organizations.
The Ministry of Education, University and Research (MIUR) is responsible for the administration of the education system at central level. At a decentralized level, and limited to school education, the Ministry of Education operates through the regional school offices (USR) which in turn are articulated in the territorial areas at the provincial level. At the municipal level, there are no decentralized offices of the MIUR.
The buildings of the nursery, primary and middle schools generally belong to the Municipalities; the high schools, academies of fine arts, music conservatories and boarding schools are the property of the Provinces. Structural and maintenance refurbishment are under the responsibility of municipal and provincial administration to which they belong. School administrators are required to make requests for any work to the competent administration.
A regulation on administrative decentralization and the transfer of functions from the State to local authorities (Legislative Decree 112/1998) has assigned to the Municipalities and Provinces the administrative competences in the scholastic field, previously charged to the State.
The Constitution Reform of the 2001 redefined the institutional levels of competence, giving the State the power to define the general rules of the education system and the Regions and Territorial Bodies the competence to organize the education and training service in the territory. The State and the Regions must, however, contribute to defining together many functions inherent to the education and vocational training system.
All schools are bound by the general rules defined by the State in reference to educational and learning objectives, teaching contents and educational systems.
The Ministry of Education was reformed at beginning of 2000 and it transferred powers and competences to the regions and provinces, establishing the regional school offices, managed by a general director for education. At the same time some administrative competences have been transferred from the Ministry to the Regions, Provinces and Municipalities. In the past Municipalities and Provinces had a service role within the state school; with the policy of decentralization and territorial autonomy, today Municipalities

and Provinces can define the school calendar, didactic planning, the distribution of the school network in the territory, the establishment or closure of schools and scholarships.
Italian public schools benefit relative freedom since the headteacher, also defined School Director (DS), can make relevant decisions for the school management, promote educational initiatives, ensure interaction between various school components and promote collaboration between cultural, professional and social resources and economic. The headteacher deals partially with the management of school staff.
Financial issues are monitored by the state through the figure of DSGA, Director of General and Administrative Services, who oversees administrative and accounting services and takes care of their organization.
The body called the Institute Council has the task of deliberating on the immovable property belonging to the educational institution and to the participation of the school in initiatives that involve other bodies or public or private subjects and universities.
Private schools in Italy usually have a religious management otherwise are schools that follow specific pedagogical methods, such as Montessori or Steiner, or are bilingual or international schools.
An analogous curriculum to that of public schools is followed in private schools and students are subjected to evaluations by commissions made up of teachers appointed by MIUR (The Ministry of Education, University and Research) at the end of each education cycles.
Compared to public schools, they are in much lower numbers, there are approximately 13.500 in total throughout the national territory, including nursery schools, primary schools, middle and secondary schools. They are attended by a small number of students, less than a million overall, with a significant raise in the Lombardy region.
The large number of Italian private schools are nursery, while the quantities decrease drastically with primary and secondary schools.
It can be said that the system of private schools in Italy does not replace or compete with that of public education. Instead, it is noted that the public system is not able to adequately meet the needs of younger children and their families must resort often to the private school system due to the limited number of places in public nursery and to the inflexible timetable.

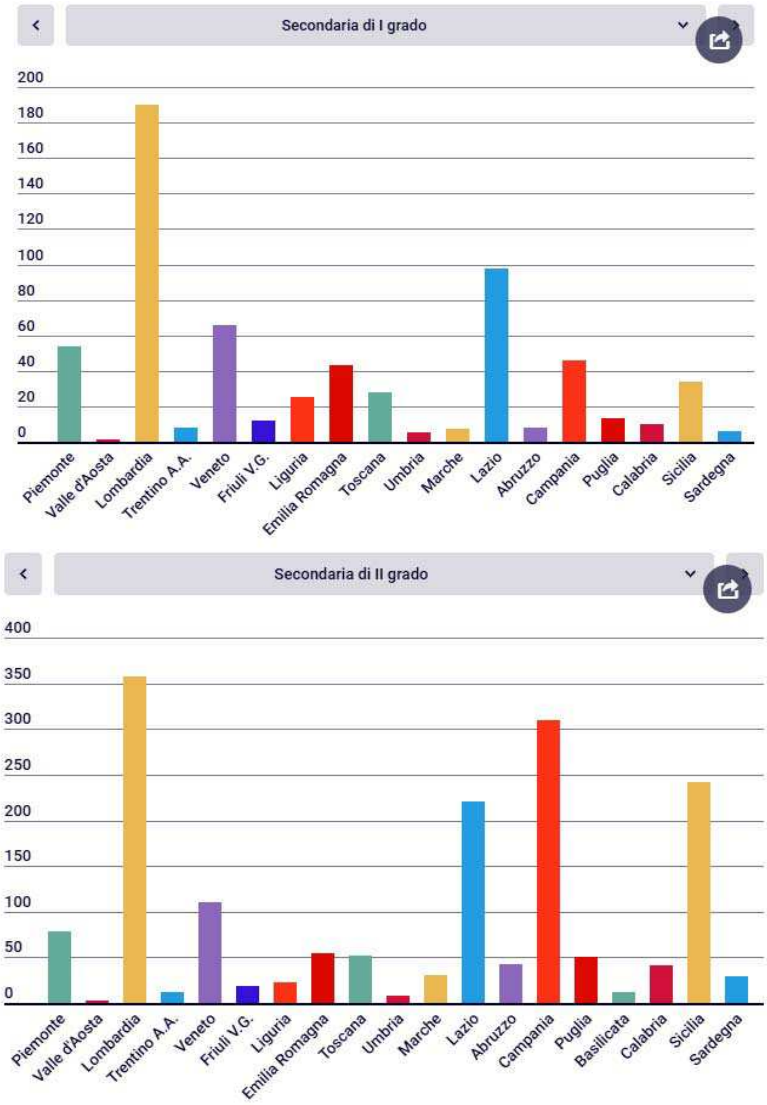


Fig. 4-2 Data on the level of concentration of non-state Secondary (Middle and High) Schools in Italy in all regions provided by the Ministry of Education. Data refer to the 2017-2018 school year.
Source URL: https://infogram.com/scuole-privateok-1gqo2qvkxndyp78

The overall picture of public and private education system in Italy appears less articulated than United Kingdom one.
The framework of the educational system in England is complex and it is the core of constant debate.
Over time, and even today, the task of controlling and managing schools fluctuates between central and local authorities.

Schools are still managed by a compound of church, state, and private bodies.
In England all children between the ages of 6 and 16 are entitled to a free place at a state school, that have to follow the national curriculum.
The main categories of **state schools** are:

1) **Maintained schools**, are the majority of State school and they can be divided into four categories:

   - community schools, managed by the local council and not influenced by business or religious groups
   - foundation and trust schools, run by their governing body, that employs the staff and sets its own admissions criteria. The buildings are usually owned by the governing body or, in trust schools, a charity.
   - Voluntary Aided schools (VA schools), which have more management autonomy than community schools. The majority of voluntary aided schools are faith schools. Usually a religious organisation or a foundation inputs a small proportion of the capital costs for the school and forms a majority on the schools governing body.
   - Voluntary Controlled schools (VC schools), are similar to Voluntary Aided schools but run by the local authority, that employs the staff and sets admissions. The foundation or trust, often a religious organisation, owns the land and buildings, and usually forms a quarter of the governing body.

2) **Academies**, organised by a governing body, autonomous from the local council and with the possibility to pursue a different curriculum. Academies are publicly funded independent schools, instituted in 1997 by the Labor Party in conjunction with the BSF program. They have been maintained to date, although the BSF program has been abolished.
3) **Grammar school**, run by the council, a foundation body or a trust. Students can be admitted only through a selection based on academic results, sometimes after an entrance exam. Recently many grammar schools have acquired the status of academy, while maintaining the level of selection of students. The grammar schools that have become Academy are independent of the Local Education Authority (LEA).
4) **Special schools** for children with special educational needs, divided into categories based on physical or mental issues.

Non-state schools are defined **Independent schools**. They are in a minority compared to academies and maintained schools.
Independent schools charge fees to attend instead of being funded by the government. They can make a profit and are governed and operated by the school itself. Some of them are instituted in the middle-ages while others later by companies and charities. They are not obligated to follow the national curriculum but are listed by the government and inspected frequently.

From the research conducted in 2019 by the Department for Education, it emerged that The number of pupils in state funded secondary schools rose for the fifth year in a row (69,500 more pupils), and in 2019 had a much greater increase in population than primary schools (10,800 more pupils). The increased number of primary pupils since 2010 have started to move into secondary schools so we expect to see the number of secondary pupils continue to increase in the coming years. In addition there are 6,500 more pupils in special schools, while there are 900 fewer pupils in independent schools compared to 2018 [Department for Education, 2019, p.1].

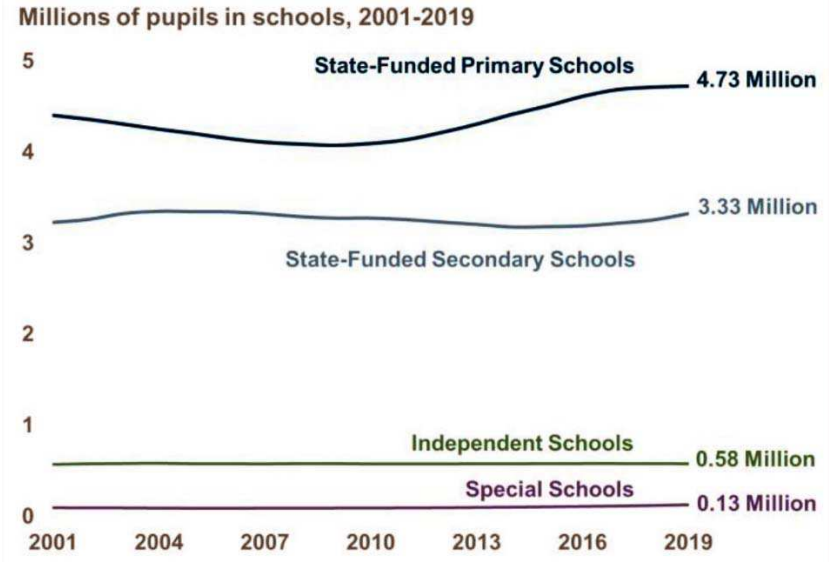


Fig. 4-3 National Statistics on the number of pupils in state and independent primary and secondary schools in the UK from 2001 to 2019. Source URL: https://www.gov.uk/government/statistics/schools-pupils-and-their-characteristics-january-2019

In state school system the Local Education Authority (LEA) or diocese is responsible for the arrangement of pupil places and the school estate.
Senior school staff and governors must verify and ensure that school building is appropriate to the specific needs of the school.
A specificity of the English school, compared to the Italian one, is the participation of other stakeholders, such as private company or charity agencies, that could provide further funding for school building, maintenance and health or social services.
In England among the upper social classes, and in significant way in London city, the tradition of private education persists, so many children attend independent schools.
Researches conducted by Independent Schools Council report that independent sector educates around 6,5% of the total number of school children in the UK, and over 7% of the total number of school children in England.
While the academies receive public funds, this is not the case for the independent schools that are subsidized by the families and charities.

A recent study by Oxford Economics reported that independent schools save the tax payer £3.5bn, generate a further £4.1bn in tax revenues, contribute £13.7bn in GDP and support 302,910 jobs [ISC Census and annual report 2019].

The Independent School Council (ISC) schools is committed in cooperation with state schools and local communities in many themes, as improvement of teaching and learning, share knowledge, skills, expertise and experience, reading with younger pupils and many other initiatives.

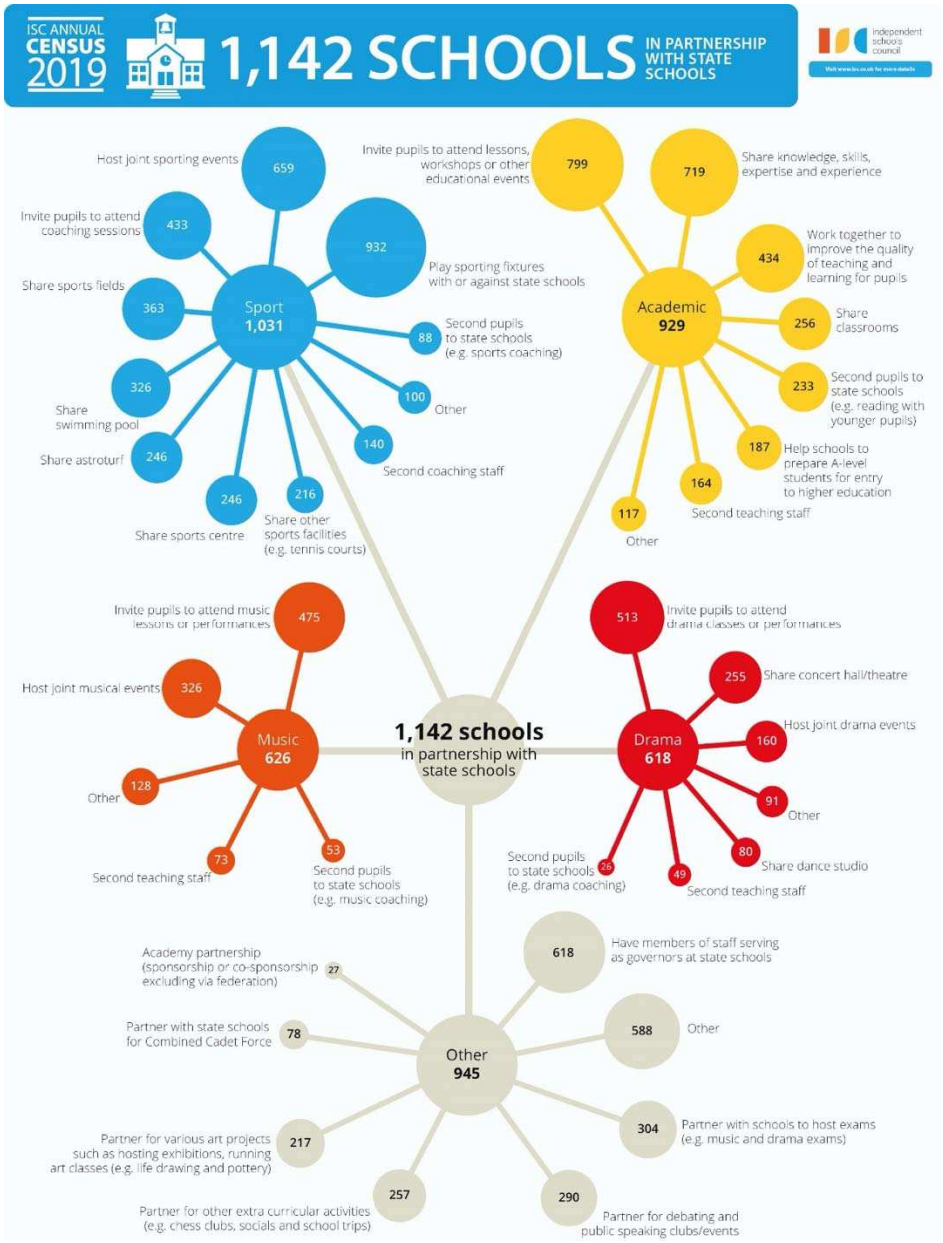


Fig. 4-4 ISC Annual Census 2019 of partnership between Independent schools, state schools and local communities.
Source: ISC Census and annual report 2019, p.5

The maps below show the location and concentration of independent schools in the UK, England, and in London city.

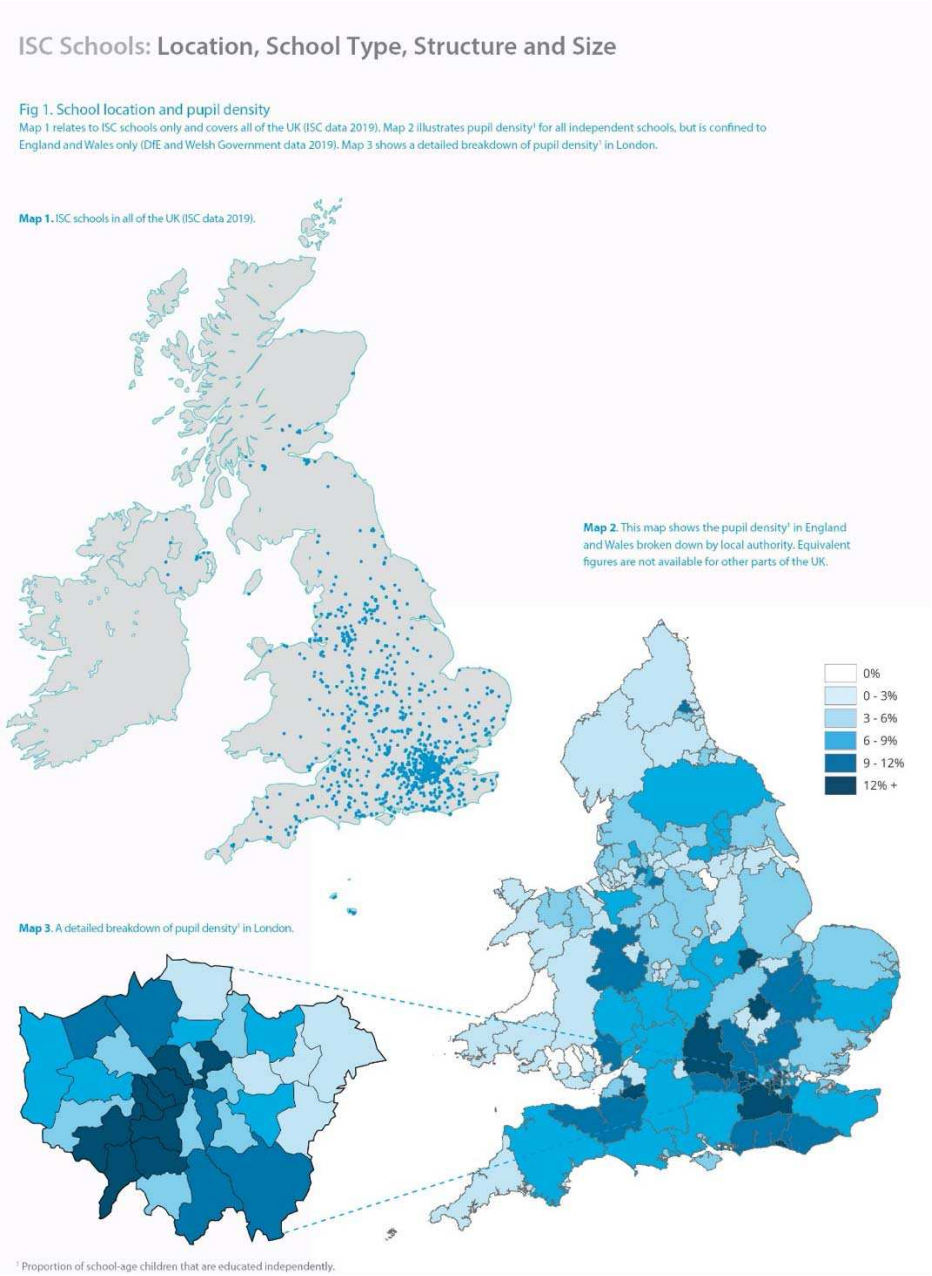


Fig. 4-5 ISC Schools location and pupil density for all Independent school in UK (Map 1), England (Map 2) and London city (Map 3).
Source: ISC Census and annual report 2019, p.5

The greatest concentration of independent schools is in the south of England, and in the city of London, especially in the central and south-west areas of the city.

The English educational system is historically linked to private initiative. In the 19th century in England a diversified education system was managed by voluntary societies and the majority of schools held and disciplined by church.
Since 1833 the government has partially provided funds to these school organizations, some of which were also established by private philanthropic initiatives, with the aim of educating communities that had developed around factories, also providing other services.
In the 1880s in England there were 14370 voluntary schools and 3692 public board schools. [Mirchandani, Wright, 2016, p.4]
The state officially starts to assume the commitment for compulsory education with the Education Acts of 1870.
It was the first law to accord the foundation of state education system in Britain and to provide schools on a national scale.
The Act foster a system of "school boards" to build and conduct schools in areas of the country without educational institutions. The voluntary schools could continue to exist alongside this public education system.
The state schools were then managed by locally elected boards and subsidized by local rates.
While in the voluntary schools religious teaching could be taught in a confessional way, in state schools was to be non denominational.
Only in 1876 the Royal Commission on the Factory Acts endorse a compulsory education to end the children labour.
The Education Act of 1880 promotes a law that makes school attendance mandatory for children within the age range of five to ten years.
Despite these laws, many children worked outside school hours, obligated to contribute to the family economy. In 1893 a law extended to eleven years the age of compulsory attendance and in 1899 to twelve.
The Elementary Education (Blind and Deaf Children) Act of 1893 instituted special schools to give a compulsory education for blind and deaf children. In 1899 the Elementary Education (Defective and Epileptic Children) Act promoted the same measure for physical disability children.
In the 1870s the London School Boards assigned to architect ER Robson the task to plan new school architecture and classrooms. He improved classroom standards, designing individual classrooms for 40 to 60 students and communal halls with classrooms arranged around.
The 1888 County Councils Act had instituted 62 administrative county areas, and in 1902 the counties take on the liability for every field of education, establishing local education authorities.
In the bigger district the local education authority had the control of elementary and secondary education, while in the smaller areas local authority administered only elementary education.
Such connection between the locality and its educational institutions represents the preamble of future debates on the role of the school within its community.

The period between 1915 and 1945 brought considerable consolidation in the education system and saw the beginnings of some experimentation in school design. The 1921 Education Act raised the school leaving age to 14 and there was much debate about the future of education throughout the period. [Mirchandani N., Wright S., 2016, p.5].

The 1944 Education Act decreed the extension of compulsory education to 15 years, increasing the school population by 10 percent. It also renewed the organization of education system replacing the all-age elementary schools with two school grades: primary and secondary schools.

The objectives of the UK school curriculum established by the 1944 Education Act are still pursued today. They aim to promote spiritual, moral, cultural, mental and physical development of students and to provide a guide to face the challenges of future life with responsibility and psychological maturity.

The act of 1944 had a great impact on the education system since it established the obligation of secondary education for all and the replacement of the previous school curriculum between elementary school and higher education in a new organisational framework composed of three stages: primary education, secondary education, and further education.

The main reforms that set up the responsibilities for publicly funded education have been passed in the 1980s and 1990s, giving more autonomy to schools about responsibility for staffing and to school's governing body the opportunity to manage their budgets. A national system for verifying the skills acquired by the students was established through tests and qualifications implemented externally.

The Education Reform Act of 1988 established for the first time the National Curriculum …..

In order to inspect the education quality provided by schools, colleges, work-based learning and adult education, in 1992 was established the Ofsted, Office for Standards in Education, Children's Services and Skills. It is a non-ministerial department which conducts weekly inspections in all regions of England independently, reporting the results in Parliament and publishing online.

In 2010 a significant reform was implemented which led to the Academies establishment. Today a minority of primary schools in England are Academies, while these constitute majority of secondary schools.

The responsibility of many academies currently concerns to a central trustee board in a multi-academy trust (MAT), unlike the past, where schools were run by local governing body.

The supervision of the Academies and of underperforming maintained schools belongs to regional schools commissioners.

These reforms have reduced the tasks of local authorities, but they maintain the role to assure a adequate equip of school places, promote school development, safeguard children and young people, especially the most helpless ones.

In 2014 the national curriculum has been revised and it is still implemented today.

From September 2016 the compulsory teaching of English and Mathematics is introduced in all year groups.

Pupils of compulsory school age in community and foundation schools, including community special schools and foundation special schools, and in voluntary aided and voluntary controlled schools, must follow the national curriculum [Department for Education, 2014, p.5].

	Key stage 1	Key stage 2	Key stage 3	Key stage 4
Age	5 – 7	7 – 11	11 – 14	14 – 16
Year groups	1 – 2	3 – 6	7 – 9	10 – 11
Core subjects				
English	✓	✓	✓	✓
Mathematics	✓	✓	✓	✓
Science	✓	✓	✓	✓
Foundation subjects				
Art and design	✓	✓	✓	
Citizenship			✓	✓
Computing	✓	✓	✓	✓
Design and technology	✓	✓	✓	
Languages[3]		✓	✓	
Geography	✓	✓	✓	
History	✓	✓	✓	
Music	✓	✓	✓	
Physical education	✓	✓	✓	✓
	Key stage 1	Key stage 2	Key stage 3	Key stage 4
Age	5 – 7	7 – 11	11 – 14	14 – 16
Year groups	1 – 2	3 – 6	7 – 9	10 – 11
Religious education	✓	✓	✓	✓
Sex and relationship education			✓	✓

Fig. 4-6 The structure of the national curriculum of primary and secondary school in United Kingdom.
Source: Department for Education [2014], *The national curriculum in England*, p.6

Schools must adhere to the national curriculum programmes but they can organise school time independently. The teaching of religion education must be treated in every school and in secondary schools must carried out sex and relationship education.
The national curriculum is set up into blocks of years called “key stages” (KS) combined with the age of the students, from 3 to 16 years.
Following are the structures of national education system currently effective in UK and in Italy.

