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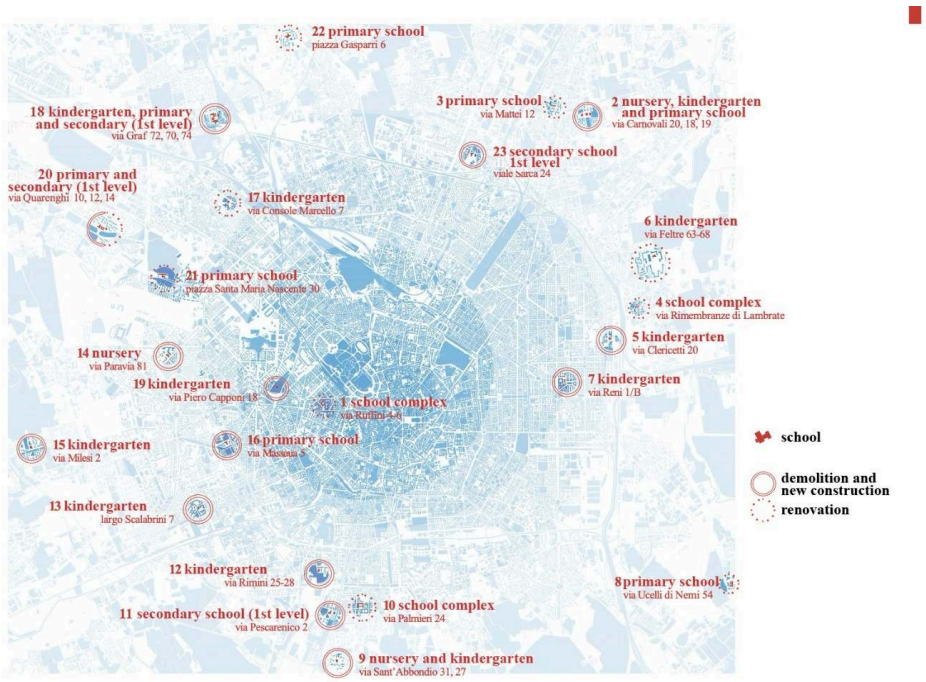
Introduction

1 Education has been a major concern in society, as a key element for sustainable progress,[1] thus leading governments to consider it an important priority for development[2] at all levels: national, regional, and local. As a case study of this approach, the article centres on the programme launched by the Municipality of Milan, which signed a protocol with the Politecnico di Milano's School of Urban Architecture and Construction Engineering (AUIC) to study and to redesign a pilot set of twenty-three obsolete educational facilities in the city (fig. 01). This project goes under the inspirational title, "Inventing Schools: A School as Big as the World," following other examples of programmes aimed at using schools as catalysers and helping to launch urban regeneration processes in the surrounding areas.[3]

Figure 1. Plan of Milan showing all the twenty-three sites included in the programme "Inventing Schools: a School as Big as the World"



Comune di Milano, Area Tecnica Scuole, 2021

2 Our chosen case-study for the second-year bachelor's students design studio was a school facing an urban space: Via Massaua Primary School and Piazzale Tripoli (n. 16 in fig. 01). The school has been deemed to be replaced, and the square is in clear need of requalification (fig. 2). With this, a twofold design goal was set: to reinterpret the school's role in the public space as a community attractor and to create inspirational school spaces for learning, both inside and outside the building.