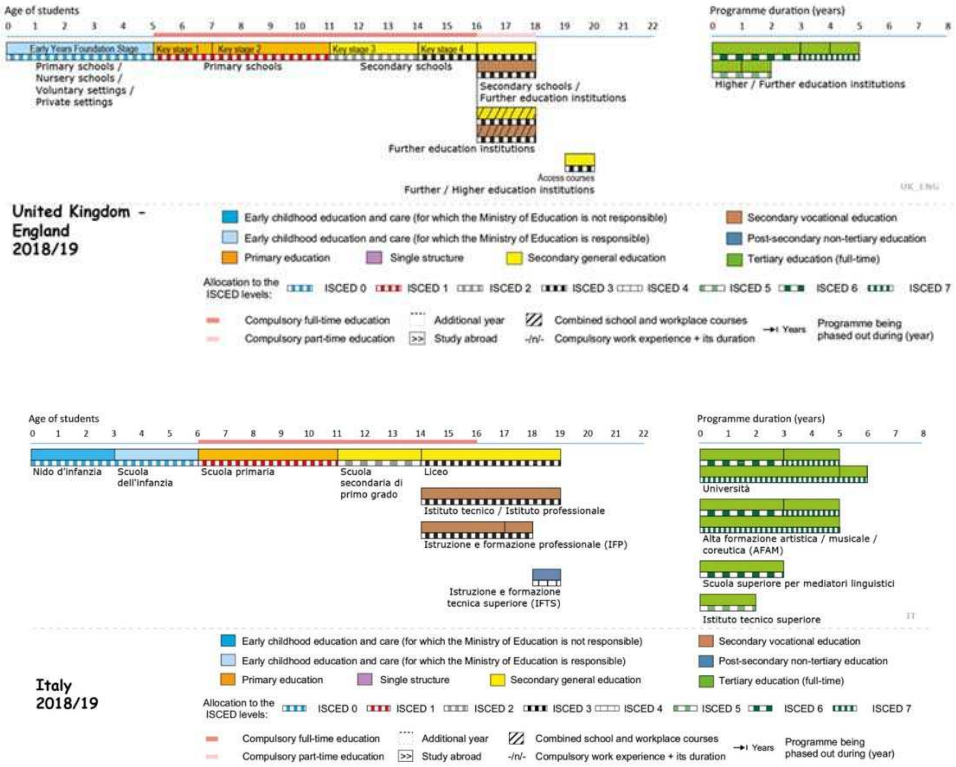


Fig. 4-7 Diagram 2018 – 2019 of the national education system of United Kingdom and Italy.
Source: Eurydice 2018-2019

The Italian and English school models are part of the student assessment system called PISA (Program for International Student Assessment) promoted by the OECD (Organization for Economic Co-operation and Development), like most of the Western school models.
PISA is an international survey aimed to evaluate the adolescents' educational level in the main industrialized countries every three years. It has the objective of verifying students' skills acquired in school considered fundamental to have an active role and conscious involvement in society.
The level of education achieved in the last years of compulsory education, according to PISA (Programme for International Students Assessment), a worldwide study by OECD in 70 nations of 15-year-old students' scholastic performance on Mathematics, Science and Reading, found that United Kingdom (499.7) in on 23° position and Italy on 33° position (485.3).

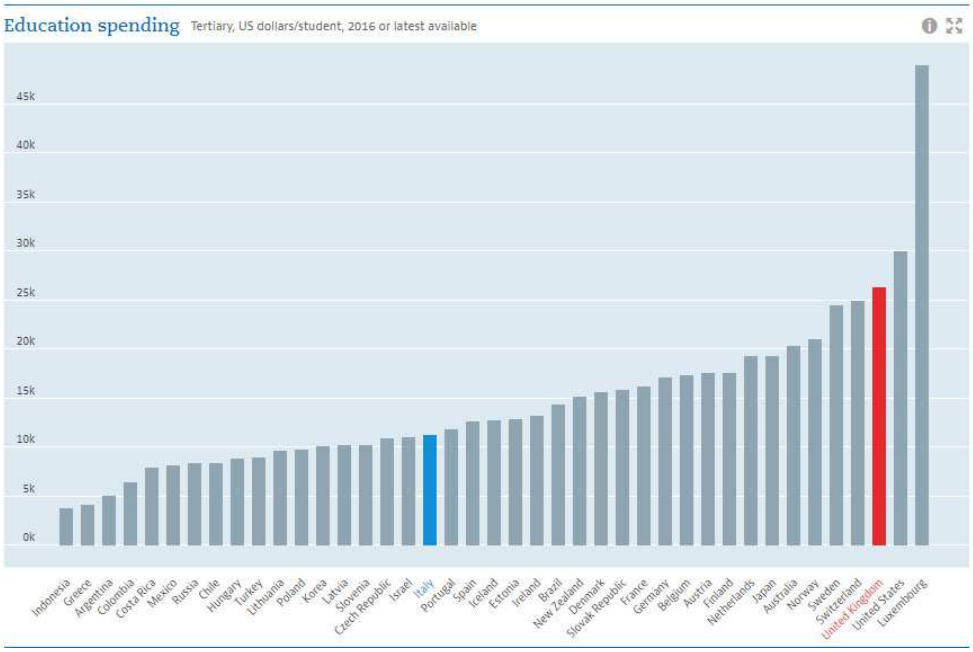


Fig. 4-8 OECD Data: Education spending covers expenditure on schools, universities and other public and private educational institutions. Spending includes instruction and ancillary services for students and families provided through educational institutions. Spending is shown in USD per student and as a percentage of GDP.
Source: Organization for Economic Cooperation and Development (OECD), 2016.
https://data.oecd.org/pinboard-editor/ (visited on 11-2-2020).

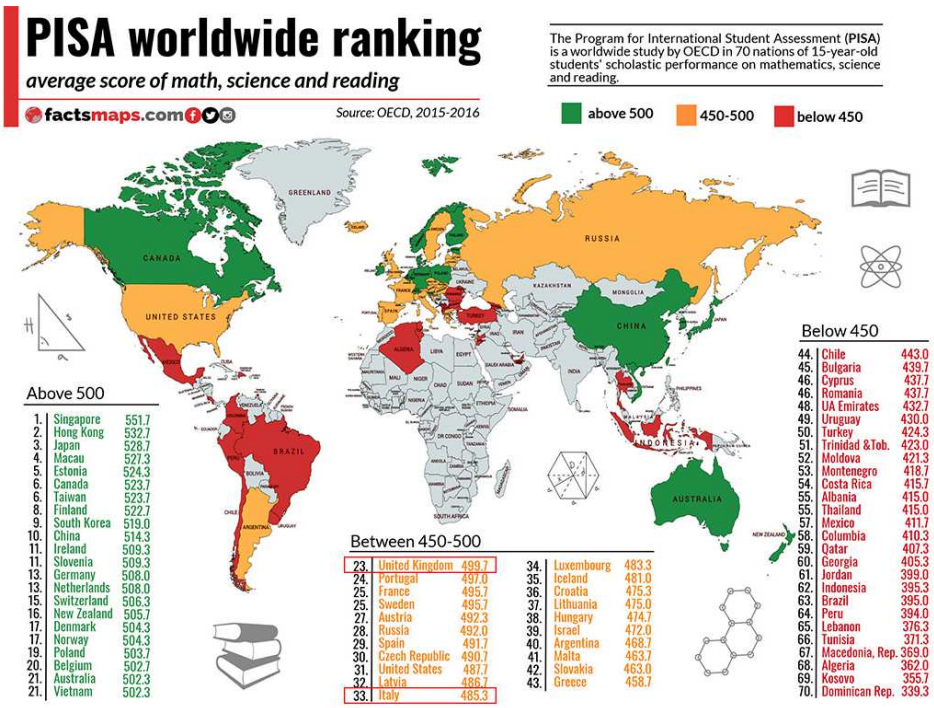


Fig. 4-9 PISA Worldwide Ranking – average score of math, science and reading
Source: Organization for Economic Cooperation and Development (OECD), 2015-2016

It is evident that Italy has reported worst overall results than the UK and considering the results in the individual disciplines, it emerges a greatest gap between the two Countries is in Science Scores (17° UK and 34° Italy) and Reading Scores (21° UK and 34° Italy), while lower is the mathematical gap (27° UK and 30° Italy).

Overall it can be said that despite the diversity of school systems, the outcomes of the education system place the two countries in an acceptable range.

4.2. Building School for the Future Programme

In England, after 2000, the policy on school building has undergone several changes.
Between 2003 and 2010 the government invested considerable resources to improve the design of learning environments. This program, conceived for a long time, had the goal to offer architecture for quality education to the young population, where they could better develop their potential.
At once, in designing new learning environments, pedagogical needs had to be considered, creating spaces in which teachers could better perform their work with students.
The considerable aspect is that, this huge program was carried out through a participatory planning process, which involved the children and the staff of the school and the wider community [DfES, 2002, p.63].
The programme, called Building school for the future (BSF), started by the Labour government led by Tony Blair and commissioned by Department for Education and Skills (DfES) allowed to designate many funds for the construction of new schools and to improve learning method.
It was a massive school building programme which consisted of the refurbishment or rebuilding of every secondary school in England over 15 years starting in 2004, at a total budget of £45bn, and it constitutes the government's most ambitious school building programme since the post war period. [Bornat, 2013].
BSF was launched in February 2003, to provide 21st Century learning environments that engage and inspire young people, their teachers and the wider community. It was introduced by Schools Minister at the time, David Miliband, with these words: "*School buildings should inspire learning. They should nurture every pupil and member of staff. They should be a source of pride and practical resource for the community*." [PfS, 4Ps, 2007, p.4].
Partnerships for Schools (PfS) was the government agency tasked with delivering BSF and was commissioned by the government to build up to 400 Academies.
The implementation of Building School for the future program, has been interrupted due to political changes in 2010, since in England political power has shifted from a Labour Government to a Conservative Government.
This change of course in politics, let to a radical change in the investment policy in the field of public education.
According to Cox, Daniels, Stables and Tse in "Designing Buildings for the future of schooling", *the move to reduce the input of designers into the process and consultation with school communities, alongside reduction in budgets and the roll-out of standardisation, had caused something of a furore. Importantly, this policy shift also gave rise to debates about the very nature of schooling.* [Cox et al., 2019, p.1].
The publication deals with the issues that concern the relationship between the design of school buildings and his impact on pedagogic practice, that is, the relationship between the architecture practice and educational practice. Furthermore the perspectives of the BSF program have been highlighted, the positive results in the learning system in England and also the unresolved issues are evaluated.

Regarding the issues of program BSF funding, it was crucial the decentralisation of funds to local education partnerships who had the task to improve secondary school buildings as well as organise and supervise the educational evolution and the community regeneration. The main purposes of Building Schools for the Future programme were:

- renew the entire building stock of secondary schools, that added up 3500 schools, rebuilding around half of them, reinforcing the structure of 35% and refurbishing the rest [Marcarini, 2016, p.143];
- improve the quality of education;
- increasing school diversity and improve teaching and learning in those areas with highest levels of deprivation and with lowest attainment;
- *collaborations between schools;*
- *the development of new forms of infrastructure;*
- *new models of school organisation;*
- *the enhanced teaching force;*
- *new patterns of distributed leadership;*
- *personalised approaches to teaching and learning, involving significant and novel use of information and communication technologies (ICT);*
- *new forms of central governance.* [Cox et al., 2019, pp.2-3].

The BSF has started with great ambitions and a great improving impact on the English educational system, but there were a lot of critiques on the possible risk of bad quality in the architectural design and construction.
In reality the programme started with the intention to deliver 200 schools within the end of 2008, faced a lot of difficulties. Indeed at the end of 2008 it delivered only 42 out of 200 schools.
In 2010 the programme have been revised with the aim to take into account the existing investments and formulate recommendation on how to distribute them for the future investments.
The general goal was that the future investments provided a good ratio quality-price, improved the learning and created an adequate numbers of seats in the schools in line with the increment of the birth rate.
In 2013, were announced projects that could have been supported by the programme and a plan for the Academies.
Academies *were designed to replace schools considered 'failing' by the school inspection body, Ofsted. Academies were not 'maintained' by local authorities, instead being 'sponsored' by businesses, individuals, churches or voluntary bodies, which made a contribution to the capital costs and then ran the schools. Revenue costs were met directly by central government. Sponsoring bodies established trusts (private companies with charitable status) which entered into funding agreements (contracts) with the Secretary of State.* [West, Wolfe, 2018, p. 4].
Initially the academies' governance was based on the contract foreseeing a major autonomy of the admissions and exclusion with respect to the maintained schools.

Some representatives of Labour Party had reservation about Academies for the following reasons:

- their independence from Local Education Authority (LEA)
- the opportunity of original schools to ask for private sponsorships;
- the potential influent of sponsor having their own religious or ideological agenda [Brighouse, Coles, Pipe et alii, 2015, p. 32]

In 2010 there were only 203 sponsored academies out of 3333 secondary schools, around 6 per cent of all secondary schools.
After the 2010 general election, the Conservative-led Coalition Government enacted the Academies Act 2010 which provided a bespoke statutory mechanism for maintained schools, both primary and secondary, to be forced or allowed to "convert" to academy status. New academies were also established under the label of "free schools". Where a local authority considers that there is a need for a new school in its area, it must (other than in exceptional cases) seek proposals to establish an academy in the form of a "free school". Following new Academies have been established and in most urban areas which needed of schools.
In 2012 the Department of Education has revised the design and construction standards of school buildings: maintained school, independent school, academies, free schools and all other school typologies.
The projects presented in "Advice on standards for school" are referred to primary and secondary schools and represent guidelines to limit the construction costs without modifying the features of the school.

4.2.1. Development of the school spaces and connections with the community in the secondary schools

One of the main theme about renewing schools in England, including secondary ones, was the transformation of the learning environment inside and outside the school, to create new relationships between students, staff and the wider community.
Secondary schools have received substantial money from state funding to modernize schools for the needs of the 21st century.
A key programme conceived specifically to refurbish and to build secondary schools in England was Building Schools for the Future (BSF), whose prerogatives were to make enhancements in the school buildings as well as school grounds, for better fruition by school and community users.
In the guidelines enunciated by Department for Education and Skills (DfES) is recommended to adopt an integrated approach to the school design reconfiguring interior spaces and grounds.
Integrated thinking is fundamental to good design, build, use and management of schools, with the indoor and outdoor spaces treated as a continuum. Designers and contractors have specific skills that can complement those of educationalists, and a collaborative approach to school grounds design can bring outstanding results. Their expertise can ensure high-quality design, which will make a real difference to learning and children's experience [Department of Education and Skills (DfES), 2006, p.4].
The school ground is subjected to specific attention, as they are considered to bring benefits to the students and community in the fields of learning and teaching, healthy lifestyles, student behaviour, social development and sustainability.
Starting from the assumption that the school ground has historically been considered a marginal aspect of school design, in the guidelines for new schools is argued that it should instead become a crucial element, developing together the building and outdoor space.
The choice of the site where to build a school is considered fundamental for the layout and for future use and maintenance. At the same time the grounds represent an effective place which can offer opportunities for formal and informal educational uses, therefore it must be adaptable to changes and constantly respond to the needs of the school and the community.
A participatory planning process is endorsed, in which young people are involved with adults in decisions, in order to encourage a sense of belonging to the place and the district. The cooperation of landscape architects, local community councils and community groups, local planning officers and other consultants is also required.
The objectives to be pursued for the design of the new school's outdoor spaces are commonly discussed by all the actors involved in the process, following a specific outline, according to the assumption that *the external space is in effect a large classroom and therefore should be given the same level of detail in its specification* [Department of Education and Skills (DfES), 2006, p.13].

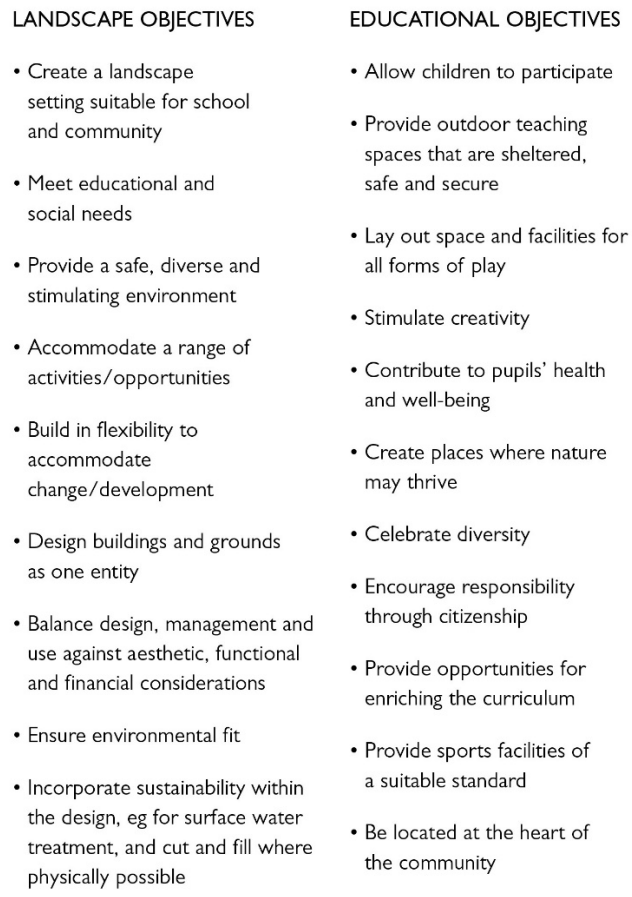


Fig. 4-10 Source: Department of Education and Skills (DfES) [2006], Schools for the future. Designing school grounds, Printed in the United Kingdom for the Stationery Office, London TSO, p.13.

Study on the quality of the outdoor school environment and benefits on secondary school students are indicated by a research of the National Foundation for Educational Research and Learning through Landscapes [Rickinson M., 2004].
The research is conducted on play in grounds for 11-18 years old in secondary schools and it demonstrated that students who have a positive play experience at break and lunch reinforce the mental and physical health, develop the creativity, resilience and brings improvements in self-confidence and learning.
The involvement of secondary school students in the process of planning the school grounds allows in suggesting switchs, convene ideas and make economic decisions, activities that develop citizenship skills.
In last twenty years the debate on innovative school design has increasingly considered the topic of "extended schools", especially in secondary schools. In the UK, newly built schools

aim to become multi-purpose environments, integrating a variety of activities that are not only strictly educational, but open to the community.
This idea is already successfully applied in the Netherlands, even in lower grade schools.
In the English context, an element of debate is how to proportion student safety in the school environment by creating a welcoming environment for the community.
Many indoor and outdoor school spaces are used in different ways by the community: sports facilities are leased to third parties, theatre and halls can hold local events, rooms devoted to Information Technology (IT) and can be used by citizens of different ages, including the activity of adult education.
These and other community functions are provided by the schools in extended opening time in the evening and in some cases even during the weekend.
To give an effective solution to safety requests, it is advisable to plan adequately the access possibilities to the spaces used outside school time.
In the planning phase the early adjacency diagrams for the management of multiple and prolonged uses of the school and to decide the number and disposition of entrances and fence lines are useful.
The fences are used in most contemporary schools in England and constitute a limit to the idea of a school open to the city and inclusive. In some Northern European countries such as Denmark, Finland and the Netherlands, schools are built without gates, physically connected to the district and therefore more open to the city.
A possible alternative to the positioning of gates along the whole perimeter of the school can be provided by a suitable location of the functional environments, putting those frequented by the citizens in positions easily accessible from the street and studying the paths.
The architecture of the school itself carries out the function of delimiting spaces and protecting users. Further fences are often superfluous and constitute a barrier between the city and educational architecture. The main entrance of the school, in particular, should have a welcoming appearance and the whole building should offer more permeability to the urban community.
A Guideline for Secondary School Projects by Department for Education and skills asserts that *any mainstream secondary school can provide extended school activities and services, outside the school day, to help meet the needs of its pupils, their family and the wider community. Some schools may provide more extensive provision for non-school use during the school day.* [DfES, *Building Bulletin 98: building framework for secondary school projects*, 2014 p.19]
Extended school facilities achieve three main requests: access by the wider local community organising a design and management of the building suitable for this purpose, flexible multi-use areas for use by others within the school during the school day (parent, community, health care), areas for dedicated non-educational services. The position of the structures open to the community must be carefully adjusted for the aspects of access, security, parking and child protection.
Facilities which are most commonly used outside school hours are hall or performance space, and sport facilities, both indoor and outdoor.

4.3. Case studies: three secondary schools in the north London area

Two of the three examined case studies are selected in less better-off areas of London: **Regent High School in Camden district**, in the ward of St Pancras and Somers Town, and **Bridge Academy in Hackney** district. **UCL Academy**, instead, is located in **Camden Swiss Cottage**, an area characterized by a very varied socio-economic structure, with rich areas and, in some sections, areas with council houses. It is interesting to examine the qualities and the characteristics that make possible to define the success of a school in a specific context.

The choice to identify three secondary schools built with the *Building school for the Future Program* as case studies was made before the inspection in the city of London, as previous studies of documents concerning the *BSF program* had been carried out on the basis of literary disclosures and official documentation on the web.

The *BSF program* was initially born with the aim to build and refurbish most of secondary schools and, only later it was expanded to other grades of schools.

Since studies on the innovative architecture of secondary schools are rare in Italy, and even less their projects and constructions, it has been used for the examples of secondary schools that offer architectural quality, an innovative pedagogical program that responds to the needs of students living in the contemporary city.

The identified schools, in addition to being exemplary cases for their architectural quality and for their ability to integrate physically and socio-culturally with the context of the neighborhood in which they arise, offered ideas for interesting reflections on different aspects which, although in different proportions, could be considered for the construction of secondary schools in Italy.

In general, the three case studies were examined: the design principles and character areas, the opportunity sites, the school vision and objectives.

The UCL Academy is suitably integrated into the urban context of Camden Swiss Cottage as the building follows the road curtain and has no fences in front of the main entrance.

It also provides an interesting perspective on the educational sphere, since the University College London developed a partnership with UCL Academy proposing a pedagogical experimentation through the collaboration of university professors and tutors and school teachers, interacting strongly about learning setting and environments and about teaching methodologies.

These two perspectives can be starting points for the construction of new secondary schools in Italy and for planning educational activities in line with changes in the pedagogical field, coordinating the internal activities of the school with support and guidance from universities located in nearby areas to schools.

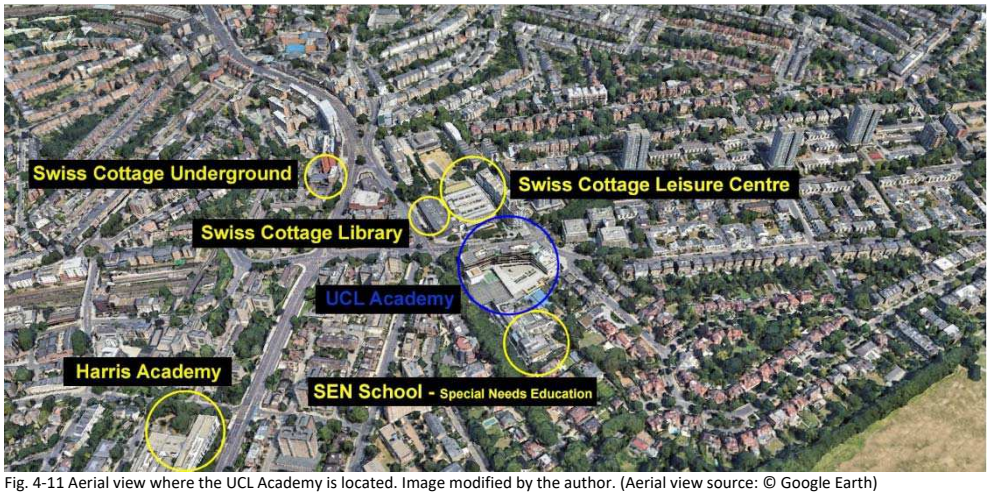


Fig. 4-11 Aerial view where the UCL Academy is located. Image modified by the author. (Aerial view source: © Google Earth)


Fig. 4-12 Main entrance to the UCL Academy (©author's photo).

Regent High School is located in a very central and high urban density area of the London city. It is attended by students from families of different ethnic backgrounds, a large majority of Bangladeshi and Black African students, as well as English.

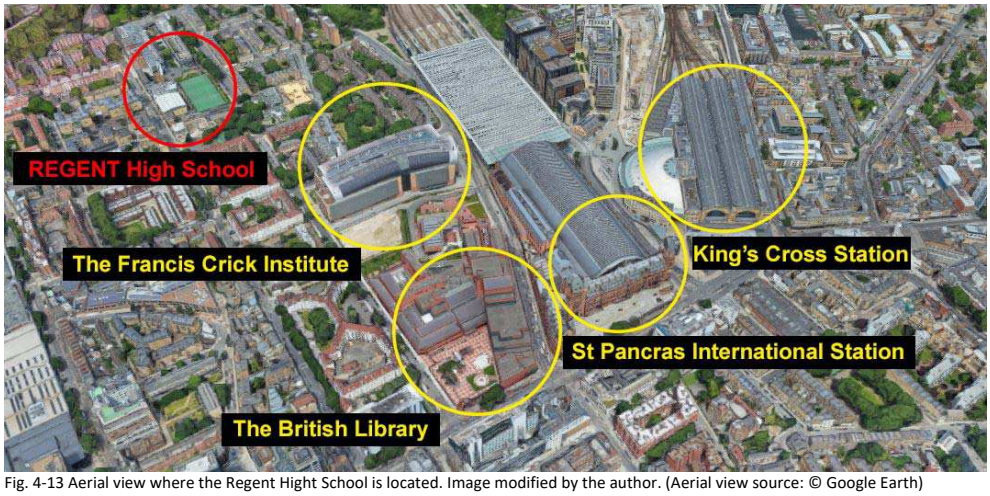


Fig. 4-13 Aerial view where the Regent Hight School is located. Image modified by the author. (Aerial view source: © Google Earth)


Fig. 4-14 External and internal view of Regent High School (©author's photo).