Figure 2. Present-day photograph of the elementary school in via Massaua showing the currently disbanded and obsolete structure of the school built following rigid past normative regulations

Jana Marinovic, 2021

3 Thus, the article is a post-reflection on the course and its results, aiming to comment on the works of the students within the framework of present-day scholarship on educational architecture. In order to understand the relevance of students' proposals, it seems necessary to explain the organisation of the course. The year-long projects started with a couple-week period centred on urban analysis, after which the students were made aware both of specific requirements for the school in Via Massaua and of the present-day state of scholarship concerning the architecture of educational spaces. This was done by presenting them with the core issues of the national guidelines in Italy, which they were encouraged to interpret by designing new types of spaces. In particular, importance was put on distancing themselves from the "traditional" layout of classrooms and long narrow corridors, and embracing the role of the school as a local community centre, thanks to opening up certain spaces to the neighbourhood, such as the auditorium, the library, and the gym. However, no particular educational model was imposed on the students (discussion of alternative solutions was the aim), and while some mentioned the Montessori method, they were not required to apply it. Indeed, while the design studio had a well-defined structure based on different themes – like urban analysis and design, the school's relationship to the context, and the illustration of the interior and exterior features of architecture – the approach to single designs was student-based, meaning that they were free to follow a chosen design strategy (e.g. based on functional analysis or the formal connection with the context). As a result, the design studio was structured as a 'design by research' process, where the students were able to be creative and required to find new references and case-studies to support their options. To illustrate this process, the article proposes to

comment on a selection of students' designs, which best illustrate these different aspects inside the class.

4 The problem of educational spaces, as presented to the students, stems from a reflection based on the words of educational reformer Ken Robinson,[4] according to whom teachers are like gardeners. Since "plants grow themselves," then what good teachers can do is to create the conditions for learning. Thereby, what role can architecture actually play? Can space really be the "third teacher?"[5] Can architects create better conditions for a good educational process? Throughout the studio, these vital questions were discussed through design with the students, and the proposals we have chosen to illustrate in this article demonstrate their convictions. In order to answer these questions, this article first explains the present-day situation of the schools in Milan, before moving to an analysis of emerging initiatives in relation to school architecture and explaining the background of the selected school site. Second, it assesses the students' proposals against evolving teaching models, including their relationship to the concept of "learning streets," meaning school's interior and exterior spaces promote informal learning, mental wellbeing, green spaces, and shared streets. It then finishes by explaining the role of a school within the local community.

Schools in Milan

5 Most of the schools in Milan were built between 1951 and 1981, which resulted in many schematic and serial proposals. Amongst those built in the 1950s and 1960s, seventy follow a Y-shaped plan, and thirty-two have an L-shaped layout. Later buildings follow similar patterns, elaborating on previous experiences.[6] A typological and normative approach would be connected to the planning policies and regulations from that time. For example, between 1955 and 1960, the city's Design Office paid much more attention to typological studies, structural calculations, and installation innovations than the actual connection with the surrounding area. In addition, from the mid-1960s through the 1970s, the national regulations based on urban standards reinforced the serial and typological approach to school design. In fact, for the first time, technical regulations for school buildings dating from 1975[7] included indexes for teaching functions, buildings, and urban rules to be respected in new school buildings. The very systematic and normative-based character of these regulations tended to diminish the flexibility of spaces, while still putting emphasis on the concept of the typical 'classroom' or '*sezione*.' Therefore, it resulted in spaces struggling to adapt to new teaching models and to new, more 'open' uses of a school, as will be further discussed in this article. In addition, this set of rules did not relate to efficiency and sustainability (concepts not even discussed at the time), and only more recently, in the Ministry of Education's 2013 Guidelines,[8] were these aspects included in an official document for school design; which gives less importance to indexes and required surfaces, and addresses basic notions of energy saving and production, building efficiency, and new teaching approaches. These guidelines define not only spaces for school activities, but also material and technological aspects, along with considerations related to these issues, such as adaptable furniture and the relationship of the school with the city.

6 As a result of the legal frame from the 1970s, most of the schools in Milan are limited by functional rigidity, seriality, and energy inefficiency, nowadays requiring significant interventions in order to modernise and improve interior spaces, keep the facilities up

to date for new school activities, and decrease both the consumption of energy and pollution emissions. In particular, difficulties emerging from the management of school activities during the Covid-19 pandemic have highlighted the need to rethink school spaces, in order to respond actively to unexpected events that require spatial flexibility, alternative circulation flows and, at the same time, the need to have open-air spaces available for recreational and educational functions.[9] In fact, according to official data, although 200 out of 265 schools have a garden,[10] there are very few or no open-air spaces for learning in certain school complexes, a reality which led the city to launch several initiatives. This includes the programme "Inventing Schools," which intended to generate new concepts of layouts for educational spaces and to create a better balance between interior and exterior spaces, among other principles.

From "Open Schools" to "Inventing Schools"

7 It is worth mentioning two of these initiatives, "Open Schools" and "1+4 Model," as they had a visible impact on the content of the course. The former, promoted by the Municipality of Milan, was born to transform a school into a social reference and catalyst at the local scale, to be used and lived not only during school hours, but also afterwards as a local community centre.[11] Following the recent scholarship, it means that a school would go "beyond the boundaries of the building, establishing synergies between school life and city life, and competing in a system of services on an urban scale and become, when possible, a visual and civil fulcrum ."[12] Such an idea of considering schools as central points within community life, able to take the role of a civic centre open to the neighbourhood and to the city, was passed on to the students throughout tutorials during the year, which resulted in most of the projects explicitly having a community-related part, as will be illustrated later. The second of these initiatives, the "1+4 Model," has been developed by the Istituto Nazionale Documentazione Innovazione Ricerca Educativa (INDIRE)[13] since 2016. Its aim is to renew schools through the development of flexible, multifunctional, modular, and configurable solutions according to the needs of students and teachers, so as to favour the concentration and active involvement of the student, as well as cooperation and the feeling of well-being.[14] A school should then be designed using different types of spaces, including a polyfunctional group learning space, which can be considered as an evolved traditional classroom; that is, a space where pupils can meet up and build their own identities through creating and presenting both individual and group works, as well as collaborating and discussing. In addition, the model includes a common informal space for the entire school community. The very idea of reversing the organisation of a school from the typical classroom outwards can be therefore connected with the concept of "learning streets," where the distribution spaces are similar to this common informal space.

8 Based on these initiatives, the "Inventing Schools: A School as Big as the World" programme, directly connected to the course's curriculum, continues to move in the same direction. It was established in 2021 by the Administration of Milan, with the goal of taking concrete action on the redevelopment or reconstruction of twenty-three schools, equal to approximately 9% of the total number of schools in the city.[15] For that purpose, the Municipality has celebrated a protocol ("contract of applied pedagogy") with the School AUIC of Politecnico di Milano, to develop design proposals for new

kindergartens, primary and secondary schools in the city.[16] The idea of such a 'school contract' emerges from positive experiences in other cities, such as Brussels, where a similar urban regeneration programme aimed to improve the educational environment and to strengthen the relation between a school and its surrounding community.[17] Some of the schools are to be renovated through technical interventions (e.g. ventilated facades), but others need to be completely redesigned as Nearly Zero Energy Buildings (NZEBs).[18] Moreover, in the future, schools must be able to attract and offer services of public interest to citizens, taking on a new role as catalysts for public activities and becoming community centres – therefore making a direct reference to the "Open Schools" initiative. Thus, schools must be able to offer spaces and buildings suitable for public functions, which is not the case today in Milan. A significant inadequacy of spaces and functions exists: only 34% have an auditorium, 45% have a gym with an external access, 7.5% have outdoor sports fields, and 2.2% have a swimming pool.[19] This shows that the school buildings of Milan should be revised and redesigned, as they do not reflect the idea of attracting local communities.