According to Michàl Cohen words, "*It's an old city block and there were a series of the building on the site. This required to design a pretty form and architecture response, so we tried to make a good building on this site. We have tried to create a good pleasant space outside also. At the same time there were the needs of Building school for the Future, such as break out space, equally base learning, independent learning, in order to have a full learning environment."* [Interview Transcript, Cohen, Michàl (Interviewed), Rubino, Anna C. (interviewer), 2019].

An interesting aspect is the ability of this architecture to dialogue with urban pre-existences and to integrate the Victorian school with the new building. The design and aesthetic choices of the new structure have assonances with the compositional and aesthetic choices of some schools of architecture in Italy.
It is no coincidence that one of the main project managers is an Italian architect, Giovanni Bonfanti, who did his training in Italy, and then went to work in London.
An interesting aspect is the ability of this architecture to dialogue with urban pre-existences and to integrate the Victorian school with the new building. The architecture design and aesthetic choices have assonances with the compositional and aesthetic features of some schools of architecture in Italy. It's not a coincidence that one of the main project architects is an Italian architect, Giovanni Bonfanti, who did his training in Italy, and then went to work in London.
The Bridge Academy provides an important example of vertical and horizontal flexibility in the use of spaces, which also comes from Hertzberger's lesson, a Dutch architect who has influenced the schools design internationally and has recently built a school in Rome.

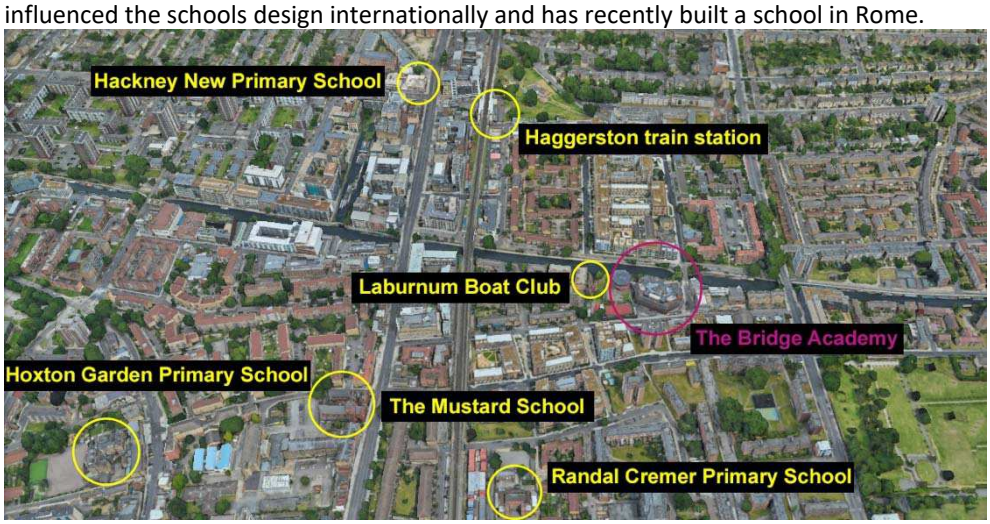


Fig. 4-15 Aerial view where the Bridge Academy is located. Image modified by the author. (Aerial view source: © Google Earth)

Fig. 4-16 Model photo and view of interior. (©author's photo).

The Bridge Academy has contributed to the physical and social regeneration of a peripheral London neighborhood.
This aspect can provide a starting point for those Italian schools that arise in the outskirts of cities, or in suburban areas, characterized by a medium-low people cultural level and by a high presence of immigrants with low educational qualifications.
The Bridge Academy is also open on weekends to host events and religious services of different communities and ethnicities.
The material about UCL Academy, Regent's High School and Bridge Academy was gathered by going to UCL Bartlett-Faculty of Architecture Library, RIBA Library, Camden Local Studies, Archives Centre and Swiss Cottage Library, The Hackney Archive.
Reports and guides on legislation relating to school management and school construction comes from the websites of Department for Education and skills, National archives of UK Government, and provided by European Commission and CABE (Commission for Architecture and the Built Environment).
Results on the outcomes of teaching in the schools come from a file review of documentation held by the Ofsted (The Office for Standards in Education, Children's Services and Skills).
The schools was visited and photographed in the external and internal spaces.
About the UCL Academy, the following people were interviewed:
The Careers and Guidance Coordinator at UCL Academy, Mrs Eranda Aliu, who provided me information on school management, educational activities and the use of space.
Architect Mark Rowe of Penoyre &Prasad Architectural Firm provided me news on the building design and construction process and on the building features and spaces.
About the Regent's High School, the following people were interviewed:

Mr Richard Harrison, Director of Community Engagement at Regent High School, who provided me information about the school pedagogical vision and use of school spaces.
Architects Michàl Cohen and Giovanni Bonfanti of Walters & Cohen Architectural Firm provided me news on the building design and construction process and on the building features and spaces.
About the Bridge Academy, the following people were interviewed:
Mr Ken Robb, Finance & Resources Director at The Bridge Academy, who allowed me to visit the school and provided me information about the school management and use of spaces by the students and the local community.
Architect Keith Papa of BDP Architectural Firm, for providing me sector publications on the Bridge Academy, drawings and several information on the school architecture.
The three school districts with their educational agencies in the areas of the three schools were examined and photographed.

4.3.1. UCL Academy

Location	Adelaide Road, Swiss Cottage, Borough of Camden, London, UK
RSC Region	North-West London and South-Central England
Government Office Region	London
District	Camden
Ward	Swiss Cottage
Parliamentary Constituency	Hampstead and Kilburn
Urban/Rural Description	Urban major conurbation
Construction completion	2012
Architects	Penoyre & Prasad
Contractor	BAM Construction
Client	Camden Council
Local authority	Camden BSF
Phase of education	Secondary
Age range	11 to 18
School type	Academy sponsor led
Funding status	State - Academy
School category	Maintained school (funded and controlled by the governing authority)
Academy sponsor	University College London (UCL)
Gender of entry	Mixed
Establishment status	Open
Specialism	in STEM (Science, Technology, Engineering and Mathematics)
Admissions policy	Non-selective
School capacity	1150
Number of students	1102
Ofsted rating	Good (Last inspection: 24 June 2016)
Official awards for the project	Cabe's School Design Review Panel, BREEAM (Building Establishment Environmental Assessment Method) excellent rating

The UCL Academy is an avant-garde school, realised in the final phase of Building School for the Future Programme, as a reform model not only of school architecture, but also of the vision of teaching and learning.
The school is located in wide Camden area, in a zone called Swiss Cottage, North London. The architectural firm Penoyre & Prasad LLP worked with BAM Construction to develop the Camden BSF (Building School for the Future) scheme, which provides the demolition and rebuilding of the new UCL Academy and replacement of the Swiss Cottage Specialist SEN School.
Swiss Cottage SEN (Special Educational Needs) School is the largest SEN school in London for pupils with special education needs from nursery to A-level (16-18 years).
The new complex is made of two buildings different by volumes and programme but consistent for compositional choices, such as the use of materials and drawing details.
The UCL Academy was the first school in England to have a university – University College London – as its exclusive sponsor at the time of its opening. The aim of University College London (UCL), one of biggest multidisciplinary universities in England, was to promote a partnership with a inner London school and contribute to the educational development of the Camden area. Furthermore the university want to establish a formal and habitual interaction of teaching and learning practice with the school.

Fig. 4-17 Academy at Swiss Cottage. Aerial view. (© Penoyre&Prasad)
(Source: newlondondevelopment.com/nld/project/swiss_cottage_specialist_sen_school_and_ucl_academy) (Visited on 13-6-2019)

Site History

The area created part of the old Parish of Hampstead. The southern section of Avenue Road, already existed in 1824. In 1826 the "Finchley Road Act" authorized the construction by 1829 of Finchley New Road and Avenue Road, which therefore expands north. Building development took place at the relevant point formed by Finchley Road and Avenue Road, while Adelaide Road crossed the grounds of the College of Eton in 1830.

In the space between the three mentioned streets, by 1841, it was built by The Swiss Tavern, built in the style of a Swiss chalet. At that time the area was rural and the tavern was frequented by travelers, as it was located near a toll booth.Many houses, called Regent's Villas, are located in the Hampstead section of Avenue Road in 1842. A second building measure in 1845 led to the evolution of construction in the late 1940s and 1950s. In 1957, the "Central School of Speech Training and Dramatic Art" moved from Albert Hall to Swiss Cottage into the Embassy Theatre and related buildings. Following several stages of expansion, it has now become the dramatic conservatory of the University of London, "The Royal Central School of Speech and Drama".

In the early 1960s, the library, swimming pool and new headquarters for the Hampstead Theatre were opened. At the beginning of the 19th century, the need to restructure many sites led the Camden Authority to invest many resources, £ 85 million, a "waterfall" of money that has not been seen since Victorian times. Today, Swiss Cottage is equipped with several services, however, very close to poor areas. There are several ethnic groups, none of which are majority, although non-British whites have a significant number, being formed by Irish, Australians, New Zealanders, North Americans, as well as Russians and others from Eastern Europe. [Baker, Bolton, 1989].

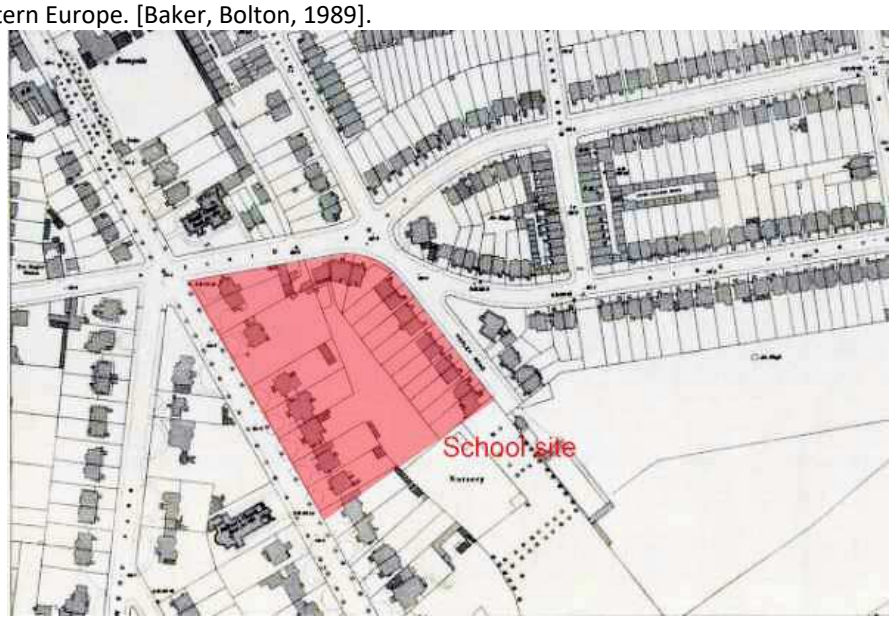


Fig. 4-18 Plan detail of London – Swiss Cottage (1894).
Source: National Library of Scotland. On-line gallery home
https://maps.nls.uk/view/101201217

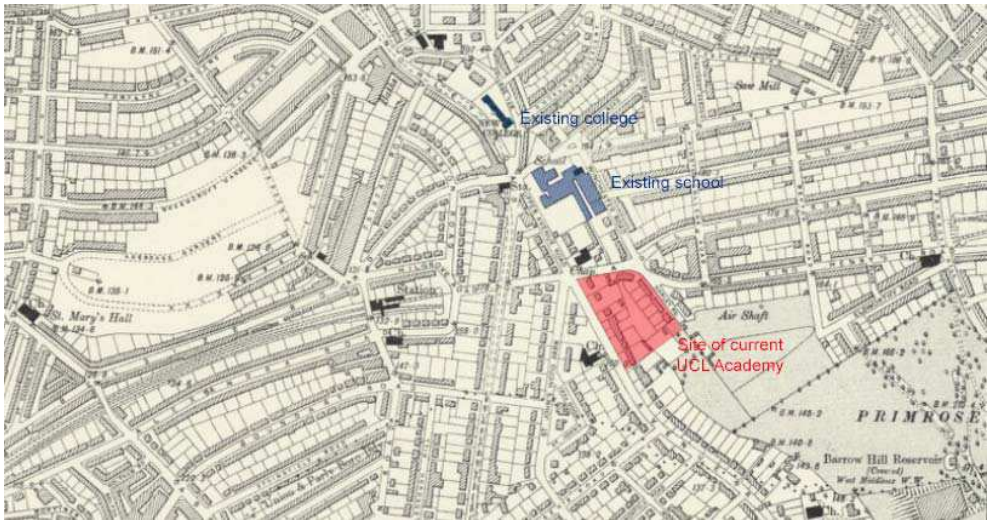


Fig. 4-19 Plan detail of London – Hampstead (1894-96).
Source: National Library of Scotland. On-line gallery home
https://maps.nls.uk/view/96805008

Fig. 4-20 Plan detail of London – Hampstead (1915).
Source: National Library of Scotland. On-line gallery home
https://maps.nls.uk/view/103313246

Urban Analysis of City Scale

The borough of Camden is composed of six town centres, each with a specific character. The area of Finchley Road and Swiss Cottage is the third largest town centre in the Borough after Camden Town and Kilburn High Road. It has a connotation of a district, within the city of London.

It is supplied by the subway, with the Swiss Cottage Underground Station.

The UCL Academy is located in the south of Finchley Road/Swiss Cottage centre, in an area provided with other facilities with a social and cultural function, such as The Swiss Cottage Leisure Centre and the Swiss Cottage Library.
The main civic and commercial activities are situated along either side of A41 Finchley Road, that divides the two sides of the area.
The public transport effectively serves the whole area, as they are located in different points, nearby the school.
In West Hampstead area there is a public transport interchange of three stations, served by London Underground, London Overground and Thameslink.
Particularly two Underground stations of Jubilee Line, Swiss Cottage Station and Finchley Road, are next to the Swiss Cottage district.

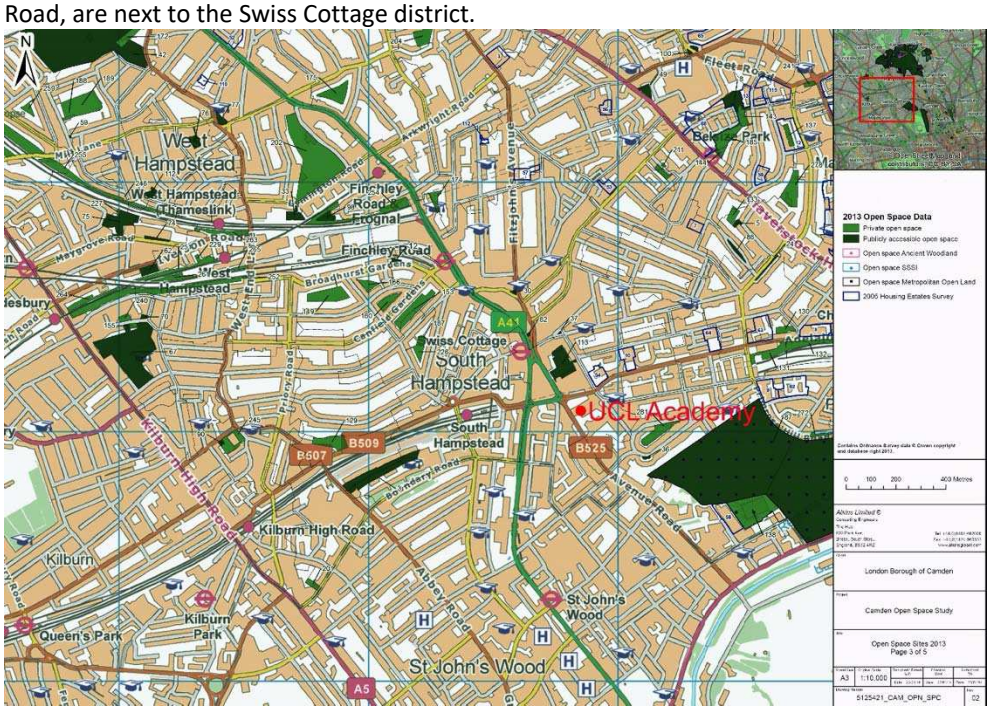
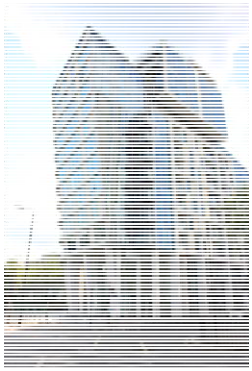


Fig. 4-21 Camden Open Space Study (2013). South Hampstead and Swiss Cottage.

Neighbourhood and Architectural Character Elements

The area arises a great variety of architecture, from high and modern buildings to those of council houses, up to luxury single-family houses in Tudor revival style or contemporary style.



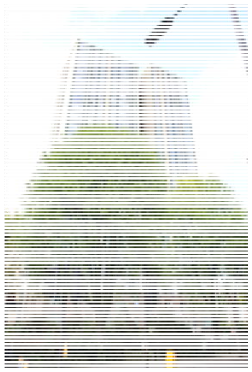


Fig. 4-22 Neighborhood of UCL Academy in Camden Swiss Cottage, London. (© author's photo)

School Design

The UCL Academy is located in a limited parcel in a very dense urbanization area, with several constraints as no-build zones above two London Underground tunnels and rights-of-light issues with neighbouring buildings, reason why the key driver of the project was to build a vertical school, with five staircases in the building.

The planning framework springs from the conditions of the place, so the six-storey UCL Academy is placed at the northern limit of the site, on Adelaide Road, while the four-storey SEN school to the west, along the Avenue Road.

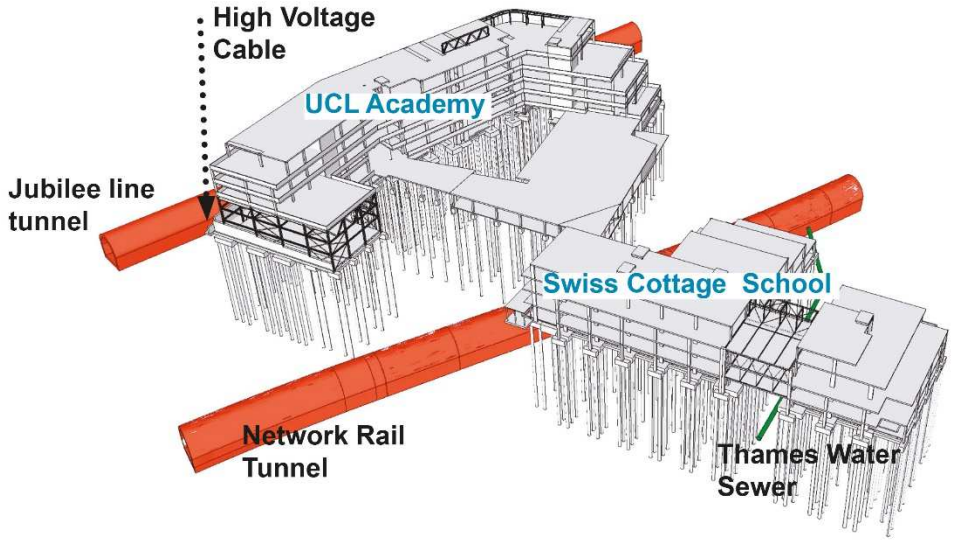


Fig. 4-23 Adelaide Road Schools. Whole Site Strategy – Structural Model Indicating Site Restrictions. (© Penoyre&Prasad)

The school design is based on criteria of functionality and with core on learning environments, rather than designing an astonishing architecture. The project has been widely approved and supported by Cabe's School Design Review Panel.

The UCL Academy is grounded on pedagogical model promoted by SCABAL Architect (Cullinan and Buck Architects) and University College London. The concept of learning spaces is also conceived on a vertical system of "Household", easily distinguishable from one another by the use of specific names and colours.

According to Eranda Aliu, Careers and Guidance Coordinator at UCL Academy, *the " "House" is like a community the students belong to"* [Interview Transcript, Aliu, Eranda (Interviewed), Rubino, Anna C. (interviewer),2019].

As stated by Mark Rowe, one of BDP leading architects who designed the school *"There was very strong idea to arrange the spaces around the staircase and then beyond there was the idea of the "Superstudio" a place where students would spend a whole two-hour session. The school with no corridors and very focused on those learning zones it was very conscious not to have many grand spaces, to not have a trim space, to not have showing of spaces in, the money was going into the learning spaces themselves."* [Interview Transcript, Rowe, Mark (Interviewed), Rubino, Anna C. (interviewer),2019].

Superstudio is one of the main drivers of the project and its conception stems from the example of the Dutch schools, in which large open spaces for practical activities and study constitute the privileged learning space.

The prospect on Adelaide Road follows the road curtain and is characterized by a system of sliding windows that extend on the surface of the facade which coincides with Superstudio, while the rectangular windows coincides with the classes.

Interior Space

Unlike many secondary schools designed with *Building School for the Future Programme*, UCL Academy has no large atrium, but at the main entrance it has a medium-sized atrium with the function of passage and waiting. Most of the spaces have a learning function and space for corridor have been minimized.

University College London (UCL) developed a pedagogic concept based on a variety of learning methodologies, which required flexible and multifunctional environments.

Influenced by a number of Dutch schools in which "workspaces" form the heart of each learning department, the UCL Academy is arranged as five vertically streamed "households", which contain several "Superstudios" surrounded by more traditional classrooms of various sizes. Topics are introduced during a two-hour session in the Superstudio's central amphitheatre space to groups of 90 students who then break out into smaller workshops in the surrounding area. [Paul Monaghan, 2013, p.34].

Fig. 4-24 Internal different learning spaces and entrance space at UCL Academy. (© author's photo)

The entrance space is double-eight and allows to access to the courtyard. At the ground floor there are also the main hall and the library. At the lower floor there are the sports hall and the sports studio, from this floor start the red, yellow and blue houses. The house system foresees that each house has a Superstudio and classrooms for other different activities.
The Superstudio space are equipped with special mobile multilevel benches that can be moved at convenience to organize the learning spaces for classrooms and seminars.
There are also interactive science theatres and the five “Households” are open onto the rear play areas.

Fig. 4-25 UCL Academy Plans (© Penoyre&Prasad)

Spaces used for differentiated activities are the Sports Hall, used also for Careers Fairs.

External Space
In the opinion of the school staff the best space of the school is the playground, in addition to the engineering department area.
The outdoor spaces of the school are also used for educational activities, learning and lessons at times, especially for arts and science disciplines.

Like the internal spaces, the external ones also offer the opportunity for individual study and also a communal sharing of knowledge and skills. Terraces, courtyards and porches allow socialised-learning.

Socialised-learning, facilitated by the Learning Sets, generates an environment that can foster individual responsibility coupled with interdependence both of which are perceived to generate high levels of effective learning. [The UCL Academy, p.1]

Fig. 4-26 UCL Academy external views: courtyard, terraces and portico. (© author's photo)

The main external space is a courtyard in the basement enhanced by a set of roof terraces to increase external social and learning chances.

Along Avenue Road is the special educational needs school, with which the UCA Academy shares some equipment.

Fig. 4-27 Views of Swiss Cottage Specialist SEN School. The SEN school and UCL Academy have facilities in common.

Urban integration

The constructive density of the urban context of the school induce to build a secondary school of six stories and a special school of four stories. Other site constraints were *no-build zones above two London Underground tunnels and rights-of-light issues with neighbouring housing.*

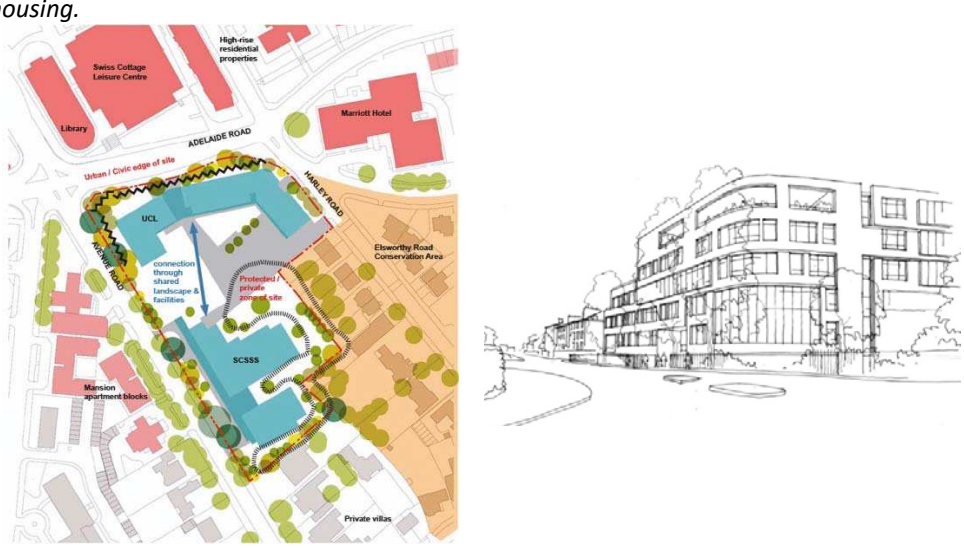


Fig. 4-28 Adelaide Road Site Character and school sketch (© Penoyre&Prasad)

Fig. 4-29 External views of the UCL Academy and surrounding space in Camden Swiss Cottage, London. (© author's photo)

Sustainable design

Sustainability is a relevant aspect of the project, as energy consumption is reduced by over 60%.