9 These objectives could also be aligned with the ongoing project "Futura,"[20] including a new set of guidelines to design or redesign schools that will be financed by the Italian Government using the Recovery and Resilience Plan (RRP) funds, considering – among others – the principles of quality (understood as a condition to improve learning and as a recognizable sign for the community); a close relationship with the local community and the outdoor spaces; and better learning through aligning the design with the new pedagogical models (besides sustainability, low consumption, and accessibility goals). Such an overlap of ideas makes it clear that both the "Inventing Schools" programme and the design studio activity are tightly connected to new trends in educational architecture; the latter aiming to give the students a similar task to that of designers renewing the schools included in the "Futura" project. Reflecting on how to create new spaces where new generations can experience a new form of education, the programme "Inventing Schools" links the design of the new schools to the needs of the students, teachers, parents, and the community, especially in terms of the capacity for building new relationships between schools and urban spaces, contemporary functional and teaching needs, as well as outdoor teaching. Another important goal to achieve – and a central argument to the design studio – is to interpret the role of a school as a community centre open to the neighbourhood, and a fundamental point of interest within the urban social context.[21] This means schools need a strong relationship with nearby public spaces, offering extra-schooling activities in flexible and usable buildings for a range of different functions. The goals of both the "Inventing Schools" programme and of the design studio are to create innovative spaces able to improve the quality of education, in order to reimagine new schools focused on students' needs and interests, and also respond to the working needs of teachers and staff.[22] To do that, many aspects must be considered: general planning choices, volume and form of the buildings, relation between architectural and pedagogical aspects, accesses and paths, organisation of interior and exterior spaces, sustainability, resilience and life cycle.[23] Students were thus required to start the design process with a brief urban analysis of the neighbourhood, to get a basic understanding and perception of the area. This allowed them to develop a master plan and create new relationships between the school building, the surrounding public spaces, and the existing buildings. As a result, some groups were led to create a strategy of a larger network of paths, pavements and

green spaces, spreading from the school towards the neighbourhood, as in the case of Dediulia-Foissard-Valla (fig. 03).

Figure 3. Students: Dediulia-Foissard-Valla, masterplan of the design proposal showing the importance of the integration of the school plot in a larger network of public and green areas

Sofia Dediulia, Clara Foissard, Chloé Valla, 2022

Piazzale Tripoli and the Neighbourhood

10 Within the "Inventing Schools" programme, one of the buildings indicated for complete reconstruction is the primary school in Via Massaua. It is located adjacent to Piazzale Tripoli, and just next to several of Milan's second fastest-flowing bypass avenues, which generate a physical barrier and divide the public space. Therefore, the design of a new school requires a reconsideration for its role in the neighbourhood and the surrounding urban flow.

11 Piazzale Tripoli faces the school, and is close to the border between the urban expansion determined by the Beruto Plan and the one defined by the Masera Plan, in an area limited on the east side by Viale Misurata, one of the bypass avenues. Its other limits are defined by Viale Caterina da Forlì on the north side (separating it from the school plot), by a double system of roads with side parking areas on the west side, and by a double system of closed roads towards Viale Misurata on the south side. Surrounded by heavily used vehicular arteries, the square needs interventions favouring the creation of liveable public space that is more sustainable and accessible for the local community. The existing roads and parking lots prevent the perception of Piazzale Tripoli as a unitary element, entirely accessible without obstacles. The connection between the school plot and the square requires a solution that allows safe access to the school entrance and a more direct connection between the school building and the public space. This is an urban design issue that will be discussed in further detail ahead.

12 One of the two streets on the south side has been a subject of the "Open Squares"[24] programme, through which the Municipality of Milan intends to redevelop urban spaces currently used for transit or parking areas into new public spaces able to promote social interactions in neighbourhoods that do not have adequate available public outdoor spaces.[25] This road has recently been closed to traffic through a 'tactical urban planning' intervention, thanks to which ping-pong tables, benches, picnic tables, and other urban furniture have been introduced to improve the usability of the public space.[26] An important pavement art intervention also took place, for which a tender was financed and carried out by the local municipality, and won by the creative, artistic and cultural production studio, Artkademy. The artwork was done by the artist SMOE, who developed the portrait of a little girl based upon the work of Gianni Rodari *Favole al telefono*, a tribute to the educator and childhood.[27] This new direction of improvements for an area historically heavily impacted by high-flow traffic suggests an important change in the social and urban relations within the area. This change of perspective must continue, and it must be focused on greater attention with regard to pedestrians and cyclists, along with the use of shared spaces. In the following sections, both of these issues will be related to the existing teaching models and wellbeing concepts.