All main roof areas and terraces of UCL Academy and Swiss Cottage School have been coated by a high quality insulation system which improves the thermal performances. On the top have been created green areas with biodiversity and walkable terraces.


Fig. 4-30 (1) UCL Academy terrace (© Penoyre&Prasad), (2) UCL Academy terrace (© author's photo)

Educational model

UCL Academy is a comprehensive school specialist in STEM (Science, Technology, Engineering and Mathematics) with a maths and science specialism, which pursues the goal of providing excellent interdisciplinary education. In parallel it has educational programme of music, art and drama and sports.

The aim of University College London is to support students of all ability levels and to encourage them to carry out their studies at university grade.
The Academy's vision is based on a conscious involvement by student in the learning process and the overall education. For this purpose is implemented the self-directed learning programme (SDL), which provides that the students actively participate in longer Academy day.
The collaborative learning is achieved by the Learning Sets of six students, in which they cooperate to enable group problem-solving and group based-research. This approach has led to good results both in terms of academic learning and in the area of "soft skills", such as the ability to socialize and interact.
A Learning Set of 5-6 students, according to pedagogical theories, offers the optimal situation to complete tasks with confidence, thanks to the collaborative method that provides the opportunity to share knowledge and skills.
When the school opened in 2012 had 180 students in Foundation (Year 7) and 125 students in Level 3 (ear 12). Over the years the school has considerably increased the number of students, reaching today about 1100 scholars.
The partnership with University College London enables the students of UCL Academy to benefit from UCL facilities and resources that develops school curriculum like seminars, summer schools and tutoring given by UCL staff. The school and the university have developed a connected curriculum, thanks to government approval in 2008 and later in 2012.
The UCL Academy staff states that University College London is the 'intellectual sponsors' with which to interact for pedagogical and didactic aspects. The university supported the school with:

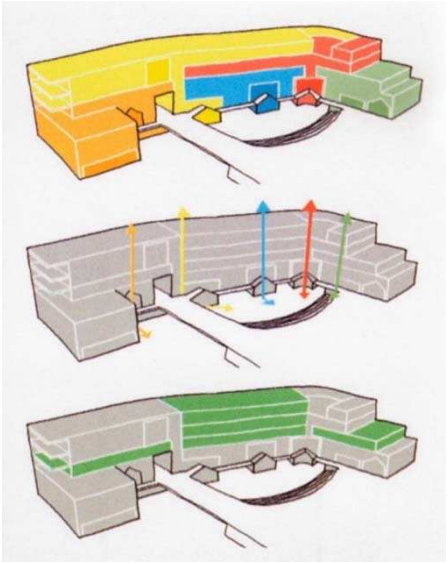
- UCL students mentoring the school students
- Curriculum Development
- UCL students volunteering their time to go to UCL Academy and support after school clubs
- Guest Lecture Series from top UCL academics – students hear from the best Professors at UCL
- Support for the development of the school middle leaders (teachers)
- Maths tutoring from UCL students to UCL Academy year 10 students
- And UCL researchers going to school to do their research.

The quality of learning is attested by the results achieved by a class of students who received excellent results in the core GCSE subjects (General Certificate of Secondary Education), above the national average.
UCL Academy operates a pioneering educational approach based on university-style project based learning within a variety of spatial settings. [Aya Award, 2013].

Fig. 4-31 Arrangement of Learning Spaces. Horizontal and vertical section. Source: http://avantiarchitects.co.uk/project/ucl-academy/

Fig. 4-32 UCL Academy Laboratory (© Penoyre&Prasad)

A significant feature in terms of educational organization is given by “The House System”, named Cygnus, Lyra, Vela, Orion and Equuleus, to which all school members and students are matched.



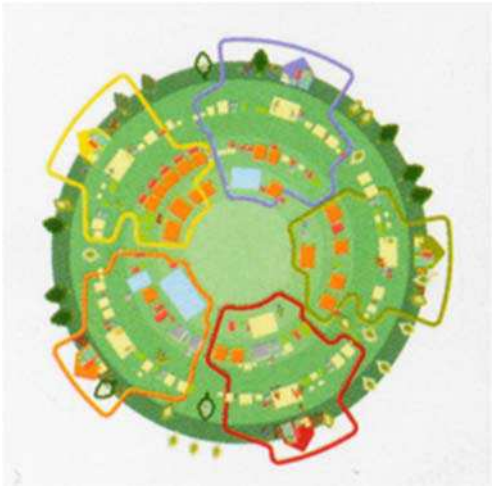


Fig. 4-33 (1) (2) "Households vertical movement and "superstudios" (Source: Architecture Today n.237, April 2013, pp. 34) (3) Symbols and names of the five houses that assemble "The House System". Source: http://ucl.smartsandbox.co.uk/curriculum/house-system/

Throughout the course of study at the UCL Academy, students belong to the same household, so that they can develop the sense of identity. The Houses have the function of supporting the academic and pastoral training of students by the existence of learning sets and he presence of tutors and Heads of House.
The school spaces are associated with the households, for which the respective members must guarantee the functionality, to allow the use of these structures to the whole school community. The Houses are all equipped with a canteen and a study area called Superstudio space.

Fig. 4-34 View of two of the five canteen, respectively of Orion House and Equuleus House. (© author's photo)

A pedagogy of individual learning pathways is achieved in Superstudio, a large space in which the seats are arranged in the shape of an amphitheatre, where groups of 90 students spend a two-hour session listening to a lesson and then divide into groups moving to surrounding space and rooms.
In terms of curriculum the idea was that each child has a highly personalised curriculum so in Superstudio students sit down with their tutor to review the work out their own paths,

that's why especially each one of these learning zones can accommodate quiet variety of learning styles.
The space is inherently flexible on a day-to-day and an hour to our according to educational needs.
The open-plan areas of Superstudio is related to the idea of a creative industry, to get young students used to self-managed and conscious training.

Fig. 4-35 (1) (2) Superstudio (© author's photo). (3) Superstudio (© Matt Clayton, Tim Soar). (3) Classroom with a flexible learning space (© author's photo).

Every year competitions in many areas take place between the different Houses, which assign a score for school and sports activities.
Making a comparison between the school report drafted by Ofsted (The Office for Standards in Education, Children's Services and Skills) in 2014 and in 2016, and the current scores obtained by the students made public by government, there is an improvement of teaching quality, in learning and outcomes for pupils, between 2014 and 2016, while there was a decrease between 2017 and 2018.

Facilities open to the community
During the week the external clubs are used in the late afternoon by local citizens for sports activities.

Fig. 4-36 (1) UCL Academy Sport Yard (© Penoyre&Prasad). (2) (© author's photo)

Partnership with other institutions

The local authority provides good support by a network of local English curriculum leaders. An effective assistance is also granted by expert consultants cooperating with the Academy.

Community learning district

The UCL Academy is member in the Camden Healthy Schools Programme, a plan that involves schools to develop the well-being and health of peculiar areas of Camden district.
This initiative focuses on specific topics aimed to improve lifestyles, such as nutrition education, participation in school and street life, self-assurance and motivation in order to lead a satisfying life, which helps them achieve, at once, good academic results.
Healthy Schools London is a programme funded from 2013 by the Mayor of London, that involves many schools in the city boroughs.
The programme support schools to stimulate and reinstate the healthy environments, and aims to achieve tangible outcomes, specifically improve links between schools and communities that promote physical activity, reduce incidence of bulling, educate to better behaviour and attendance.
Furthermore, the proximity to The Swiss Cottage Library and The Swiss Cottage Leisure Centre, located in front of the UCL Academy, on the other side of the street, ensure that the district provides educational, cultural, sporting and recreational services comes to conform.

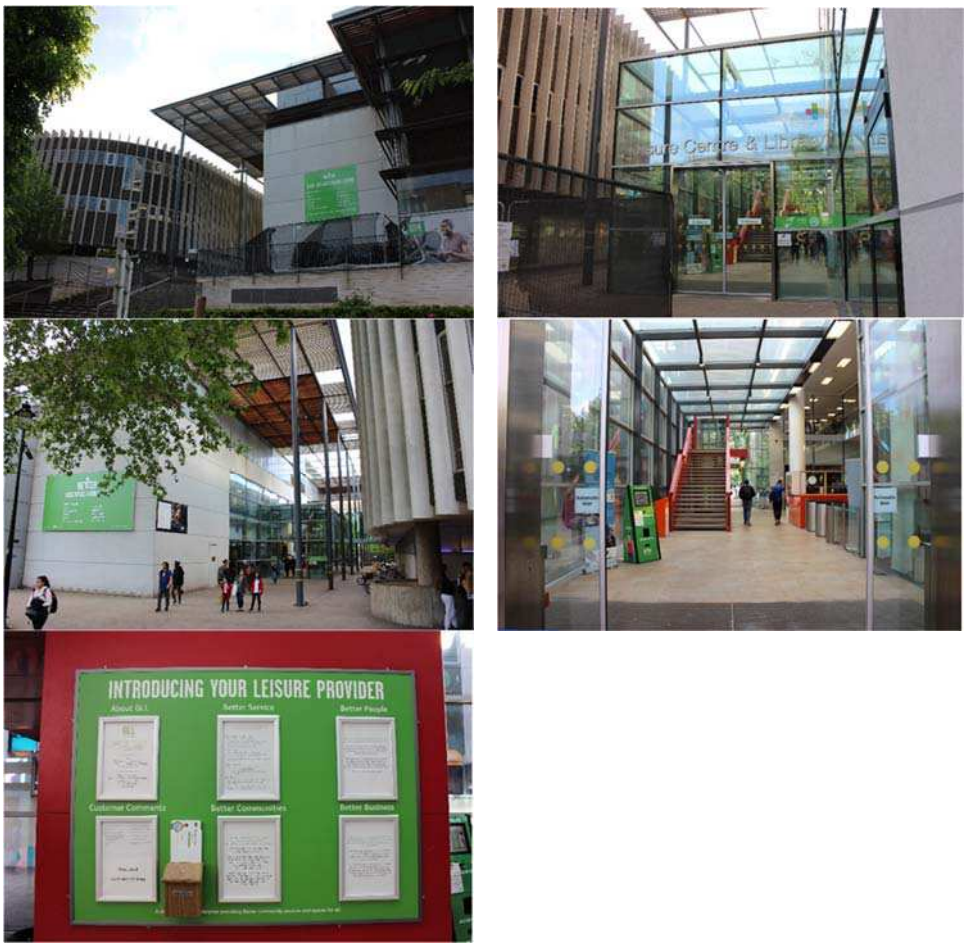


Fig. 4-37 The Swiss Cottage Leisure Centre and the Swiss Cottage Library. Covered passage leading to the building entrances. (© author's photo)

Fig. 4-38 The Swiss Cottage Library. (© author's photo)

Swiss Cottage Central Library has also a architectural significance, for the quality of interior and exterior. It was designed by Sir Basil Spence in 1964 and inside houses the art gallery for professionals and non-professional artists, with exhibitions about the artistic history of Camden or with reference to contemporary art community of Camden.

Fig. 4-39 Temporary exhibition in The Swiss Cottage Library in June 2019. (© author's photo)

Public spaces and Social life

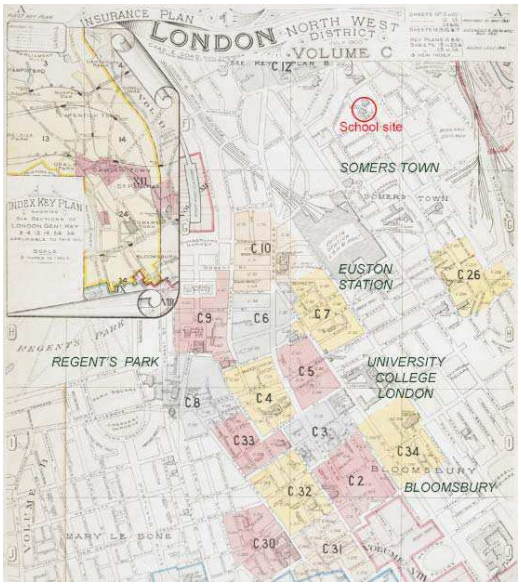
Fig. 4-40 The Swiss Cottage Playground. (© author's photo)

4.3.2. Regent High School

Location	Chalton Street, Borough of Camden, London, UK
RSC Region	North-West London and South-Central England
Government Office Region	London
District	Camden
Ward	St Pancras and Somers Town
Parliamentary Constituency	Holborn and St Pancras
Urban/Rural Description	Urban major conurbation
Construction completion	2014
Architects	Walters & Cohen
Landscape Architect	Grant Associates
Contractor	BAM Construction
Client	London Borough of Camden
Local authority	Camden BSF
Phase of education	Secondary
Age range	11 to 18
School type	High School
Funding status	State
School category	Maintained school (funded and controlled by the governing authority)
Gender of entry	Mixed
Establishment status	Open
Specialism	in STEM (Science, Technology, Engineering and Mathematics)
Admissions policy	Non-selective
School capacity	1550
Number of students	932
Ofsted rating	Good (Last inspection: 31 January 2018)
Official awards for the project	Civic Trust Award in 2017, RIBA London Award, RIBA National Award, RIBA London Sustainability Award in 2016, Camden Design Award in 2015

Regent High School, earlier called South Camden Community School, is the result of an audacious project devised by Walters & Cohen Architects. A significant contribution to the development of the project was given by the Italian architect Giovanni Bonfanti, partner of the architectural firm.
It is part of the Council Program named Building Schools for the Future, to which the architects worked in collaboration with Bam construction.
The space design is functional to a wide teaching and learning methodology for around 1500 students of secondary school.
The school is located in Somers Town, in the London Borough of Camden and its renewal falls within the Camden Council's regeneration plan.
The strategic area of the school is one of the most central hubs in London. It is located within walking distance of the St Pancras International, King's Cross and Euston Stations, and near to Mornington Crescent Underground station.

Site History
Camden is a central area of London, which in the past stretched from Highgate Village to north to Holborn and St Giles to the south. Until the 18th century it was a rural area, with few roads running south to north.
Charles Pratt, the first Earl Camden, decided to institute a new town in 1791, calling it Camden Town, from the name of Elizabethan historian William Camden, who had lived here int the 1600s.
London had a rapid expansion in the early 19th century and Camden Town turned into a middle-class suburb for a while.
In 1965 Hampstead, Holborn and St Pancras are definitively merged together as Camden, in step with the reorganisation of London government, which led to the formation of new and larger boroughs across the old metropolitan area.
In 1889 the Greater London Council was established, which was to replace the London County Council in governing the metropolis.



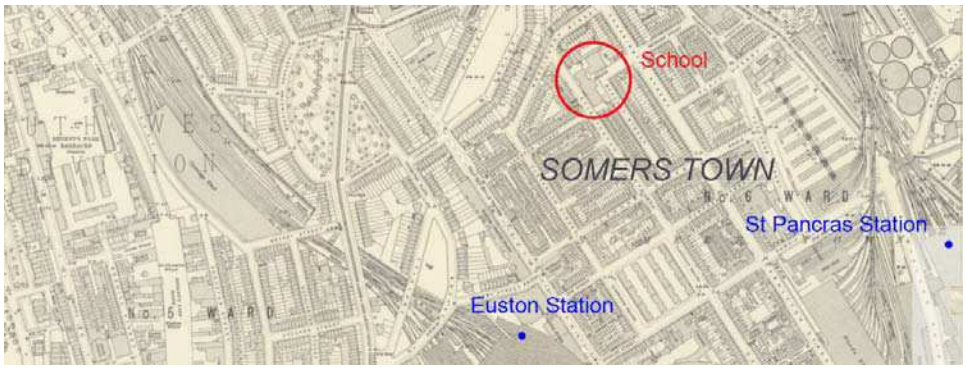


Fig. 4-41 (1) Plan of London North West District (1900). Source: British Library. On-line gallery home.
http://www.bl.uk/onlinegallery/onlineex/firemaps/england/london/atoc/mapsu145ubu23ucufs001r.html
(2) Plan detail of London. V5 (St Marylebone; St Pancras) (1915). Source: National Library of Scotland. On-line gallery home.

Urban Analysis of City Scale

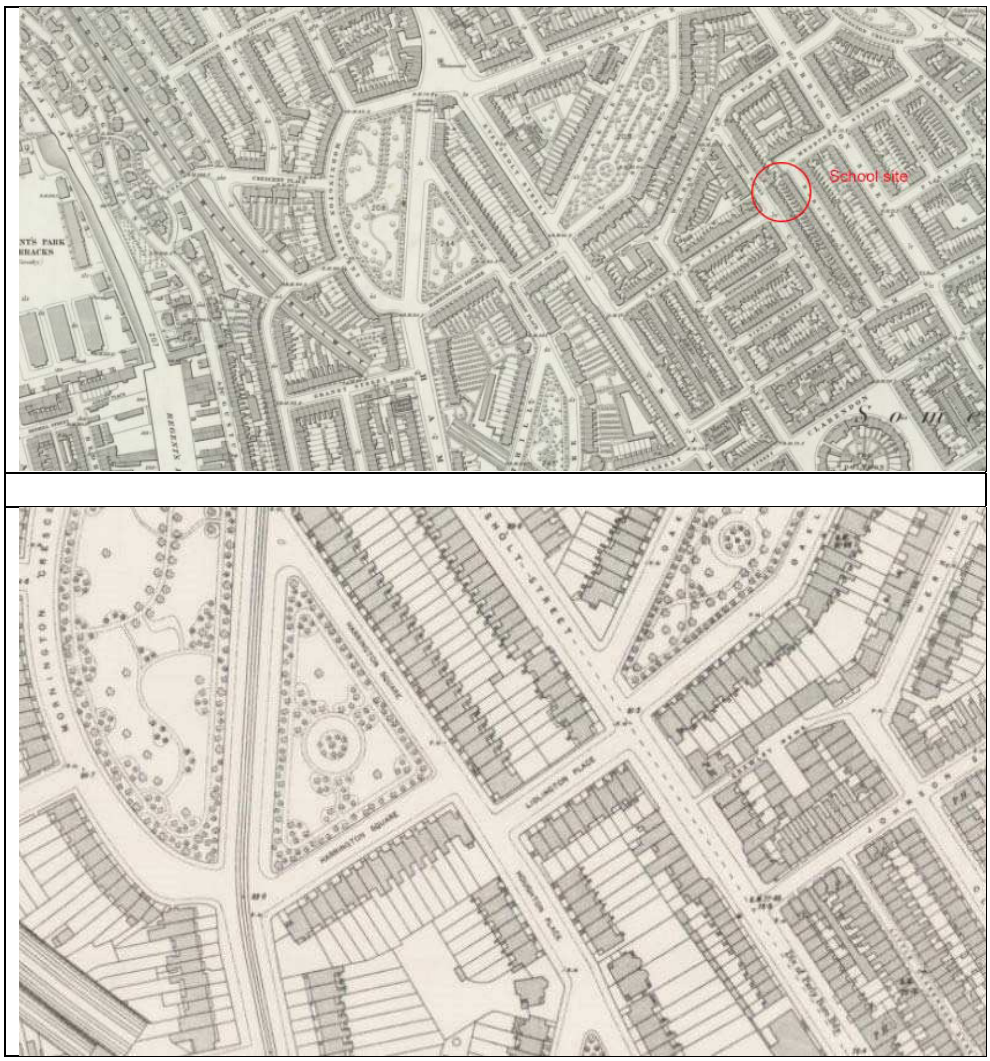


Fig. 4-42 (1) Plan detail of London (1870). Source: National Library of Scotland. On-line gallery home https://maps.nls.uk/view/103312994
(2) Plan detail of London (1895). Source: National Library of Scotland. On-line gallery home https://maps.nls.uk/view/101201493

A significant amount of houses where built early in 19th century, and artists and writers lived in the area.

Fig. 4-43 (1) St Pancras station view. (2) City map nearby St Pancras. (3) Mornington Crescent Station (© author's photo). (4) Mornington Crescent view (© author's photo)

Neighbourhood and Architectural Character Elements

Fig. 4-44 Views of Somers Town area nearby Regent High School (© author's photo)

School Design

At the root of the project's achievement is a vision shared by all the actors (players) who took part in the school building process: architects, contractor, council and school. The good agreement between partners allows converging aims to successful project.

Regent High school project was one of the last of Building Schools for the Future programme for the non-selective, co-educational secondary school.

The school condition before the recent architectural intervention by Walters & Cohen Architects was irregular as the structure was composed by several buildings raised over time, starting from the Victorian age, up to the 90 years of the 20th century.

The critical points of the building were the faulty arrangement of spaces, the lack of natural lighting, an ineffective routes layout, impervious spaces.

The classrooms and other teaching spaces arose inadequate for recent needs. It was also required to host a surplus of around 500 students and a substantial number of teachers and staff.

The architectural intervention consisted of four fundamental actions: demolition of parts deemed inadequate, refurbishment of buildings that hold qualities, especially the Victorian era one, erection of new volumes.

The pre-existing volumes and news are settled around a central court, surrounded by arcaded paths, which run along the buildings at ground floor.

Relevant emphasis has been given to open space, which is used constantly for recreational, educational and social activities.

By this transformation, the entire school complex strengthened the connection with the surrounding area, also thanks to the repositioning of the main entrance from Charrington Street to Chalton Street.

The main entrance is outstanding and discreet at once in the built context, and fits between historic brick buildings.

A concrete portal, flanked by metal gates with wooden slats allows the access to small courtyard that precedes the doorway to the school.

Crossing the entrance there is a hub space of the school, the Arcade, that successfully connects the parts built in the Victorian era with the new additions. It is a volume of three floors with balconies overlooking a wide longitudinal space.

It is welcoming and elegant, thanks to the correlation between historic and contemporary architecture. It is furnished with minimal design seats, which leave wide space for the free circulation of students, staff and family members.

On the ground floor there are volumes containing two smaller classrooms, for educational activities in small groups. They have rounded edges and wood coated, creating a pleasant chromatic contrast.

The classes are distributed on the different floors around atriums designate to flexible uses, reachable by flights of stairs and along balconies.

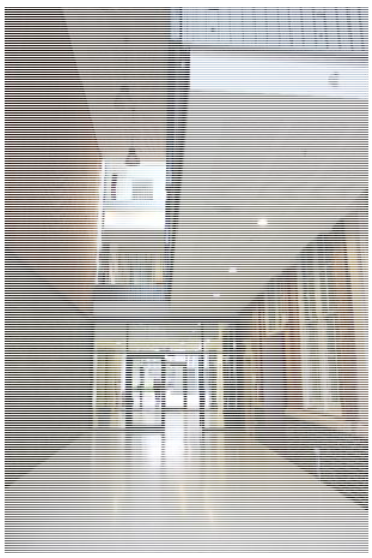


Fig. 4-45 Theatre entrance to Regent High School (© author's photo)

External Space

The external spaces of previous building became uncongenial over time and of poor architectural and environmental quality.

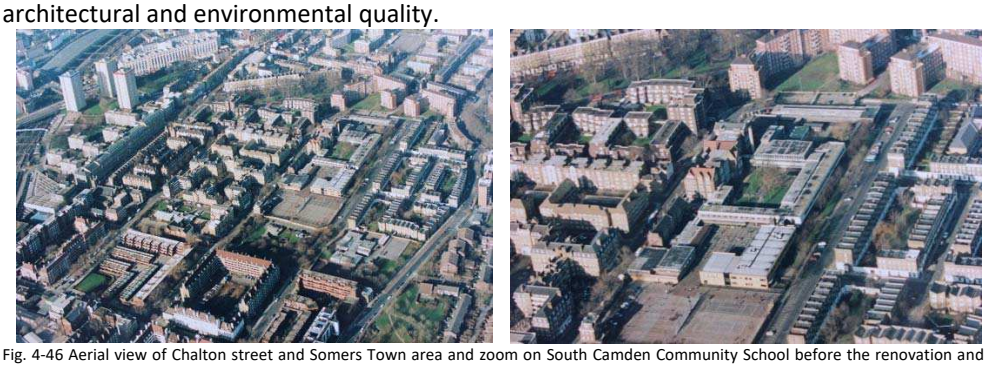


Fig. 4-46 Aerial view of Chalton street and Somers Town area and zoom on South Camden Community School before the renovation and conversion in Regent High School (© photos by Regent High School Archive).