The New European Bauhaus

13 As already mentioned, the programme "Inventing Schools" inscribes itself in a larger context of design policies and new pedagogy models of broader influence; such as the Sustainable Development Goals (SDG-4),[28] a call for action promoted by the United Nations towards the 2030 Agenda for Sustainable Development or, more recently, the New European Bauhaus (NEB), launched in November 2021 by the European Commission. The NEB project is an ongoing initiative aimed at changing perspectives, challenging the established schemes, and promoting interdisciplinary approaches in the context of education. This holistic approach suggested by NEB aims to unite artists, scientists, and professionals from different disciplines, while promoting the participation of the community.[29] The reference to Bauhaus is thus a demanding challenge to respond to the present-day crisis and contribute to the foundation of new living and teaching models. Spaces for learning and teaching are of vital importance here, as they contribute to the formation of new generations at an early age. Therefore, educational architecture as "the litmus paper" of its own time creates spaces which shape the minds and the lives of new generations. A reflection on these spaces is therefore tightly linked to the core of both the SDG and the NEB, the latter including a range of different initiatives, amongst which some concentrate on revising the learning and teaching models, such as the role of the physical space used to learn, the relation to the community, and the new ways of learning.[30]

14 The fact of building and improving schools is indeed considered a mark of prosperity and innovation.[31] The present-day tendencies defining architecture for pedagogy aim to innovate not only teaching methods, but also spaces for teaching and the very design process of educational buildings. All of these three aspects (methods, spaces, and processes) can contribute to the new challenges defined by the NEB.

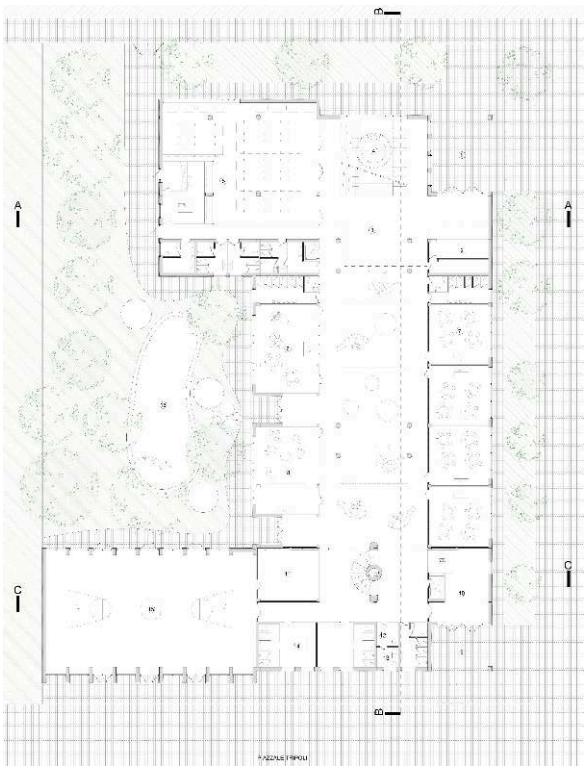
New Paths for Pedagogy and “Learning Streets”