An example of a multiple use of the main courtyard was achieved at school Summer Fair, on 29th June 2019, when the various outdoor spaces for learning and social activities were open to the inhabitants of the neighborhood.

In this circumstance all open areas were used for artistic activities, dissemination of cultural and social initiatives in the neighborhood, civic education activities, sports and theatre events.

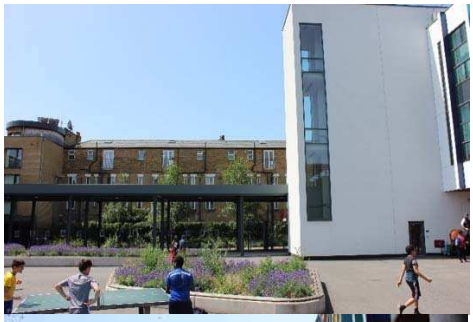







Fig. 4-47 The Regent High School, School Summer Fair 2019. (© author's photo)

During this event parents, students, teachers and other members of the local community worked together to raise money for the school fund.
On this occasion, as in all neighborhood network initiatives, there is also the WMC Camden College, one of the most important adult education institute in Europe, with some of its representatives.

Urban integration
The previous school was a combination of disparate buildings, in conjunction with the old Victorian school house. The joint of buildings gave rise to spaces no longer suited to current educational needs. The new project by Walters & Cohen architects includes the Victorian School within the new building.

Sustainable design
The project of Regent High School is sustainable in several perspectives: it includes the renovation of a part of the building, improves access and use of space, increases natural brightness in the interiors.

Educational model
The quality of the design and architecture, in the case of the Regent High School, is an educational tool as the students can find many facilities that are able to entice them to attend the various activities proposed.
Beyond theatre, also usable by the local community, there are drama studios, music recital rooms, a recording studio, art studios, science laboratories, technology laboratories, a media studies suite, a library, a supplied gym, three playing fields for multiple uses.
"*Walters & Cohen took the trouble to fully understand our educational vision, and when they presented their first design ideas it was clear they had the necessary skill and ambition to help us translate this vision into a practical and beautiful environment that works perfectly*" [Rosemary Leeke, former headteacher].
Michál Cohen, who designed the Regent High School in partnership with Giovanni Bonfanti, both directors at Walters&Cohen Architects, participated in the STEAM Commission, established by London Borough of Camden, to examine the area's STEAM economy and to foster a better compound of creative, digital and scientific disciplines.

In a recent seminar in London about STEAM (Science, Technology, Engineering, Arts and Maths) and learning environments, held at The Bartlett Global Centre for Learning Environments (part of UCL Bartlett Real Estate Institute), educationalists, architects and designers discussed this topic. In this circumstance Architect Cohen highlights as the spaces of STEAM schools must have specific characteristics such as visibility and connectivity. ['STEAMing ahead' Seminar at The Bartlett Global Centre for Learning Environments, UCL London, 4 April 2019].

In the vision of STEAM schools, learning environments take on a less rigid organization, with a prevalence of open space. The demand for all project participants is to conceive, experiment and shape innovative spaces for learning to educate future citizens no longer according to traditional methods, but raising them to develop creativity and flexibility, to face the challenges of a society and a changing economy.

In the seminar the risk is highlighted that in the STEAM school system the importance and funds dedicated to artistic disciplines are reduced, which on the contrary should be supported, also inviting visual and performative artists within schools.

At the same time, it is necessary promoting languages education, considering that many STEAM schools are attended by a multitude of immigrant students, who often speak English as additional language.

Both in past and present years, the school is attended by a high percentage of students from minority

ethnic backgrounds is high with a large majority of Bangladeshi and Black African students, mostly Somali.

Comparing Ofsted's 2011 report (The Office for Standards in Education, Children's Services and Skills) of the previous South Camden Community School, before refurbishment and expansion that transformed in Regent High School, with the most recent reports, there is an increase in the number of students and a significant improvement in academic performance.

Before the rebuilding, the school was awarded visual and performing arts specialist status; after refurbishment it became STEAM school.

The Camden STEAM Commission was established in 2016 and in June 2017 launched "Creating Camden's 21st Century Talent: Report and Recommendations of the Camden STEAM Commission".

The main aims of Commission are point out Camden's unique economy and the STEAM proficiencies required by the society of the future, boosting an integral education of creative, digital and scientific skills, activating funds to enhance educational paths and encourage careers, motivate the participation of Camden youth in local activities and opportunities.

In 2018 a STEAM Hub was founded with the aim of fostering collaboration between teachers and employers for the development of integrated skills around creative, digital and science subjects.

Regent High School is one of the five schools and colleges, a consortium of educational bodies within the borough of Camden, that cooperates with the STEAM Hub in improving the training of its staff in the disciplines and objectives provided by the Steam project.

In the last Ofsted inspection in 2018 it is highlighted that despite the *disruptions caused by moving into a new building on the existing site* the school provide a good quality of education.
The critical points highlighted in the previous Ofsted report in 2016 were addressed thanks to effective team coordination and leadership work. The school is defined as inclusive and effective in local community, that encourages everyone's improvement and expectations. It is also strongly committed to enhance school attendance with children and families, boost the connections between good participation in school activities and better outcomes for students.
Further fields in which Regent is investing through educational strategies is students' behaviour, the academic insertion in appropriate classes to support children learning, improvement in languages and humanities disciplines.
Regent High School stands as a school open not only to local cultural initiatives but also to international exchanges, as an opportunity for educational enhancement for school students. The School is part of European Commission-funded Erasmus + Programme and has already actuated actions with school staff and students from Germany, Hungary, Spain and Sweden. The project entitled "Innovate to Create II", is underway, which aims to explore and compare teaching approaches and how to get good performances in music and English language lessons between schools in different member countries. In recent years another project focused on visual art, drama and digital technologies has been carried out. These educational activities concern the disciplines and art forms that are fundamental in the training curriculum of Regent High School.
The opportunity to understand and share practice with European colleagues, and to understand more about each other's countries and contexts, has been a fundamental component of the three projects, with this becoming an even more significant element as the UK explores its future relationship with the EU.
Speaking about the project, Richard Harrison – Regent High School's Director of Community Engagement and project leader – said: 'Regent High School is an outward facing school that wants to both share its practice while also learning from the approaches taken by teachers in other contexts. We know that our students will go on to work across Europe and the world, and so it is particularly important that we have a shared understanding of each other's educational systems and styles. As staff, we are also able to refine our practice by learning from and with our partner schools and cultural organisations.
Gary Moore, Headteacher of Regent High School, said 'Successful schools are outward-facing, and we are thrilled that we are able to look beyond London to our European partners and neighbours. This is a visionary project and I am looking forward to seeing how the partnership develops. [Source: Regent High School website].

Facilities open to the community
Regent High School complex can accommodate different facilities, thanks to the opportunity to rent out the spaces for conference, meeting, performance and even as a film set.

The spaces made available by the school are a theatre with 300 seats, a conference room, two drama studios, a science lecture theatre, a recital and music room, and even the classroom spaces for conference and events, equipped with technological devices as interactive boards and laptop docking stations.
Furthermore, the main connective space, called the Arcade, can be allocated for a variety of functions and events.


Fig. 4-48 Science Lecture Theatre, conference room. Source: Regent High school website http://www.regenthighschool.org.uk/Lettings-02062016144048/


Fig. 4-49 Recital room, music practice room. Source: Regent High school website http://www.regenthighschool.org.uk/Lettings-02062016144048/

In July 2019 the Regent High School theatre hosted “Learner Success Night”, a WMC The Camden College event, in which the school staff and the local authorities involved in education field rewarded the adults and young students who distinguished themselves for specific values in the field of art, language and life skills.

Fig. 4-50 The Regent Theatre, "Learner Success Night", WMC Camden College Event in Regent Theatre. (© author's photo)

The use of school spaces by other schools or institutions proves the intend to create a network of synergy between educational authorities within Camden community.
A key structure of Regent High School is the Somers Town Community Sports Centre, consisting of several space for sport activities, also usable by citizens at moderate price.
Among them are indoor and outdoor spaces, such as sports hall that can accommodate football, basketball, indoor cricket, indoor tennis and activities studio, a space used for dance, fitness and martial arts.
A large outdoor field, the Multi-Use Games Areas (MUGAs), assigned to sports as football, basketball and various sport training activities.


Fig. 4-51 Sports hall, activities studio. Source: Regent High school website http://www.regenthighschool.org.uk/Lettings-02062016144048/

Fig. 4-52 Multi-Use Games Areas (MUGAs). (© author's photo)

Partnership with other institutions

The collaboration with institutional bodies pursues the goal of making student's training heterogeneous and integral, to create global citizens of the 21th century.

The institutions involved are University City London, UCL Institute of Education, Rothschild, British Land, Wellcome Trust and The Francis Crick Institute, Central Saint Martins College of Arts and Design, Global Generation, City Learning Centre, Somers Town Community Association and Neighbourhood Forum, The British Museum, British Library, Age UK Camden, Foundling Museum, Metropolitan Police, Camden Fairtrade Network, Camden Mela and Somerstown Festival, Anne Frank Trust and ARUP, Young Enterprise and The British Council.

Partnerships between schools with local institutions in Camden district want to benefit the young people of the Camden community, including pupils from primary schools in the neighborhood, which will potentially attend the Regents High School in the future.

The activities accomplished in association are mentoring, lecturers and trips, often carried out outside the school, expanding the boundaries of the learning space.

Regent High School students are encouraged to play roles outside of school, such as support the Somers Town Community Centre activities, become sports leaders in the neighborhood's primary schools, participate in community projects such as sharing good practices on sustainability with local schools and associations.

Fig. 4-53 Theme characterizing the Knowledge Quarter, the area within St. Pancras Station and Kings Cross Station (© Knowledgequarter.london)

In order to encourage students to engage and achieve excellent results in the various disciplines, the partner organisations sponsor awards based on criteria of performances in each subject area, effort and increase during the year, overcoming complicated situations. In 2019, for example, Central Saint Martins and The Francis Crick Institute sponsored awards for the Most Promising Artists and Scientists among the students. At events open to public, as the annual Achievement Evening, award are given to students and motivation is explained.

Fig. 4-54 (1) The Francis Crick Institute. Main front on Midland Road in front of the St Pancras International Station (London). (© author's photo). (2) The Francis Crick Institute. Detail of the prospectus. (© author's photo)

At this year's evening held in the Regent school Theatre, a representative of Crick's Education team explained the role of science in society, and the importance of young people studying and working in science, technology, engineering and maths.

The main intent of The Francis Crick Institute is support researchers to work in staff with other disciplines to study the biology for the improvement of human health, for developing diagnosis and prevention of human disease.
International researchers and Phd students are funded and hosted in the laboratories, with the further purpose of generating economic opportunities for the UK.
The Francis Crick Institute promotes numerous events to involve the inhabitants of the neighborhood in their initiatives, as “The Crick at the Somers Town Festival”, and open to all citizens, some specifically to first and second level school students.

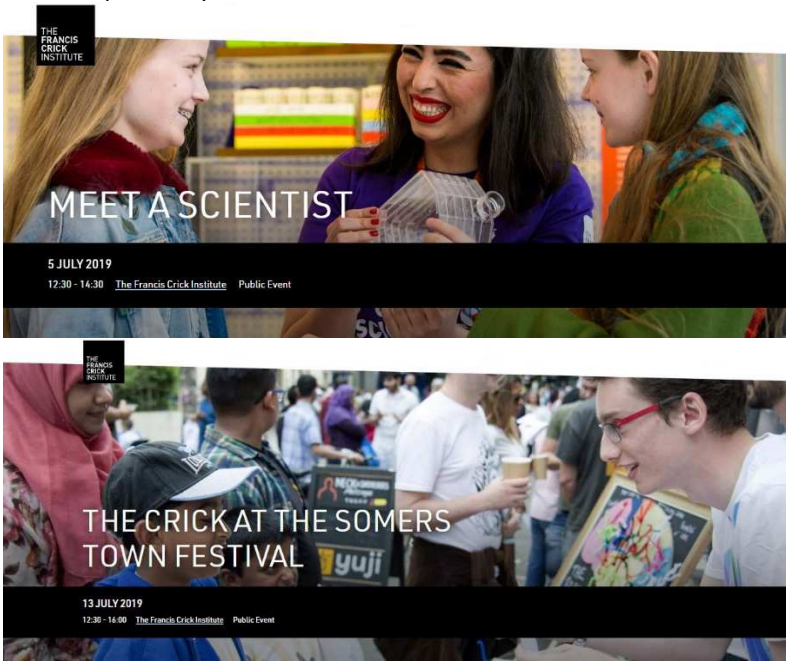


Fig. 4-55 . (1) Presentation of public event “Meet a scientist”. Source: The Francis Crick Institute website https://www.crick.ac.uk/whats-on/meet-a-scientist-31
(2) Presentation of public event “The Crick at the Somers Town Festival”. Source: The Francis Crick Institute website https://www.crick.ac.uk/whats-on/the-crick-at-the-somers-town-festival.

Fig. 4-56 The Crick at the Somers Town Festival in Chalton Street on 13th July 2019. (© author's photo)

The Francis Crick Institute has a partnership also with most important universities in London, including UCL, Imperial College London, King's College London, and other scientific research institute, as MRC (Medical Research Council) and Cancer Research UK and Wellcome, an institution that funds research in biomedical science, population health, medical innovation, humanities and social science, and public engagement.

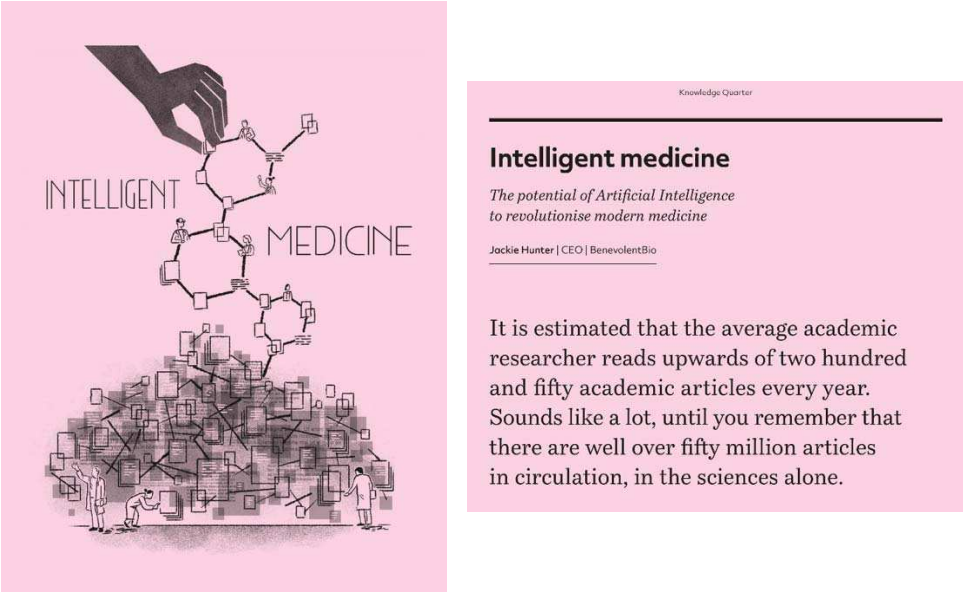


Fig. 4-57 Theme characterizing the Knowledge Quarter, the area within St. Pancras Station and Kings Cross Station (© Knowledgequarter.london)

The partnership between structures is promoted in Camden district through a special constitution, Camden Partnership for Educational Excellence (CPEE).

The Camden Partnership for Educational Excellence (CPEE) was set up in April 2012 with the vision to make the London Borough of Camden 'the best borough for education' (Camden Council, 2016). The CPEE aim has been to drive forward the recommendations of the Camden Education Commission (London Borough of Camden, 2012), which highlighted key issues and opportunities for Camden schools in the light of the changes to the English education landscape. In 2013, the CPEE board invited schools, colleges, partners, and stakeholders to bid for funds from a £2 million pot set up to support innovative projects, centred on raising achievement and attainment and, in particular, to find ways of improving outcomes for the borough's most vulnerable groups of students. [Brown C., Taylor C., 2016, p.7]

Among the main objectives of CPEE are relate the education to other support agencies in Camden to advice and benefit the community and contribute make Camden *the best place to be educated and the best place to work in education*. [Camden Education Commission, 2011, p.14].

The Council is asked to foster partnerships, involving existing schools or setting up new schools and encouraging them to become members of the CPPE, adhering appropriately to admission and participation codes.

The CPEE also has the task of identifying the areas where an intervention is required, assessing progress and activities from time to time to reach the objectives, managing the funds provided by the local authority, reviewing the results and evaluating further

improvements, check the quality of Council services, examine best practices implemented in other context from which Camden could also have advantage.

Community learning district

The district of Camden is historically considered to be very active on a social and cultural level, as it hosts a wide number of educational and social institutions.

Already by 1867 some of these larger houses on the west side were being used for institutional purposes. [Camden History Society, 2003, p.85].

In the area between Camden Town and St Pancras since the second half of 19th century many educational and social institutions have been established: St Pancras Home for the Rescue of Young Women and Children, the London Female Preventive & Reformatory Institution, a reformatory home at Euston Road. The Camden Street Infants' School (1874) was *one of the first schools in St Pancras to be built by the London School Board after the Education act of 1870. Some years later, an Elementary (junior) school for girls (1884) and another for boys (1895) were erected to the north of the Infant's school. (…) The infant's school had by then been taken over by the boy's department of the Central School and infants had joined juniors in the Elementary School buildings. (…) Until the Education Act of 1870, ladies' school and other small educational establishments abounded in the adjacent streets. There were at least six in nearby Great College Street in 1862.* [Camden History Society, 2003, p.85-86].

In Camden Street was settled the North London Collegiate School for Girls, an institution that had a great influence on education of girls for over a century and half.

In 1854 was founded the Working Men's College (WMC), the earliest adult education institutions established in United Kingdom by Christian Socialists to contribute to the cultural education of the artisans.

It is the oldest adult education institution still in existence in Europe.

Among its founders, there are eminent personalities, such as Dante Gabriel Rossetti, John Ruskin and James Clerk Maxwell.

Today the institute, nearby Regent High School, is named WMC Camden College and provide flexible courses and qualifications to adults who want return to study to develop skills and increase interests.

Fig. 4-58 (1) (2) WMC Camden College. Main front on Crowndale Road and view on Camden Street, London. (© author's photo). (3) (4) Billboards on WMC Camden College gates. (© author's photo)

The courses are related to the areas of visual arts, languages, math, humanities and digital skills.

The WMC is set up as a College for the community, situated in the heart of the city, with high quality teaching recognised by official bodies as Ofsted, Education & Skills Funding Agency, and to wich it was conferred the membership of The Chartered Institute for Further Education.

In the first half of the 20th century further spaces were set up for children: some houses of the old terrace were replaced by the Lyulph Stanley Central School for Girls (1920), instead of an Elementary School a playground was extended, today availed by Camden Town Sports Pitch; in front of it was placed the Richard Cobden Infant School.

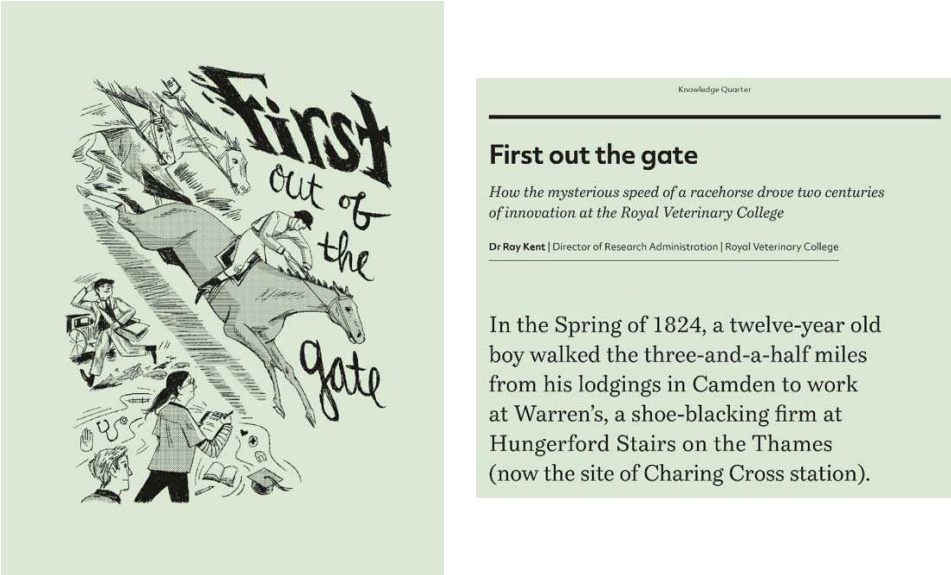


Fig. 4-59 Theme characterizing the Knowledge Quarter, the area within St. Pancras Station and Kings Cross Station (© Knowledgequarter.london)

Today public institutions are engaged in the challenge of constantly promoting cultural collaboration initiatives in the Camden district, to give continuity to the traditional vocation of a borough devoted to education and learning.
The Council, schools, parents, governors and the many partners who support education in Camden work together so that all the people of the neighborhood, and especially the new generations, have access to the many educational opportunities that such a central and dynamic urban area of London can offer.

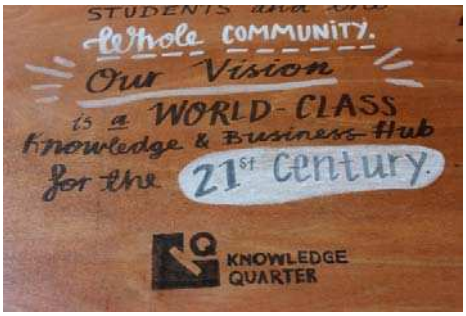
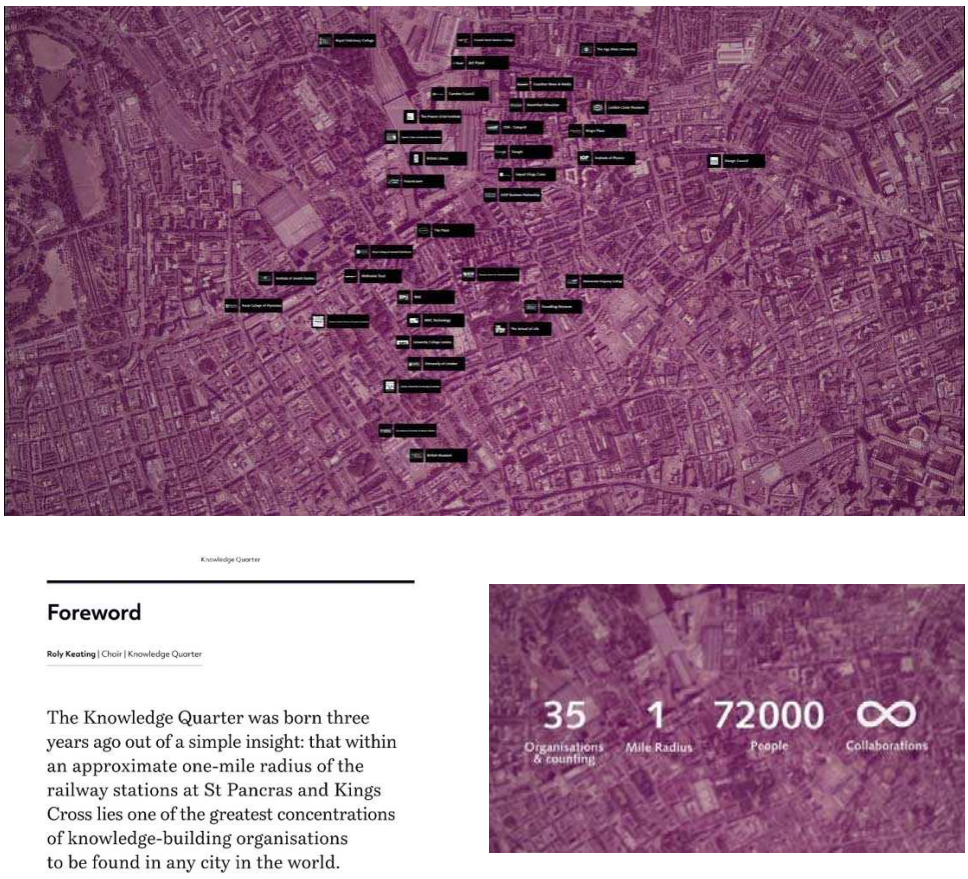


Fig. 4-60 Portico and wooden board with knowledge quarter map at Regent High School. (© author's photos)

The Camden Council and the Camden school with this goal they contributed to establish the Camden Education Commission in 2011, that interfaces with people and institutions in district to facilitate better access to the great resources of the area by all citizens.
The social environment in Camden is varied, and in the area of interest of the Regent High School, named Somers Town, many inhabitants live in conditions of economic and cultural destitution, most of them are immigrants.
Many people perceive the access to better education system and better living conditions as unreachable goal.
The action of Camden Education Commission is aimed at increasing ambitions, promote the debates between educational agencies and the sharing of good practices.
Establish a climate of trust and intelligibility between schools, institutions, and families and students.
Camden schools are required to work for long-term goals, to reach judgements by Ofsted as "good" or "outstanding", to improve results, comparing them with those of similar areas ("statistical neighbors" of Camden).



Knowledge Quarter

Foreword

Roly Keating | Chair | Knowledge Quarter

The Knowledge Quarter was born three years ago out of a simple insight: that within an approximate one-mile radius of the railway stations at St Pancras and Kings Cross lies one of the greatest concentrations of knowledge-building organisations to be found in any city in the world.

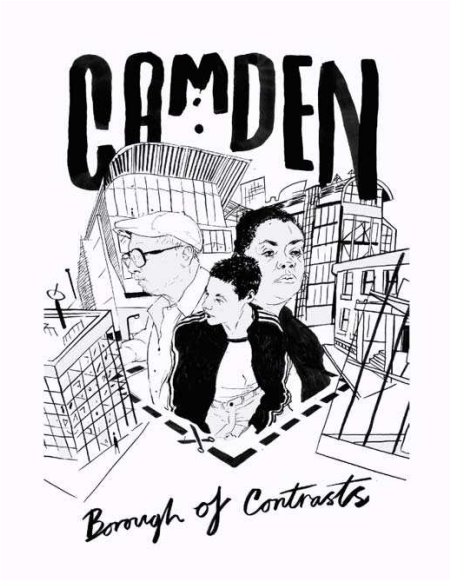
Fig. 4-61 Aerial view of institutions location at Knowledge Quarter (Source: https://bank.knowledgequarter.london/)

The Francis Crick Institute support, furthermore, a community center that provides consultations and services to the inhabitants of St Pancras and Somers Town Community. The St Pancras and Somers Town Living Centre was opened in 1977 to provide facilities for people of different ages, from early childhood to the elderly. It offers advice on many issues, from work to medical, training courses are held, a family environment for the socialization.

Public spaces and Social life

The Camden Council in last years has developed many local plan policies to improve the public spaces and the public life in the area. *Centres should be enjoyable spaces to live, work, and shop, and should have spaces to dwell and for social interaction. The characteristics of physical space can also influence opportunities for developing social ties and maintaining relationships as well as casual interactions and therefore foster social inclusion. The design and quality of the public realm, streets, and spaces is key to ensure Camden's centres are*

pleasant, safe, and convenient places to walk, cycle, and take public transport. [Camden Council, 2018, p.14].



Knowledge Quarter

Camden, borough of contrasts

New ways knowledge institutions can help in the fight against inequality.

Georgia Gould | Leader | Camden Council

As a councillor, you sit at the intersection of a complex array of parallel communities. In one day you can go from talking to a tenants' organisation about faulty boilers, to chatting with the head of a global company.

Fig. 4-62 Theme characterizing the Knowledge Quarter, the area within St. Pancras Station and Kings Cross Station (© Knowledgequarter.london)

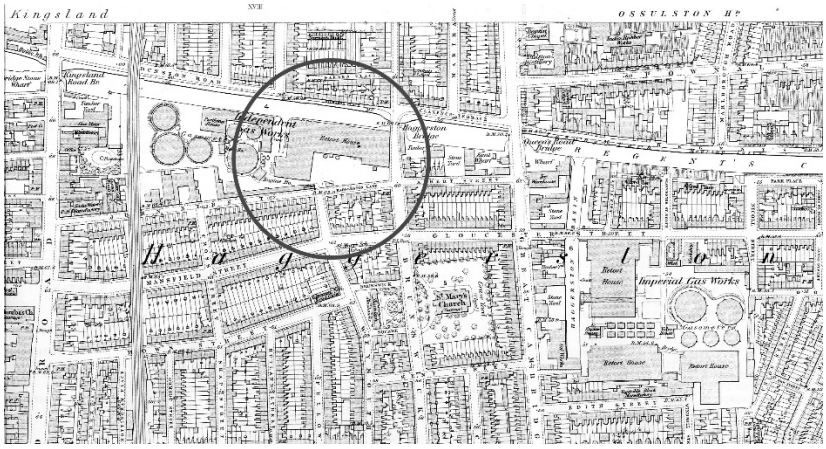
4.3.3. Bridge Academy

Location	Laburnum Street, Borough of Hackney, London, UK
RSC Region	North-East London and East of England
Government Office Region	London
District	Hackney
Ward	Haggerston
Parliamentary Constituency	Hackney South and Shoreditch
Urban/Rural Description	Urban major conurbation
Construction completion	2007
Architects	BDP
Contractor	Mace Plus
Client	DCSF (Department for Children, Schools and Families) and UBS Investment Bank
Local authority	Hackney
Phase of education	Secondary with sixth form
Age range	11 to 19
School type	Academy sponsor led
Funding status	State - Academy
School category	Independent State-Maintained Academy
Academy sponsor	UBS Investment Bank
Gender of entry	Mixed
Establishment status	Open
Specialism	Music and Mathematics
Admissions policy	Non-selective
School capacity	1150
Number of students	1107
Ofsted rating	Good (Last inspection: 16 January 2018)
Official awards for the project	ACE (Association for Consultancy and Engineering) Engineering Excellence Award 2009, Bentley Success Award (Best use of BIM) 2006, SCALA (Serving Construction & Architecture in Local Authorities) Civic Building for the Year Award 2009

The Bridge Academy is an innovative school opened in 2007, under the Building School for the Future Programme, to contribute regenerating the neglected area in which the school is placed.
The school is located in the Borough of Hackney, in an area called Haggerston, North East London.
The architectural firm BDP worked with MACE Plus to build an idea of school architecture "without corridors and columns" to encourage socialisation and a sense of inclusion.

The peculiar site where is based the Academy, along the banks of Regent's Canal, inspires the unusual shape of the building. Learning spaces and paths are designed in such a way to minimise energy use by maximising daylight.
The project also provides a physical and visual continuity between interior space and external space, to be used indifferently as a learning and recreational space.
The scholastic complex is made of three volumes, the predominant building and two minor volumes for sports and performance.
Bridge Academy is currently among the tallest secondary schools within the United Kingdom, articulated in over seven storeys, since the project area was circumscribed by site constraints.

Site History
In the 19th century in this area better housing conditions for the working class are provided. The empty area near the Regent's Canal were occupied by gasometers of the Gas Light and Coke Company.
The population was moving out from the most central areas. From 1900 a decline of the residents was beginning because they were induced to move to more peripheral areas due to the large scale rebuilding. In 1880's cheap railway connections began from Liverpool Street to the north eastern suburbs.
Some local institutions, such as almshouses and schools were gradually moved to more agreeable and remote districts. In the last years of the 19th century, the municipality built new apartments, equipping them with innovative sanitary facilities.
On the map of 1916, the presence of a school is visible in the place where the Bridge Academy stands today.
On the map of the 90s of 1900 the Laburnum Primary School is visible in the area of the current Bridge Academy.



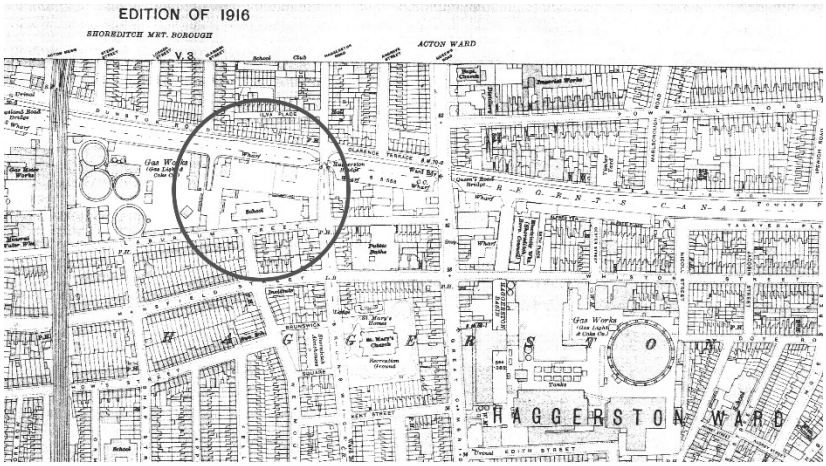


Fig. 4-63 Historical Maps of Hackney – Haggerstone of 1872 and 1916. Source: London Borough of Hackney Archives.

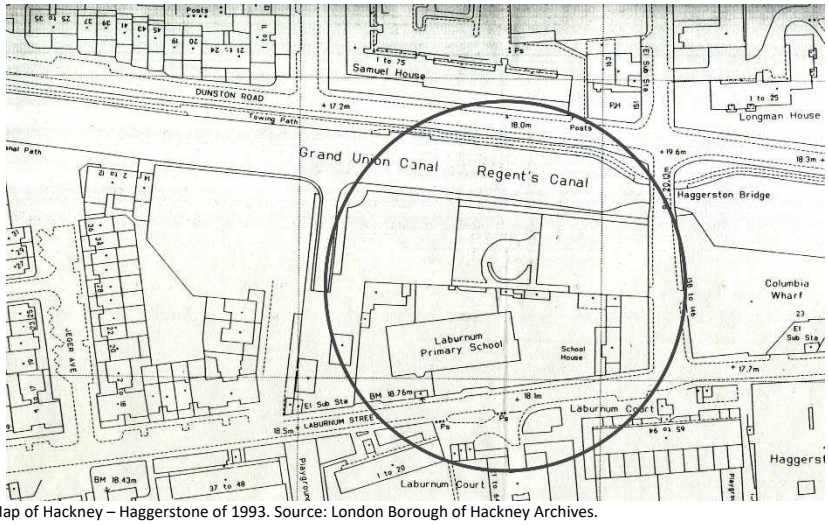


Fig. 4-64 Map of Hackney – Haggerstone of 1993. Source: London Borough of Hackney Archives.

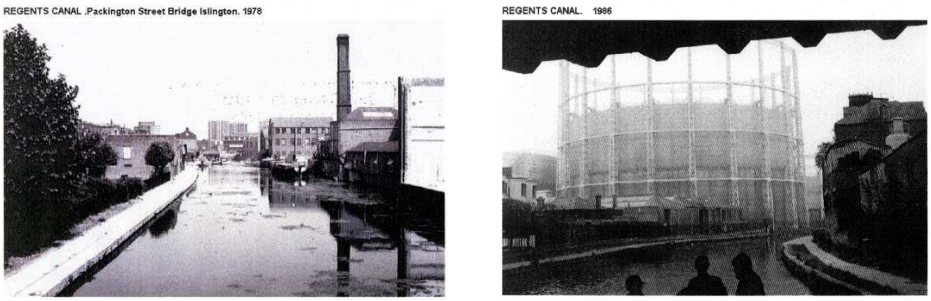


Fig. 4-65 (1) View east along the Regent's Canal past Eagle Wharf warehouses towards Sturts Lock, 1978. Source: London Borough of Hackney Archives. (2) Gas holders opposite Andrews Road, 1986. Source: London Borough of Hackney Archives.

Urban Analysis of City Scale

The Bridge Academy is located in an interior area of the extended Hackney neighborhood, in a lot between Regent's Canal and Laburnum street.

Towards the end of the 20th century the area had an aspect of the ex-industrial area. In recent years, however, it was transformed into an attractive waterside residential area.

A report of 2013 about the quality of life shows that a majority of people are satisfied about many aspects of quality of life in the Hackney area. Local people recognize an improvement in services and the urban environment: cleaner streets, better schools, better housing, less crime and violence, an improved retail offer and improved transport and local services. [State of the Borough Report, 2013].

On the contrary they found a worsening of some aspects: high cost of houses, an increase in violent crime and unemployment.

Academy leads the regeneration of an area which hopefully will be transformed in the future with mixed-tenure housing. In spite of the apparent dereliction, the school's catchment area for most its eventual 1150 pupils has an average radius of just 800 metres. [Gough P.,2009, p.2].

Fig. 4-66 Oblique aerial photo, westwards from Cassland Road and Well Street Common to Hackney Downs and Queensbridge Road, c.1966.
Source: Metropolitan Borough of Hackney. Hackney Archives Department.

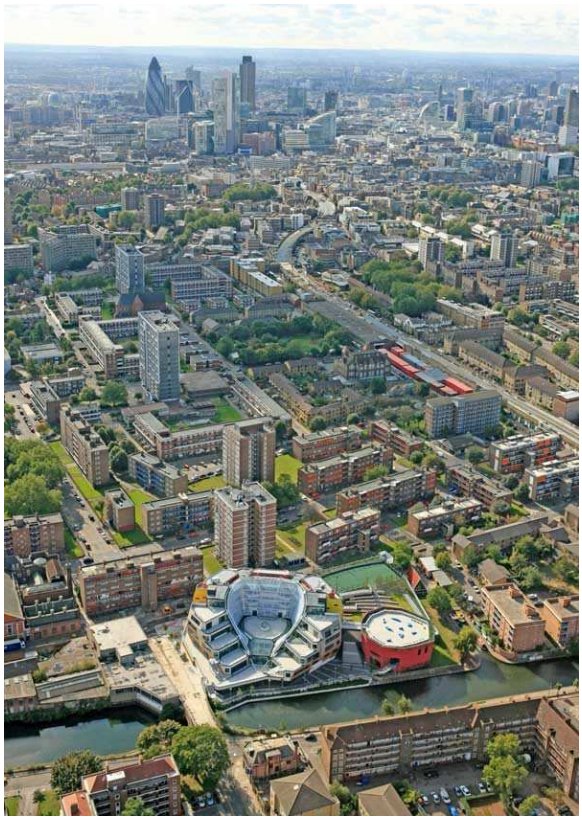


Fig. 4-67 Aerial view looking south. (photo © Commission Air)

Neighbourhood and Architectural Character Elements

Until the middle of the 19th century the typical East London home was in a two-up, two-down brick terraced house.

Today the buildings in the Hackney district are mainly residential and tertiary. Many complexes are Council houses and partly private, with low houses and flats.

In recent years several multi-storey residential buildings have been built, contributing to the regeneration of the area and the consequent increase in house prices.

West of the school is the boat club with its own canal.

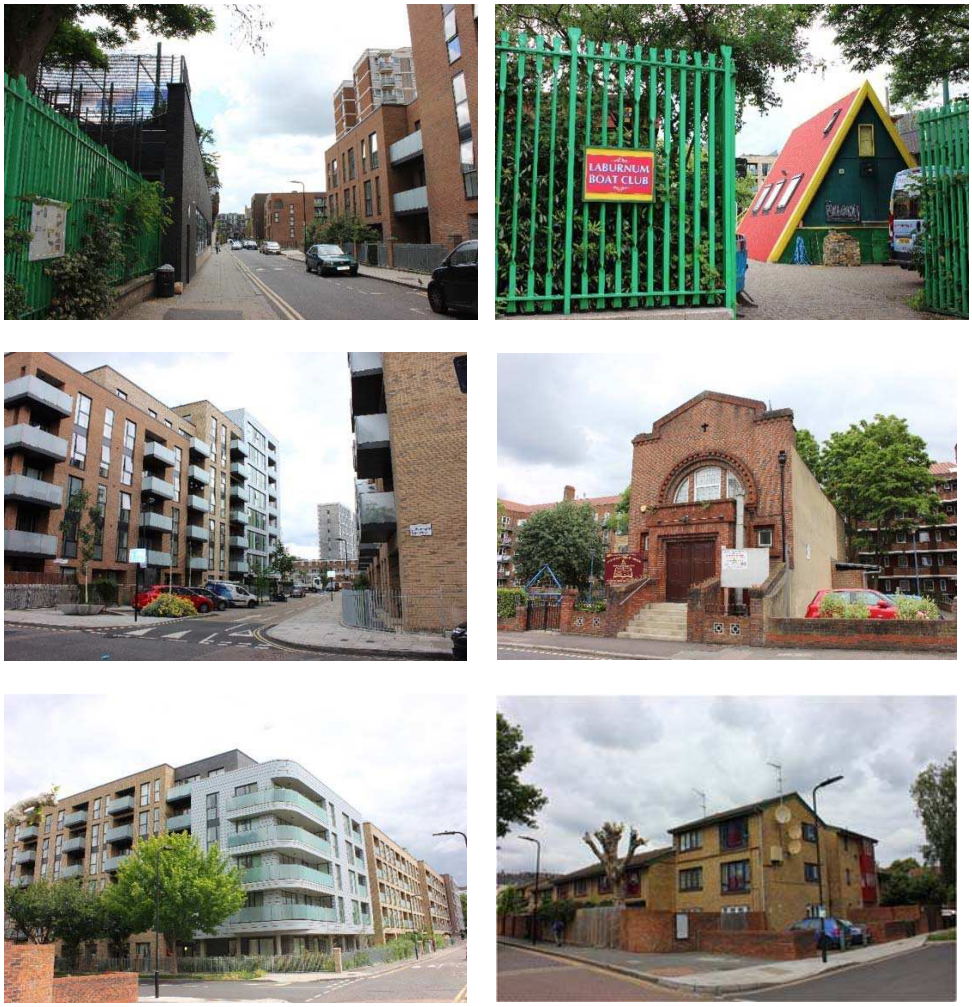


Fig. 4-68 School district views. (© author's photo)

School Design

The peculiarity of the school site led BDP architects to build vertically, and distributing the classrooms and the open learning spaces in the different floors, physically connected by open balcony corridors.

Fig. 4-69 The Bridge Academy, view across the canal. (© Martine Hamilton Knight).

Due to the building's geometry most classrooms and learning zones in the galleries have irregular shapes, providing formal and informal learning environment. [Gough, 2009].
The variety of spaces, some for undifferentiated activities, others for specific lessons, makes a multi-level learning environment.
The idea of school without corridors also aims to contribute to passive security, allowing teachers and educators to have a broad view of spaces and students.

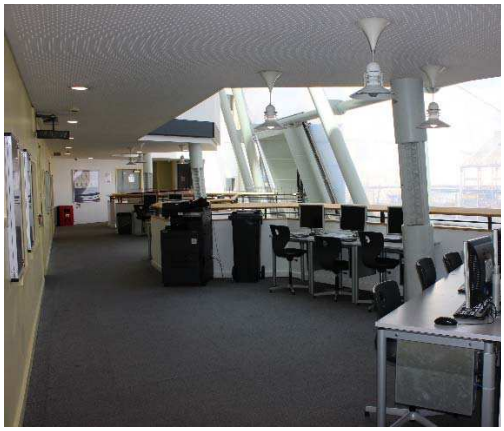
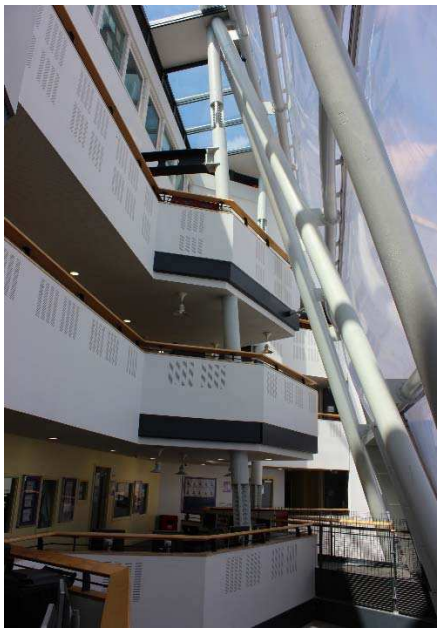



Fig. 4-70 (1) One of many open learning zones with workstation in the galleries of Bridge Academy, London (© author's photo). (2) View of different floors galleries in Bridge Academy (© author's photo). (3) Ground floor hall, as a "central square" creating impressive spatial impact in Bridge Academy (© author's photo). (4) The library floor hanging over the assembly hall (© author's photo)

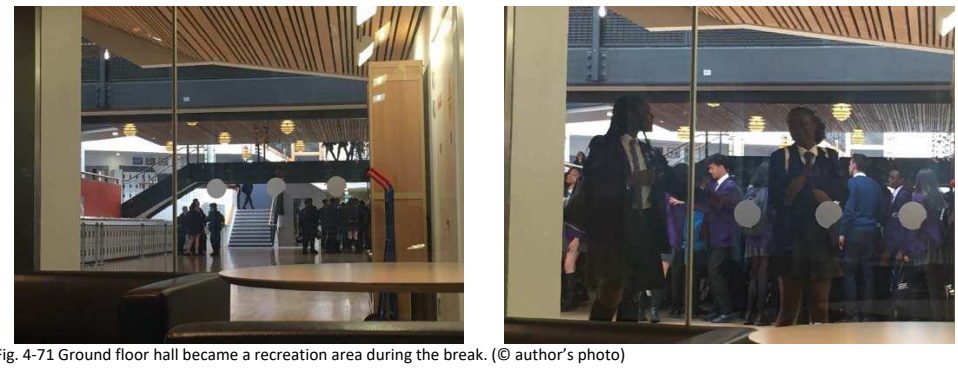


Fig. 4-71 Ground floor hall became a recreation area during the break. (© author's photo)

The six floors face internally on a ground floor "central square", a social heartspace used for assemblies and recreation, above which is suspended the library. Both convene a centralized learning and social areas to the school and everything is focused around those space. The architect Papa of BDP, involved in Bridge Academy design team, expresses the fundamentals of the project: *"We get inspiration and some specific concept of Architecture on the part of designing the school from one particular architect who influenced both in this school and others that we've designed, which is Herman Hertzberger. The Montessori School in Amsterdam is very interesting particularly for two key concepts: first it is very focused around a space or a unifying idea that the whole school is one thing and you should really be able to stand in one part of the school see the rest of it in one glance. Second is the staircases location in different point of each level, it means you going this staircase is your always heading towards another set of teaching and learning spaces and you never have that feeling of going round."* [Interview Transcript, Papa, Keith (Interviewed), Rubino, Anna C. (interviewer), 2019].

Fig. 4-72 Learning spaces on the upper floors: terrace space for science garden and art classroom.

The learning spaces are distributed on the various levels of the building, both inside and outside, providing impressive roof spaces for learning, performances and play.

External Space

The three elements that make up the school are combined in a multi-level landscape.

The external area is varied and divided into spaces for play, sport and socializing arranged around the volumes and along the canal.

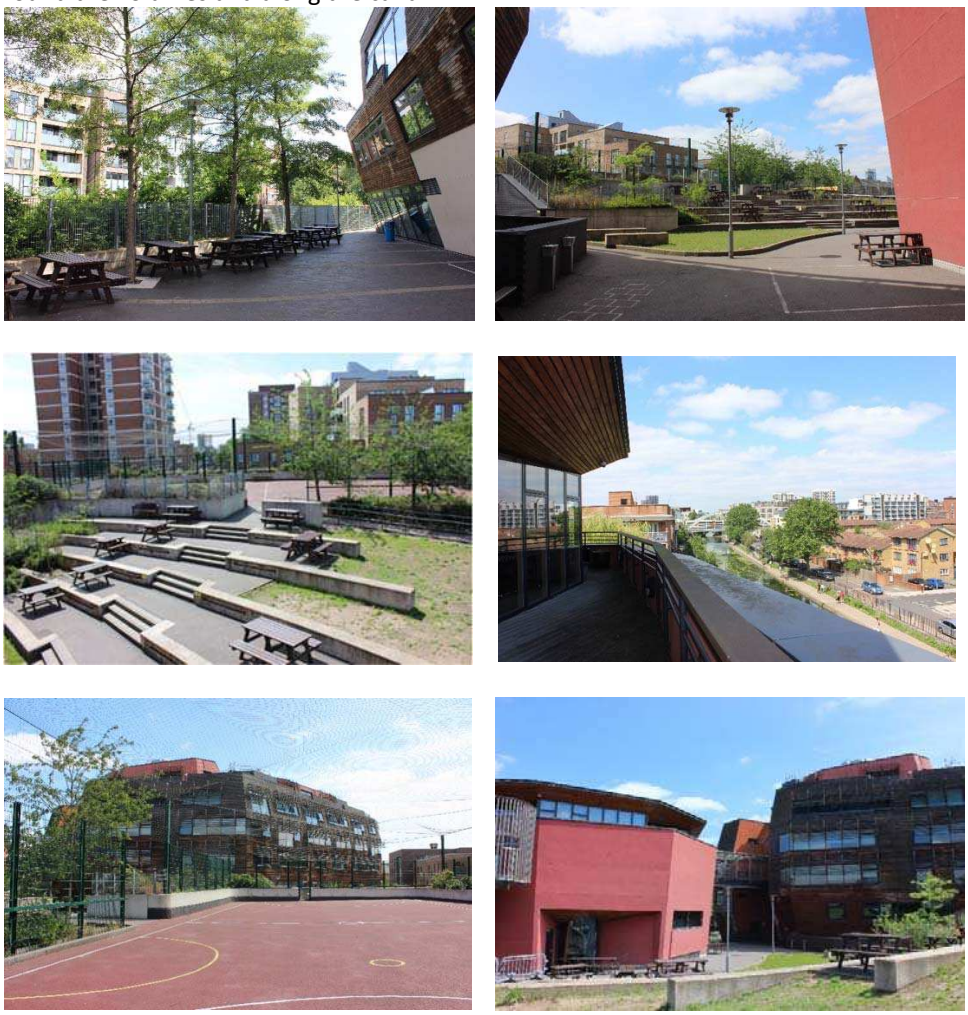


Fig. 4-73 External areas views. (© author's photo)

Urban integration

The school site is next to the bridge at the end of Haggerston Road. The school main entrance is at the crossroads between Laburnum Street and and Haggerston Road and it has no gates. Along the canal there are gates for security reasons.