15 The renewal of teaching and learning methods is perhaps the most historically well documented amongst these three aspects, as it can easily relate to the teaching models which have been defined throughout the twentieth century and that have only recently attracted more widespread attention, such as the ideas by Giuseppina Pizzigoni or Maria Montessori.[32] Both were Italian pedagogists who aimed to move away from the ‘traditional’ teaching approach based on verbal and mnemonic exercises, and towards more creative and practical processes. In particular, Pizzigoni claimed that practice, psycho-physical development, and personality must not be neglected as they have been in the ‘traditional’ approach.[33] At the same time, the Montessori Method is based on the basic assumption that a child is a “complete being, capable of developing creative forces and moral attitudes,” which remain hidden in adult consciousness.[34] The basic principle of Montessori education is thus the liberty of pupils, the only situation that enables them to freely express their imagination and creative force. This method combines physical education with creative and mental exercises, which eventually should lead the child to be disciplined. Even though the ideas expressed by both pedagogists are more than one-century-old, these ideas still reverberate in present-day educational reforms. For example, the so-called “Reggio approach,” based on the educational reforms in the Italian city of Reggio Emilia, emphasizes the importance of common spaces and practical activities, which create a “working community”[35] – a model, which can be traced back both to Pizzigoni and Bauhaus. As a result, some groups in our design studio explicitly dwelled into this intellectual heritage and studied the school design with these learning models in mind.

16 The importance given to children’s imagination and creativity connects these theories to the surge in new educational architecture models developed amongst Team 10 architects, such as Dutch designers Aldo van Eyck and Herman Hertzberger.[36] In their understanding, space can be “the third teacher,” as it was called by Italian pedagogue Loris Malaguzzi.[37] In their work, one can see that a school as a space itself can stimulate children through the organisation and articulation of its interiors, and through its possibilities to adapt to the needs of teaching and learning. One can, for example, relate to Hertzberger’s suggestions on the layout of corridors and shared spaces in a school, forming a network of spaces as “learning streets” at the interior of buildings, which he underlined by stating, “at the end of the day, education, besides being about reading, writing, and arithmetic, is about exploring the world.”[38] This is clear when looking for examples in the “1+4 Model,” which gives much importance to what formerly was a mere distribution space (even though it does not mention the actual term coined by Hertzberger).[39] In fact, following this idea, some projects did include more ‘public dominion’ areas promoting exchange between students, which take the spatial features of a square or ‘public’ areas also present in a number of Alvar Aalto’s buildings. As the former explains, “the higher a space, the more it evokes a sense of community and public space.”[40] In fact, as in the work of Fabietti-Fernandes-Glukhova (fig. 4, 5) and Mariani-Pietropaolo-Zordan (fig. 6), for example, the central school area with skylights and multiple height levels takes the role of a public space, which favours exchanges between students as peers. The concept of “learning streets” as interior spaces of schools used as informal spaces for learning, such as circulation spaces and social areas, corresponds to a merging of the inherent goals of the other pedagogic models and

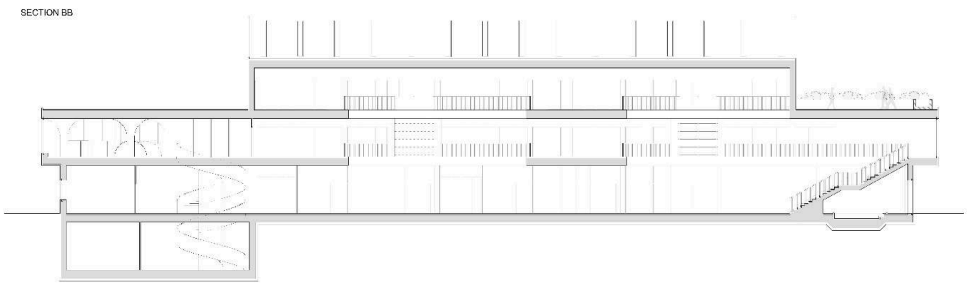
theories, always revolving around the child's autonomy and capacity to self-learn. In particular, the corridor, which would traditionally link the classrooms together, can become an open space, with a range of semi-private areas that enable the students to learn from each other. Such 'group work' areas or 'playing corners' within the main distribution area are vital to guaranteeing the school's successful functioning: they favour exchange in smaller groups of friends and peers. At the same time, more private areas next to the classrooms and the last level, in the latter of these two designs, enable the students to have their 'own' space, reproposing within the school itself the same logic as in a city. Indeed, even though the tendency to give more importance to the communal spaces of exchange has been confirmed by new regulations and studies, the role of more 'private' spaces within a school is still necessary.[41] According to Hertzberger, "a blurring of identities means that there is nothing left to exchange,"[42] which is why the designs, although recognising the importance of informal learning, included single classrooms that students would be able to define as 'their own.'