The external building envelopes respond to their context and usage with an identifiable character of their own offering grain, texture, and a human feel. The academy building forms the street edge integrating the school into its urban context rather than setting it apart. [RIBA, 2008, p.2].

Fig. 4-74 The Bridge Academy site: location plan and landscape plan. (© BDP Architects)

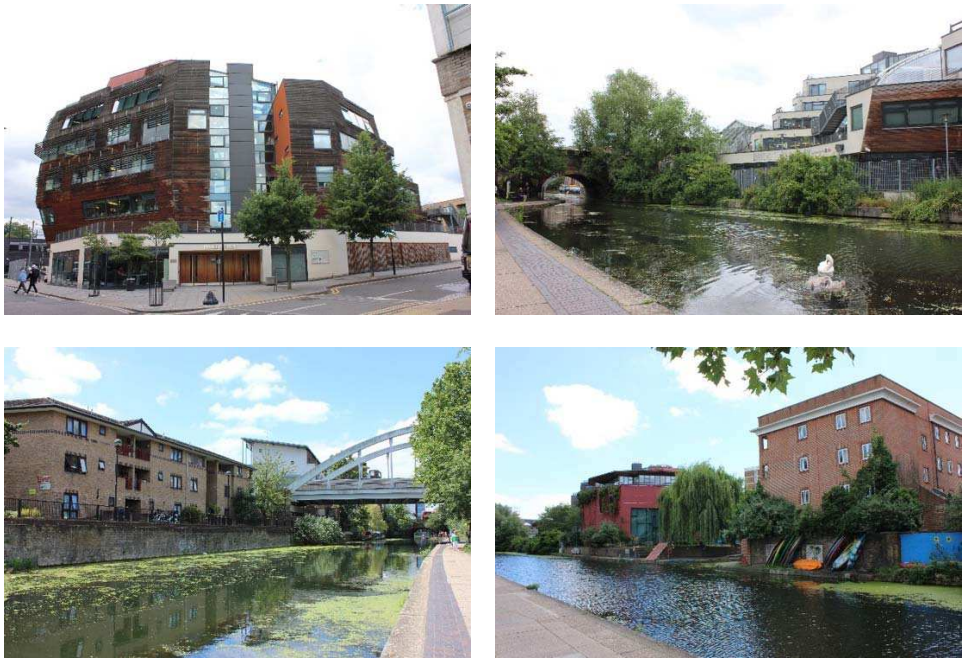


Fig. 4-75 Main school door and school from Regent's canal view. (© author's photo)

Sustainable design

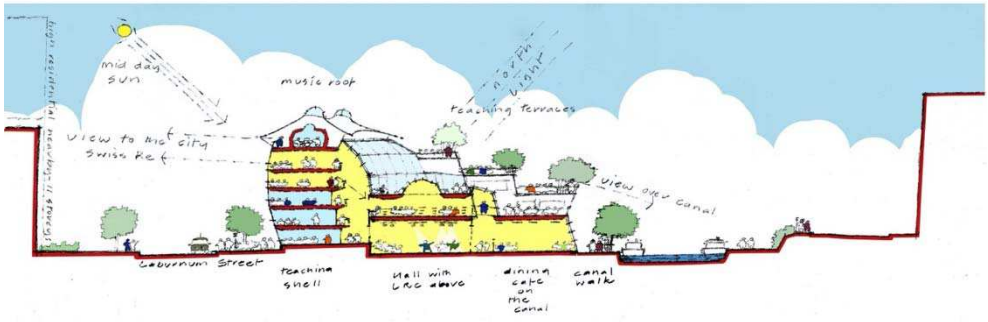


Fig. 4-76 Concept section. (© BDP Architects)

Fig. 4-77 External and internal views. Details of the roof in ETFE.

The school building shape, the layout of the spaces and the perimeter surfaces materials intended to encourage daylight in the classrooms, in the learning spaces arranged along the balconies and in the central hall.
The sloping roof is made with a surface in ETFE (Ethylene Tetrafluoroethylene), a transparent material and resistant to atmospheric agents. The classrooms are well lit, but those located on the upper floors are affected by overheating in the hottest periods.
The lighting system is been designed by Louis Poulsen luminaires with BDP's lighting designers. It works synchronized with daylight, in order to be efficient and cost effective.
The building ventilation is naturally ensured by the stack effect provided by opening towards the canal.
Painting of the building has been thought to absorb the heat during the day and releasing it during the night. There is also a domotic system able to properly manage the energy consumption of the building.
[Centre for Effective Learning Environments (OECD) 2011, p.178].

Educational model

The transformation of education in London is one of the greatest success of public policy of the last decade, and nowhere has that success been more remarkable than in Hackney, where the education offer has gone from being probably the worst to becoming one of the best, not just in London, but in UK. (….).

It is probably true to say that of all the improvements Hackney has seen, the success of our schools is the most fundamentally important, and has been the biggest driver of social change in the borough. (….)
The local authority in Hackney, while responsible for many of the problems suffered by Hackney schools in the past, has played a vital role in the turnaround of education in the borough, and continues to lead a culture of excellence and improvement. [Brighouse, Coles, Pipe et alii, 2015, p.30].
With these words Jules Pipe, Mayor of Hackney for many years, until 2016, highlighted the role played by Hackney schools in the process of social regeneration of the neighborhood.
In the late 1990s the Hackney council had many problems affecting local services and schools and education were also in decline. The failure of the neighborhood schools is attributed to Local Education Authority (LEA) in addition to a poor management of the education estate, to absence of leadership and poor confidence in culture.
The Learning Trust, a not-for-profit company, was created to conform LEA's tasks. The LT referred directly to the Secretary of State for Education.
The LT intervention gave significant boost to the support of students and schools in the district of Hackney.
The Council launched an extensive programme of capital investment for primary and secondary school estates.
From the year 2000 onwards, for about 10 years, the entire school stock of the Hackney district has been renewed.
The Hackney neighborhood was one of the first to adhere to *Building Schools for the Future*, through which achieved complete renewal of all maintained secondaries and special schools.
The appropriate initial planning with respect to the *Building Schools for the Future* carried out by the Hackney district, allowed to run out the complete school buildings renovation program, even after the abolition of BSF in 2010 by the government.
Six schools were entirely renewed with BSF and four new schools were built from scratch; 19 new children's centres and five new youth centers have been created. The buildings of all the educational institutions in the neighborhood have been renovated, in compliance with high design standards and construction quality.
The building renovation of educational institutions has had a great impact on the teacher's and students' confidence and performance. The schools appreciated by families too, so much so that, for example, the Bridge Academy began to be attended by middle class students.
The secondary schools situation of Hackney district before these interventions was unsuitable and two of them needed a complete reconstruction.
The absolute need to create new secondary schools with high quality environment has pushed Hackney Council to be one of the first councils in the UK to adopt the Labour government's Academies programme.
The multiculturalism of the Hackney inhabitants has influenced the inspiring principles of the schools built in the neighborhood: most of them want a mixed-sex, non-

denominational, non-selective schools, in compliance with values such as diversity, tolerance and sense of community. [Brighouse, Coles, Pipe et alii, 2015, p.32].
The school was designed to meet the specific educational objectives provided by the curriculum.
To promote an appropriate education in prevalent disciplines, distinct spaces have been designed and set up, such as music and mathematics laboratories.
Great importance in given to Information Technology (IT) skills, in fact at the sixth form it is supplied both Cisco training and a Microsoft Academy.
In special soundproofed classrooms there are musical instruments, made available by the school.

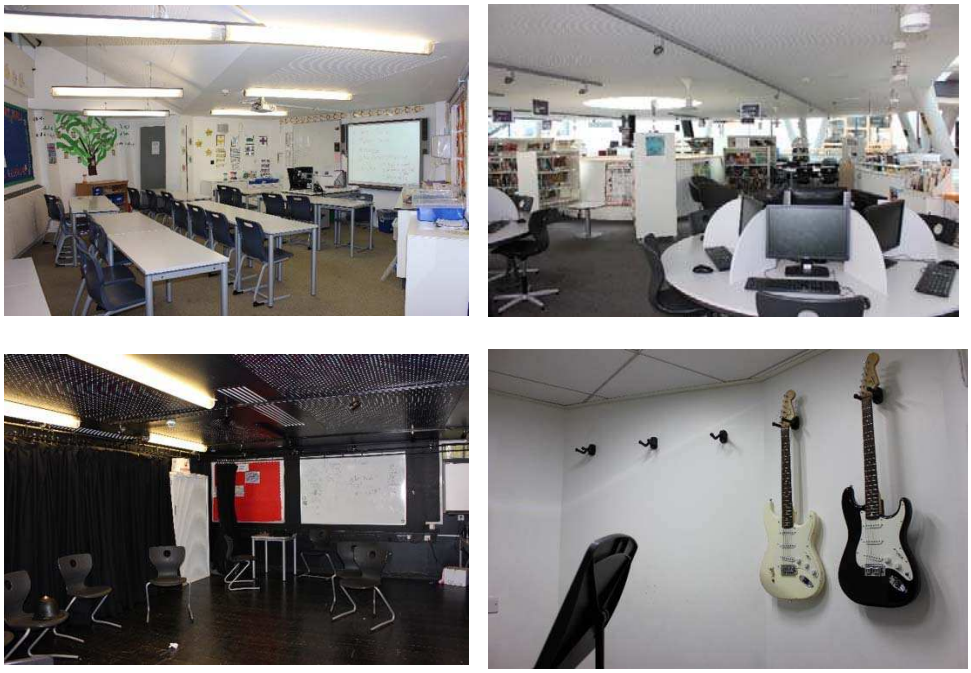


Fig. 4-78 Math room, computer lab, drama and music practice rooms. (© author's photos, 2019).

The Bridge Academy aims to provide high-level preparation to students, so as to encourage them to attend University or a high equivalent course, in order to foster the improvement of many students' life, some of whom come from disadvantaged social classes.
The school is located in a district of London that is still poor and with social problems, so great importance is given to the educational principles towards which students should be addressed: Kindness, Hard Work and Integrity. They are constantly prompted with billboards posted at different points in the school.

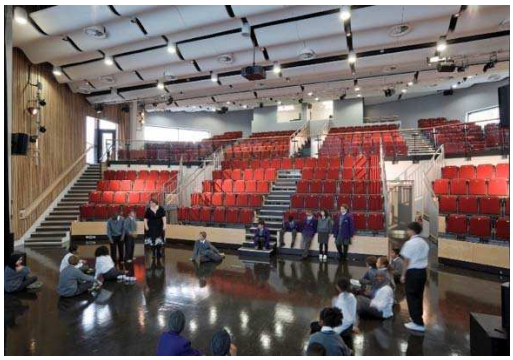


Fig. 4-79 (1) Billboard with educational principles. (© author's photos, 2019). (2) Dance studio. (© Martine Hamilton Knight).

Many special projects are also planned, with the support of prestigious London organizations.
First and foremost is UBS, a leading global financial services firm, which participated in the establishment of the school and constantly promotes educational activities.

The social impacts deriving from the partnership between UBS and Bridge are:

- *The Bridge Academy's GCSE results in 2013 were above the national average, in an area of social deprivation.*
- *In the first year of results (2011/12), Bridge reduced the attainment gap between students on free school meals and those not, from a national average of 26% to 5%.*
- *97% of Bridge sixth formers have applied to university, with 30% holding conditional offers from Russell Group universities and two from Cambridge.[https://www.bitc.org.uk/] (Visited on 13-6-2019).*

A fundamental objective of UBS is to improve the educational conditions of children who come from low-income families, providing them the skills to get better opportunities in future.
The last Ofsted report compiled on 15 January 2018 notified that the Bridge Academy has provided a good quality of education, it is conducted with good leadership and students have continued to improve learning levels, regardless of their background. *The school is in*

the top 12% of schools nationally for progress overall, and last year disadvantaged pupils at The Bridge Academy achieved marginally better than other pupils. The sponsor, UBS, contributes expertise to enrich the experience of your pupils. For example, the whole of Year 12 was visiting the sponsor's city offices during the inspection. [Ofsted, 2018, p.1].
The school is committed to the integration of children of different ethnic origins It also promotes activities to correct students' bad behaviour, specifically started an intervention programme for Black Caribbean boys with the Hackney Learning Trust.

Facilities open to the community
Hackney is one of those places that seems to collectively hold a certain set of values. Our residents come from a wide variety of backgrounds, and increasingly disparate economic circumstances, but a belief in diversity, tolerance and community defines the place today as much as it ever did. [Brighouse, Coles, Pipe et alii, 2015, p.33].
The project aims to create an inclusive and accessible architecture. The school is designed to accommodate the needs of the entire local community.
In fact, the school is also open on weekends to accommodate religious groups or events. School environments used out of the school hours by citizens are located in easily accessible areas.

Fig. 4-80 School's Theatre used on Sunday by a religious group. Posters displayed on the bulletin board outside the school to advertise a computer course and low-cost sports activities for the community. (© author's photo, 2019).

Partnership with other institutions

The Bridge Academy cooperate with many neighborhood educational agencies to improve Hackney's learning environment, such as Ministry of Stores, Hackney Pirates, Reach Out, Into University, Future First, The LSO, Hackney Music Service and Hackney Music Development Trust.

The Learning Trust, a not-for-profit company, in 2002 took responsibility for education in Hackney promoting from then a remarkable development in field of schooling and learning in the district.

In the company board directors are included three headteachers and three representatives of the community schools.

Community learning district

The *Building School for the Future Program* has had a positive impact in Hackney district, in fact, besides the Bridge Academy, another important intervention led to the Mossbourne Academy construction nearby Hackney Downs Park.

Hackney desperately needed new schools, and the academies programme was the only show in town. Those who wished to wait for a government that freely funded local authorities to build maintained schools are still waiting. Meanwhile we have seven new Academy schools, alongside those built and refurbished under BSF. [Brighouse, Coles, Pipe et alii, 2015, p.34].

In the most immediate area of the Bridge Academy there are many other independent and maintained schools, such as The Mustard School, Randal Cremer Primary School, Hoxton Garden Primary School and Hackney New Primary School.

Two public libraries, Hackney Central library and Dalston CLR James Library, are cultural landmarks in the school's area of relevance.

4.3.4. School architecture values definition an case studies evaluation

Four categories of values have been identified with reference to school architecture: architectural, environmental, pedagogical and social value. For each of these values, the quality that a school building can have has been identified.

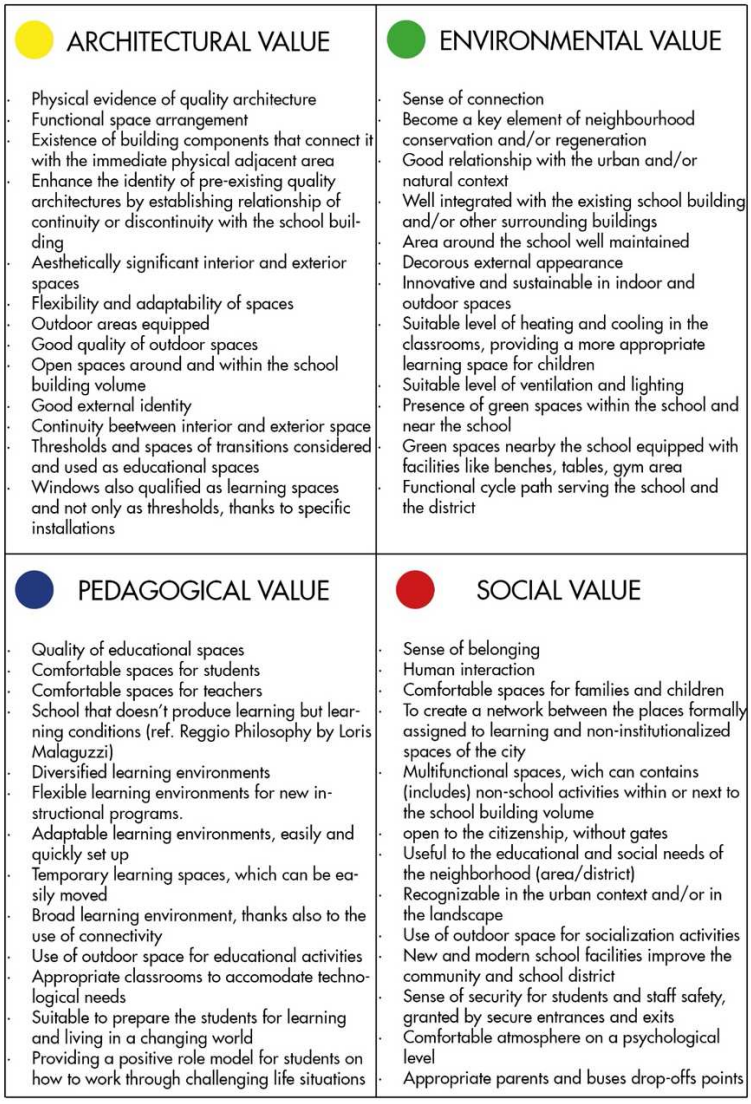


Fig. 4-81 Values table with qualities associated. (@author's photo)

The three schools identified as case studies, UCL Academy, Regent High School and The Bridge Academy, were evaluated against the four values on the basis of inspections and observations, literature review and some interviews.
The diagrams show the quality level for each value: the circles closer to the corners of the square it means that the higher the level of that particular value is.

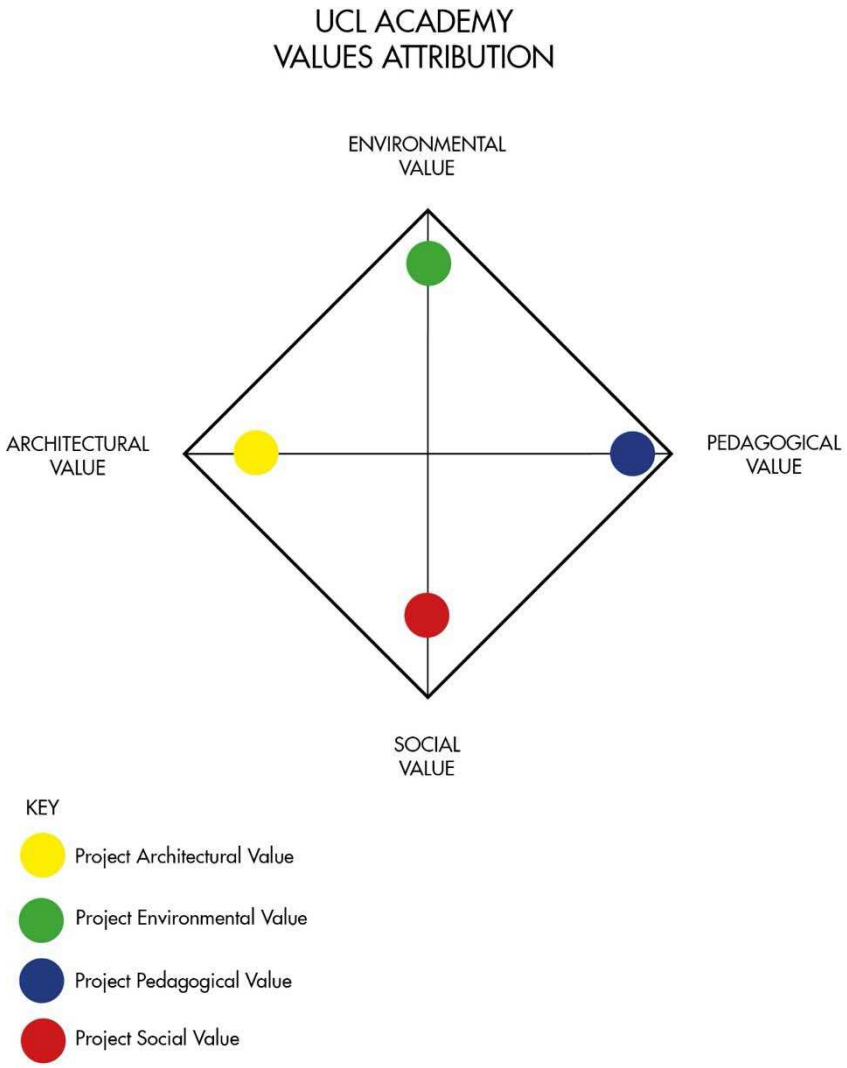


Fig. 4-82 UCL Academy evaluation diagram. (@author's photo)

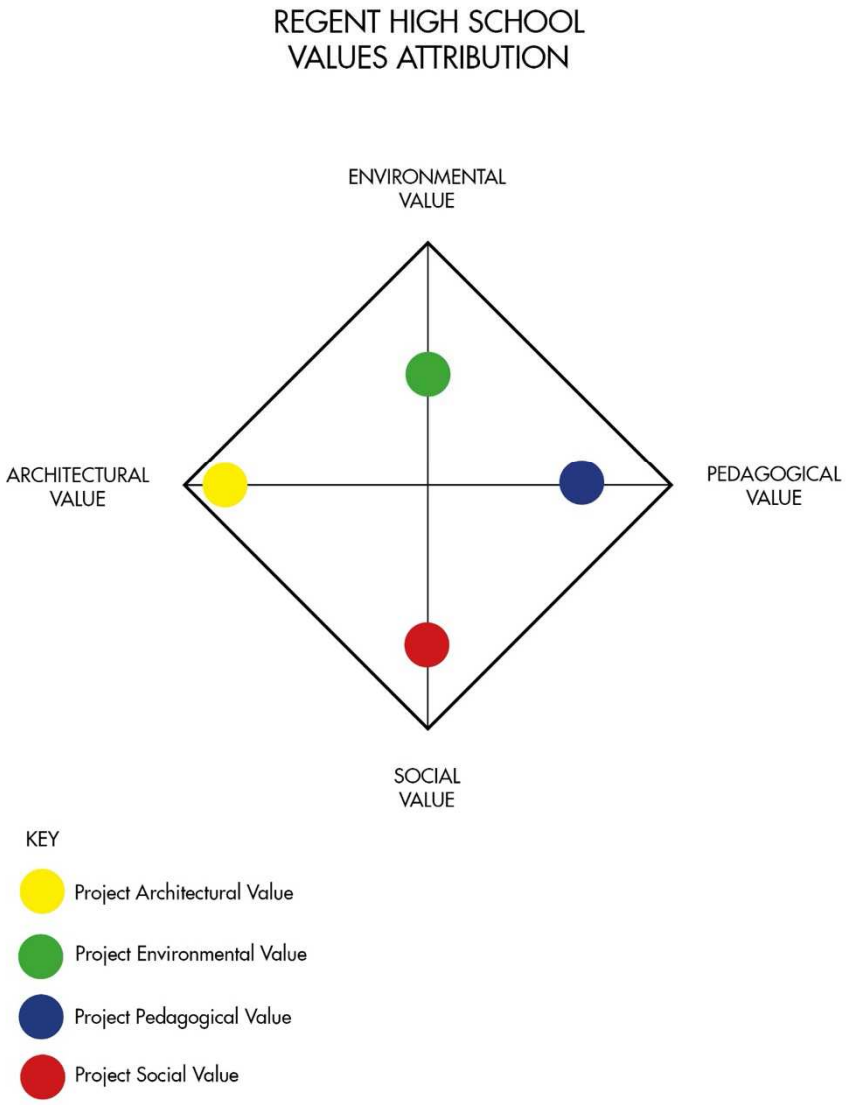


Fig. 4-83 Regent High School evaluation diagram. (@author's photo)

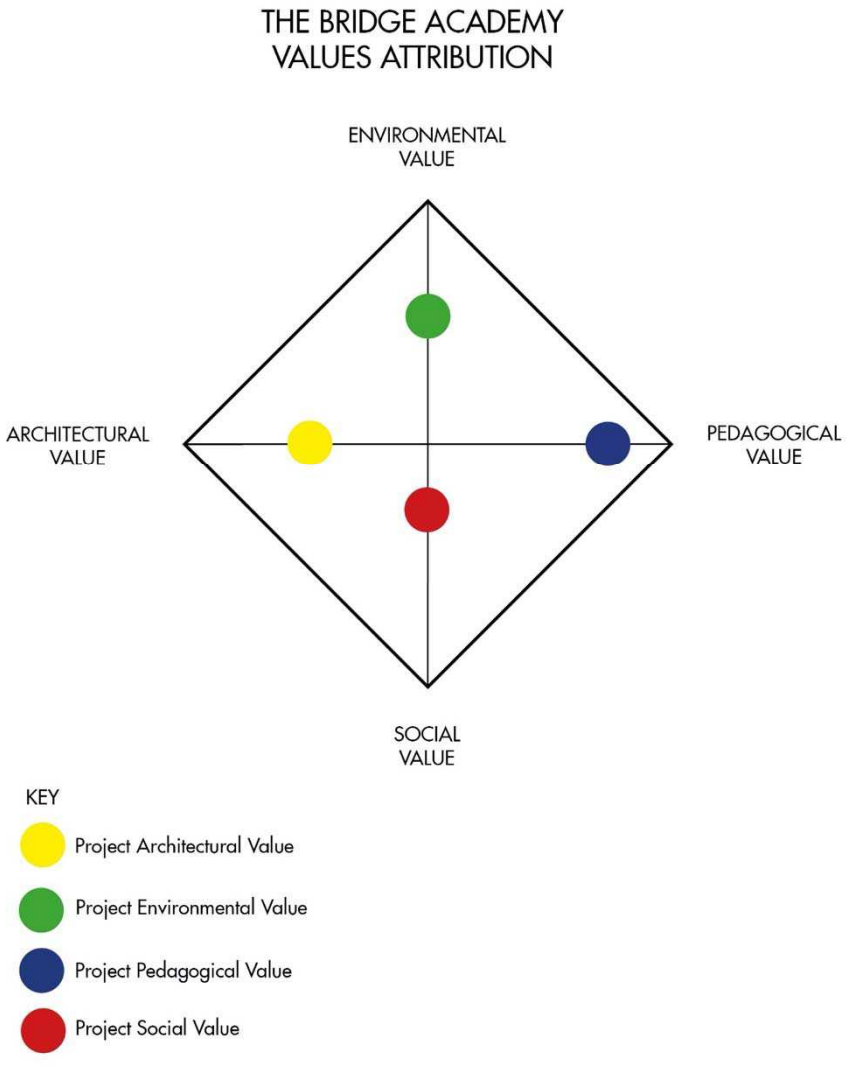


Fig. 4-84 The Bridge Academy evaluation diagram. (@author's photo)

Fifth Chapter

5. The qualities of the contemporary school in the city

In contemporary society, the qualities of good learning spaces, and especially those in which compulsory school education is practiced, should become an important topic to European policymakers.
There is still a lot to do in Italy in this regard, as the integrated research, carried out in a coordinated fashion by experts in the architectural, pedagogical, urban and social-science sectors, is underdeveloped and rarely focuses on the secondary school sector.
Today, learning and creating knowledge implies interaction, the exchange of ideas between students, teachers, representatives of cultural institutions, fitting into a network of knowledge that can be shared on a large physical and tangible scale, like that of the city, and intangibly, like that of the network.
Before the network was widely used, knowledge was more fragmented and localized. In the contemporary city, knowledge is not localized and can no longer be the prerogative of the individual, but shared by many (many groups, diverse physical contexts) that branch out into the network.
The cognitive processes in their group depend on the total knowledge distributed across the group, its environment and artifacts, resulting in what in the literature is referred to as "distributed cognition" [Scott-Webber L., 2004].
It is fundamental that the users of learning spaces in schools have control over the physical setting and be able to take full advantage of the resources available.
Designers and planners play a vital role in terms of ensuring the quality of life in school spaces, as well as the safety, health and learning process of those who use these educational environments.
Rethinking school education in this perspective means rethinking school environments and considering the aspects that concern the connections between school and city.
Today, school is the place where children spend most of their day, and in some fragile contexts it also becomes a social point of reference, giving support to families even on issues that go beyond their children's development and education.
The school is a social point of reference for the district in which it is located and, in the case of cities that are not very large, like most schools in the Italian context, it is a reference point for the city.
Schools can become a medium for sharing knowledge, ability and skills between educational practice professionals, students, citizens of different ages, ethnic groups and social classes.
School spaces must acquire physical connotations of openness to their context, both on the physical level, through greater permeability, and on the cultural and social level, with initiatives that integrate different needs of the inhabitants of the city.
The school design must include a variety of internal and external spaces, which must interact well with one another and with the immediate context (paved spaces, green

spaces, perimeter roads), with the physical spaces of the wider context (streets, squares, gardens, squares), with the surrounding buildings and, where necessary, incorporating spaces and a variety of functions, to acquire a real openness to the neighbourhood and the city.
The institutional, cultural and social needs in the various urban contexts must be able to consider the school as a public, open and sustainable agency, with an educational vocation and social support. The physical space of the school should satisfy all these functions, becoming a place of reference thanks to the institutional, cultural and social role that it performs.
The tangible conditions which shape school buildings, such as the spatial, volumetric and urban conditions of the district and the city, must interact with the intangible values (social, cultural, health), and in a synergistic way contribute to shaping urban conditions.

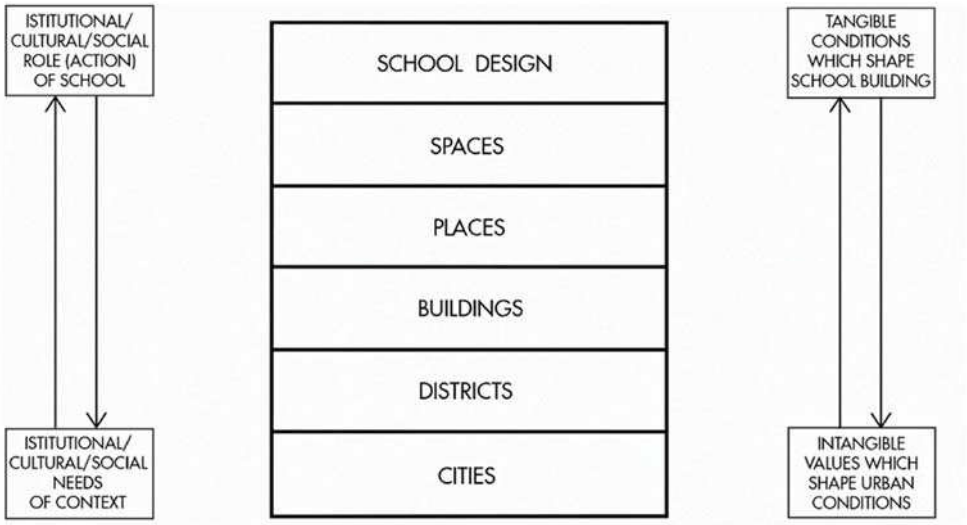


Fig. 5-1 Diagram summarizing the several environments levels, from school to city, which can interact on PHYSICAL and SOCIAL LEVEL, through tangible and intangible values. (@author's photo).

Based on these ideas, the architectural design quality of a school building is identified on the basis of criteria covering tangible and intangible facts.
School architectural design should be inherently belong to its tangible and intangible components.
Since the learning experience today has become increasingly complex, the qualities of school learning environments cannot be based just on tangible, assessable and apparent criteria, but also on a variety of intangible criteria and conditions.
According to Boys, *there was a lot of emphasis on the whole experience of learning, not just its physical space. Learning takes place through our everyday negotiations of pedagogic content and practices as experienced through our encounters with others, spaces and artefacts through time. It is how we attempt to make sense of, and survive in, the world.* [Boys J., 2016].

It is referred to a universal idea of learning, which can take place in officially invested spaces of this task, but also in spaces not formally destined for this: the physical spaces of the city and the material and immaterial places in which man performs the life experience can be considered places of learning.
Define the school building's design quality, from the perspective of its connections with the learning spaces and places of the city, is a demanding task because we refer to complex systems - the school, the learning environment, the social spaces, the city - in which a multitude of elements come into play that can vary over time depending on the circumstances.
Moreover, the concept of quality also depends on subjective issues based on perceived priorities [Choy R., Burke N., 2006].
School design quality may be considered from peculiar viewpoint and aspects.
Referring to the idea expressed by Simon on how to deal with complexity of architectural issues [Simon H., 1962], this research examines the broad theme mentioned above according to a series of identified parameters arrayed (organized/arranged/filed) in a matrix with different hierarchies, which allows an interscale reading that starts from the school building and gradually expands to the city.
A holistic approach is proposed to the definition of contemporary school qualities and the use of spaces in the relationship with the urban context, evaluating some parameters that are considered fundamental.
The framework of the approach is constructed to identify four broader categories (macro-areas) under which the main qualities that a school's architectural design should include (embed/embrace/incorporate) have been grouped together.
The four macro-areas are (Broader-categories):

- Architectural Quality: is concerned with spaces arrangement in the building, quality and inter-relationship of space (internal/external), the aesthetics and functionality of the building in the relationship with immediate and wider urban context.
- Environmental and Urban Quality: is concerned with the arrangement of building in the immediate and urban context, the connections with the streets and other landmarks of the district and city. It also relates to the overall environmental conditions which includes openings, solar light, ventilation, relationship with natural context.
- Pedagogical Quality: it relates space and learning through the uses and behaviours of students and citizens. The arrangement of school spaces and furniture, and the variety of formal and informal learning setting places, aim to change education, promoting cooperative learning and formal and informal learning in several context of the school, the district and the city.
- Social Quality: is concerned with the capacity of school spaces to become a welcoming and inclusive place for all users (students, teacher, school staff, families, neighborhood residents). It also includes the tendency to foster social interaction and encourage community association.

These quality attributes take on specificity depending on whether reference is made to the school building, or to a building complex with functions that can be integrated with the school, the school's surrounding and district, and finally to the city.
It is widely demonstrated that when an education institution provides tools and structures for students and users to foster the quality of the institution, enhance also a positive self-empowerment and sense of community among students, families and local community.

5.1. Learning spaces and physical setting: school building, district, city

SETTING EXTENSION OF SPACES	DESTINATION OF SPACES	USES EXTENSION OF USES
SCHOOL BUILDING	CLASSROOM	Learning spaces for students
	LABORATORY	Learning spaces for students and district residents
	ASSEMBLY HALL and THEATRE	Learning or social activities spaces for students and district residents
	LIBRARY	Learning space for students and district residents
	CANTEEN	Space for meals for students and district residents
	GYMNASIUM	Sport space for students and district residents
MULTIFUNCTIONAL BUILDING COMPLEX	SCHOOL SPACES	Learning spaces for students and community
	SOCIAL SPACES AND HOSPITALITY PLACE	Learning, social and free time activities spaces
	RESIDENCE	Flats for residencial use
	OFFICE SPACE	Office work
	SPACES FOR COMMERCIAL ACTIVITIES	Business
SCHOOL SURROUNDING and DISTRICT	COURTYARD, PORTICO AND OPEN SPACES AROUND THE SCHOOL (paved or green)	Exterior spaces for students as learning or socializing activities
		Exterior spaces for district residents as learning or socializing activities
		Temporary exhibition spaces for students and citizens
	FIELS	Sport areas for students and the community
CITY	STREETS, SQUARES	Outdoor lessons or guided tours in the city
	PARKS	Learning, social and free time outdoor activities
	OTHER CULTURAL PUBLIC PLACES AS LIBRARY, MUSEUM OR THEATRES	Lessons in the libraries, museums and theatres
	PUBLIC COOWORKING SPACE	Cooworking activity
	COMMERCIAL & CULTURAL ACTIVITY SPACES	Lessons in the bookshops, cafés, shopping center, shopping galleries

Fig. 5-2 The diagrams summarizes the idea that the learning setting can be gradually wider, from school to city, and increasingly diversified in the uses and ways of learning. (© author's diagrams)

The physical space used for teaching and learning, in the 21st century more than in other historical periods, has expanded its boundaries from the classroom to the urban space. Social transformations and the impact of digitalization have led to the use of not only "dedicated spaces" such as schools, but also other different environments, such as public spaces, other cultural institutions such as museums, libraries and civic centres and multifunctional spaces as learning spaces.
If formal learning corresponds to dedicated spaces, informal learning can correspond to other types of spaces.
Four types of settings have been classified in the diagram, ranging from the most limited to the largest:

- school building
- multifunctional building complex
- school surrounding and district
- city

For each of these settings, the spaces that make them up have been identified and the uses have been identified.
We want to summarize the idea that various types of learning can be implemented in various types of space, from that of the school to the wider one in the city.
To the different settings are associated the four fields of values identified:

- architectural values
- environmental values
- pedagogical values
- social values

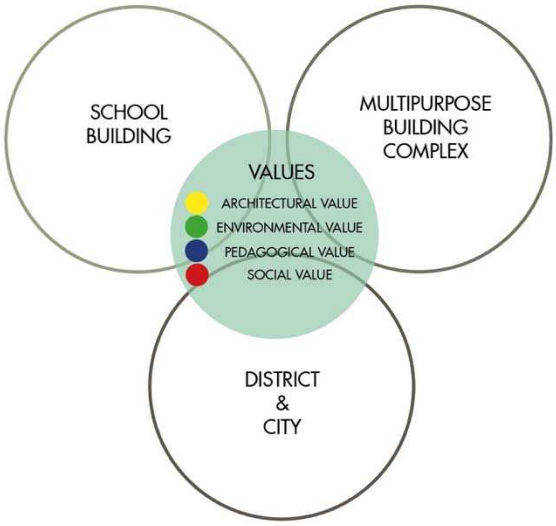


Fig. 5-3 Diagram summarizing the interaction between learning settings and identified values (architectural, environmental, pedagogical, social). (© author's diagrams)

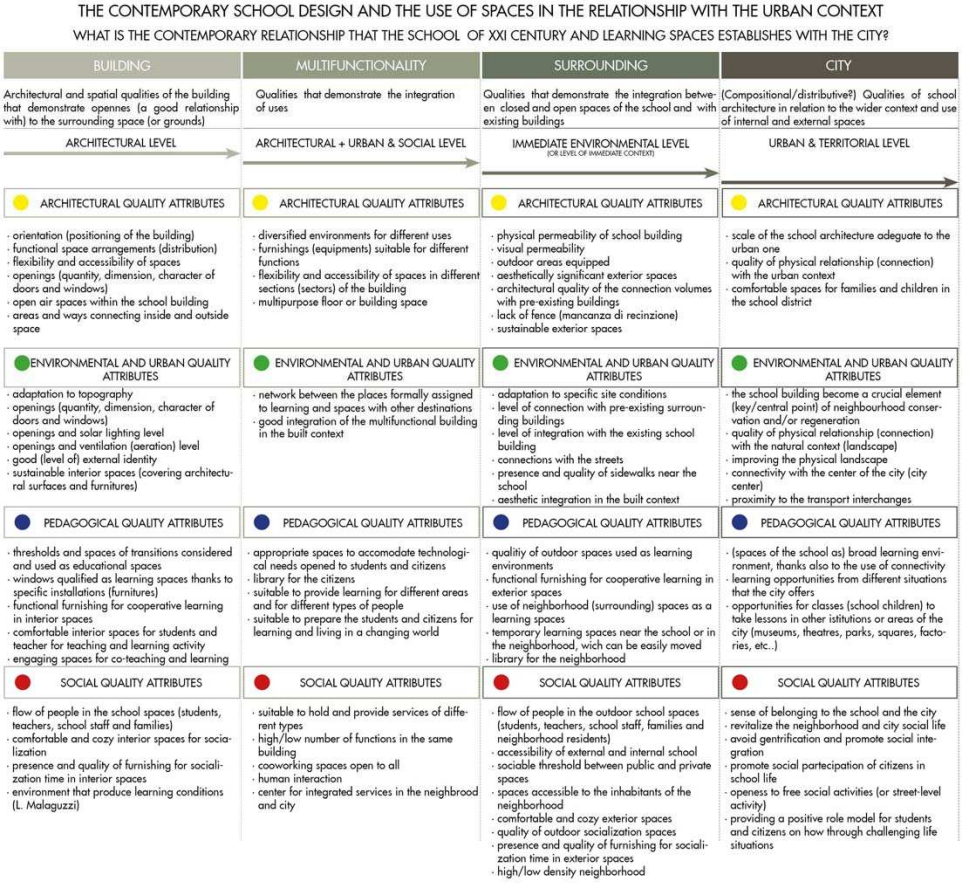


Fig. 5-4 Diagram summarizing the association of values to different learning spaces settings.

5.2. Suggestions for a 21st century schools

The school in the contemporary city must deal with a multiplicity of factors deriving from the cultural and social complexity of the 21st century. The contemporary school is understood as a complex organism inserted in a complex "holistic" system in which scholastic architecture, learning, students, urban context and virtual context should have interact.
Intersecting these themes and studying the peculiar characteristics of European schools in the most advanced contexts, qualitative data have been outlined. The same ones can be considered as possible guidelines for the Italian school design system.

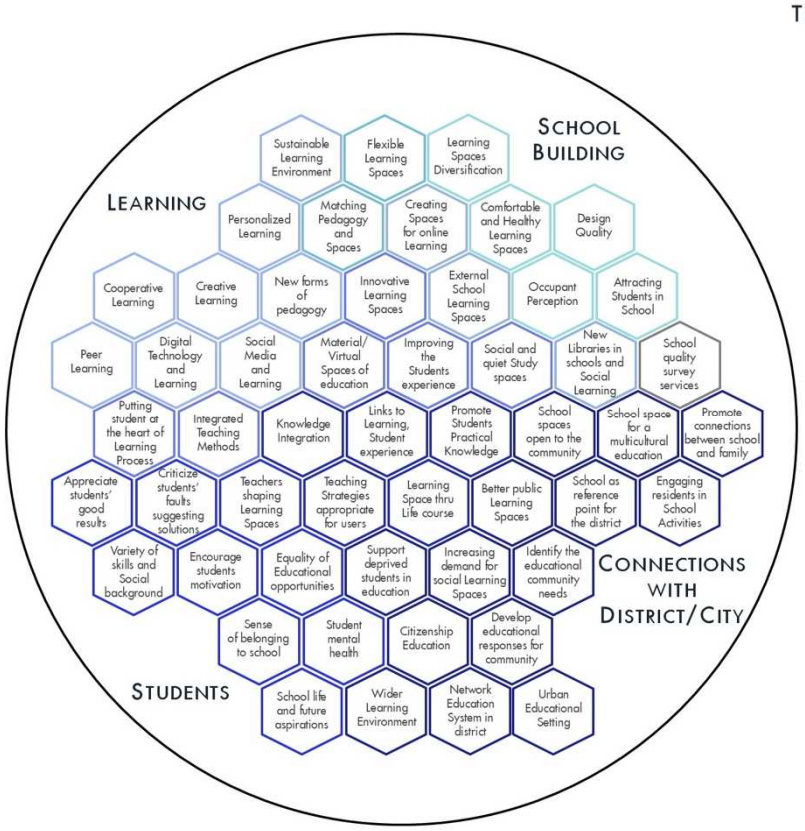


Fig. 5-5 Scheme summarizing main topics related to contemporary concepts of learning school architecture.

Conclusions

Learning is an activity that involves man for the whole course of his life and does not end with the end of the school period. Learning is today linked to the rapidly changing world of work, and it is the indispensable tool for personal interaction and promotion in the age of knowledge.
The idea that architecture can significantly influence the ways of organizing the learning process, the behavior and performance of individuals has long been accepted.
The space, understood as natural and built environment, forms social relations and practices. [Lefebvre, 1991].
Inadequate school architecture can make less welcoming and enjoyable the stay in its spaces and negatively predispose students, interfering with the process of acquiring and processing knowledge. In some cases this can be an obstacle to educational success.
On the other hand, recent literature has shown that new educational space is only one factor for the learning improvement, working as mediator among the relationship and social practices of teaching and learning. [Oblinger, 2006].
The factors that most induce positive effects on student learning are:

- the teaching method and the professional experience of the teacher;
- the school culture and the contexts which influence the teacher's ability to use the components and tools of the various classroom layouts as well.

Therefore, not just the learning spaces and school architecture influence educational practices and the success of the learning process.
Significant factors are the cultural and social context from which the students come. The educational inputs they receive in the family setting, in addition to the cognitive abilities deriving from genetic factors, are crucial elements in the development of their intellectual skills and learning abilities.
Consequently the context, understood as a set of intangible elements (family culture, social culture, the ability of teachers) intersects with a series of tangible elements (school architecture, learning environments, class furnishings, the technological tools, the educational spaces of the neighborhood and the city).
The interaction of all these factors can positively influence the learning process, facilitating and promoting the most suitable educational practices to train the citizens of the 21st century.
The research starts from the critical issues of the current school architecture in Italy, with particular attention to secondary schools, and tries to identify the causes, among which the most relevant are the decrease in the youth population and the consequent drop in investments by the public administration in building new schools.
The contraction of state investments for the construction of secondary schools determines a greater diffusion of redevelopment interventions of the existing, a widespread practice

on Italian territory. The redevelopment of existing school buildings, however, constitutes a constraint on the design of learning spaces in line with innovative pedagogical theories.
To these critical issues are added the inadequacy of the Italian theoretical instrumentation which partially addresses the issue of school design, focusing mainly on technical regulations, without considering the complexity of aspects relating to pedagogy, to the needs of the local communities that use of the school, to the management of the school.
The architecture of secondary schools in Italy had a phase of greater development between the 60s and 80s of the 1900s and the schools still retain those design features typical of the Italian architectural culture of those years, while on the didactic level they show a structure still linked to mainly traditional teaching practices.
Architects alone do not always have the tools to understand the complexity of the teaching and learning process and the dynamics of individuals in certain settings. This means that designers resort to spatial solutions that they know best and are able to manage and process, without having a real awareness of the effects. [Webber L., S., 2009, p.94].
In Italy in the context of school and learning spaces there is an oscillation between the tendency of architects to believe that they can control the project without having a sufficient culture of learning spaces and by pedagogists and teachers not to know the potential for innovative learning spaces and not knowing how to use all the resources.
Some examples of secondary schools built from scratch have been identified in the autonomous province of Bolzano, where in contrast with the rest of Italy, there is an increase in population growth, and where legislative autonomy is practiced regarding the construction of schools and school system management. In the province of Bolzano, advanced regulations have been enacted regarding the design of schools and there are many collaborative practices between designers, pedagogists, educators and students that have led to the construction of innovative schools both on an architectural and learning space level. [Weyland B., Attia S., 2015].
The Italian state, after the competences passed to the Regions and the Provinces, no longer fully dealt with the revision of the regulations relating to the design and management of schools, nor was it able to complete a broad program of architectural and didactic renewal. [Checchi P., Marcetti C., Meringolo P., 2010, p.34].
The need to identify the most advanced models regarding school architecture, educational practices and integration in the local context, led to study the Building School for the Future program and to use three case studies of the vast investment of the United Kingdom to provide some indications for the planning and management of secondary schools in Italy in the 21st century.
Building School for the Future programme it is not just a building program, but a method to institutionalize an organizational and educational model that inspired the design of secondary schools.
The idea of "educational transformation" found in the case studies analyzed in the city of London can be a source of inspiration to review the Italian approach to this topic. Some reservations about the applicability of UK projects to Italian schools are due to the marked difference in the cultural, economic and social contexts of the two countries. The population of the two countries is similar but the UK school population has been expanding especially

in cities so more recent, new schools have been created that may better illustrate contemporary and future concepts of educational needs and the related design of schools. The contemporary Italian school, understood as a broad system in which architecture, learning environments, pedagogy and the different players that attend it come into play today shows today the need to look at more updated European practices, in which the urban and social context are considered an integral part of the system.
The experts of the various disciplinary fields involved in the construction of the school and of the management of the educational practice could identify common points of interests by studying the peculiar characteristics of the European schools in the most advanced contexts, to reinterpret them according to the architectural tradition, habit, pedagogical, social and cultural needs of the current Italian cities.

Future Research Perspectives

This research raises a number of issues which are considered to be relevant for future high school buildings. These are arranged in relation to practice, research and theory implications.

1. IMPLICATION FOR PRACTICE

- Opportunity to draw inspiration from the good practices observed in the schools examined, as well as some purposes set by the Building School for the Future programme, transferring and adapting them to the Italian context.
- Improve the use of the founds available from the "European Regional Development Fund" considering that they are not fully utilized because of lack of projects.
- Provide valid examples of high schools with architectural, environmental qualities, capable of giving valid answers to the current pedagogical and social needs in contemporary contexts, to which Italian architects (or foreign architects operating in the Italian context) and the Ministry of Education, can they be inspired.
- Propose good practices to Italian public institutions involved in education to engage many actors (schools, councils, associations, public and private institutions, cultural bodies) in the process of setting up, planning and running a high school.
- Draw general guidelines for designing 21st century high schools, which concerns some aspects of the architectural and pedagogical project.

2. IMPLICATION FOR RESEARCH

- Development of a conceptual framework on the themes and values that concern the planning and renovation of schools in relation to the urban and social context.
- The thesis explored the equilibrium between architectural and environmental design quality, and pedagogical and social qualities and uses by the school community and the inhabitants of the neighborhood. The limitation of the research examples and of the urban area considered allow to outline a partial framework on school building qualities. Further studies would be opportune in the future.
- To involve in the surveys more people using the schools examined and more people in the districts.
- To extend this research to include a greater number of secondary schools built in recent years, possibly in different geographical contexts, such as those of the Scandinavian countries or the Netherlands. This would allow to have a wider framework of the situation on the relationship between school building quality and contemporary city context.

3. IMPLICATION FOR THEORY

- to reconsider the quality of school architecture and the role that secondary school has in the contemporary city, with a broader view, which includes the multiplicity of inputs that come from the city to the school today.
- High school, designed to train young people who pass from adolescence to adulthood, is now more than ever, a place where educational needs meet social ones, and it is necessary for schools to open up to ever more strategic and interconnected approach to the district's and city's other educational and cultural stakeholders.
- The predominant research approach in the faculties of architecture and engineering in Italy on this topic is partial, mainly concerning aspects of construction, uses and pedagogy. This research tries to outline a conceptual framework of examination of the importance of new school spaces and uses in specific urban contexts and it aims to propose an interdisciplinary approach, including topics such as social sustainability and the school interactions with urban district and city.

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