Figure 4. Students: Fabietti-Fernandes-Glukhova, school ground floor plan showing the central common space intended for exchange of experiences and informal learning



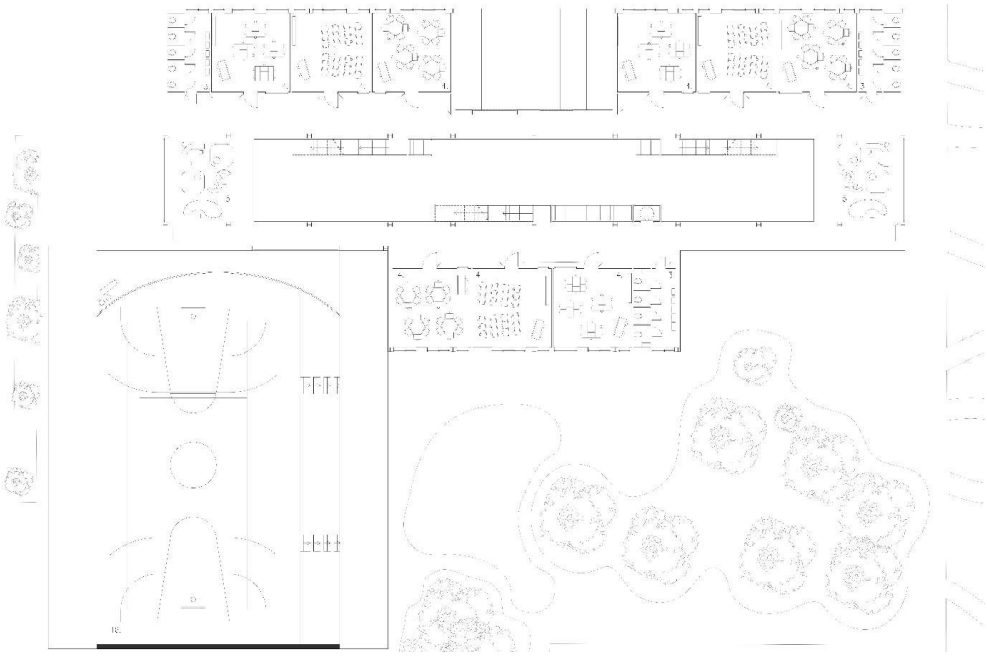
Davide Fabietti, Tayana Fernandes, Alexandra Glukhova, 2022

Figure 5. Students: Fabietti-Fernandes-Glukhova, section of the central common space intended for exchange of experiences and informal learning



Davide Fabietti, Tayana Fernandes, Alexandra Glukhova, 2022

Figure 6. Students: Mariani-Pietropaolo-Zordan, school first floor plan showing the multi-level common space as the central area of the school around which all the classrooms and ateliers are located

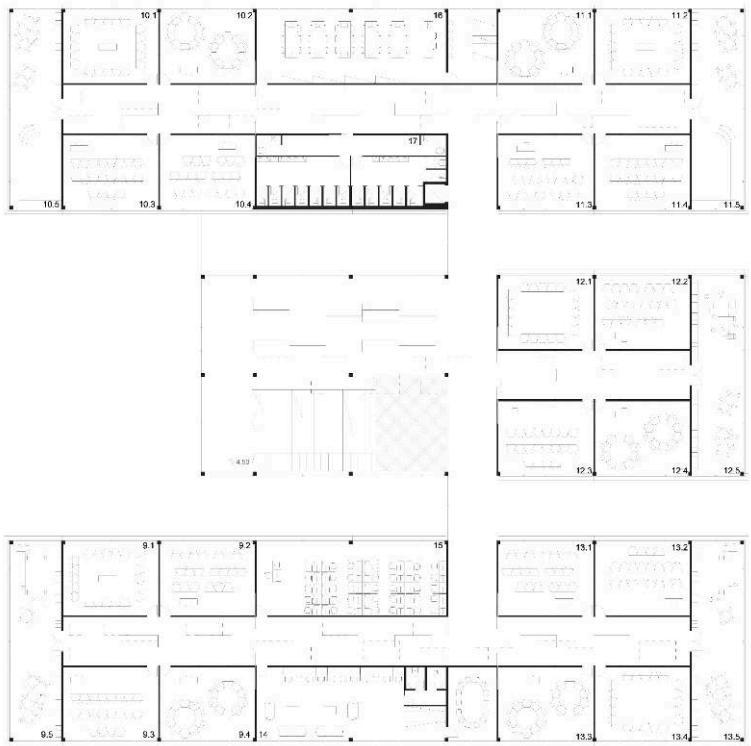


Sara Mariani, Marco Pietropaolo, Francesco Zordan, 2022

17 Building on these ideas, it has been agreed upon more recently that the right spatial articulation in schools offers the opportunity for hosting different activities.[43] In fact, today, we move away from the concept of "classroom" towards the concept of "learning space."[44] This tendency was also well perceived by the students, who felt the need to study a typical classroom in detail: in many cases they include the possibility of merging and dividing spaces (Marinovic-Pagliarello-Veneziani, fig. 7), and articulating the learning area into zones that can host different activities. The study of a typical classroom often included attempts to use different furniture, which would contribute to the innovative aspect of the teaching and learning process, although the reflection on the teaching model was not always developed and this research remained a 'formal game' for some groups. In addition to redefining these aspects, the most recent guidelines for educational architecture[45] tend to draft classrooms as less important compared to common spaces, where children can exchange, spend time together, and

learn from each other. The importance of common areas, such as large corridors, halls, open libraries, courtyards, and *agoras*, has been gradually growing, and has today become the new normality for a school. Their importance relies on the fact that learning does not occur only in a top-down process based on the teachers' activities, but also horizontally amongst peers. Through different interactions, exchanging experiences, and playing together, children can also learn in a less formal manner.[46] This was acknowledged by a number of groups, as the common areas represented an important aspect of many designs, as in the case of Mariani-Pietropaolo-Zordan (fig. 6) and Fabietti-Fernandes-Glukhova (fig. 4, 5) with a long multi-height central space.

Figure 7. Students: Marinovic-Pagliarello-Veneziani, school first floor plan showing the regular organisation of classrooms with a layout giving the possibility of wall divisions removal between classrooms enabling more flexible use and larger group activities



Jana Marinovic, Matteo Pagliarello, Sofia Veneziani, 2022

18 The importance of the school as a social space for children has been made crystal clear by the weaknesses of distant learning methods during the Covid-19 pandemic. Children need a place to meet, to socialise, and to learn about diversity: a school should guarantee that. This idea was clearly expressed by van Eyck: "what the child needs is what we need – just that: places where we can be what we really are."[47] Openness, inclusivity, freedom – all of these can be read in a sentence dating back to 1962. With this simple 'rule of thumb,' van Eyck stresses the fact that the space where children spend their time is of extreme importance, not only for their education, but also for their future lives. This very idea led many groups in their designs, which will be discussed later.

19 However, in the process of school architecture renewal, the focus is not only on the product, but on the process as well. It has been noted, "there is no model of an ideal

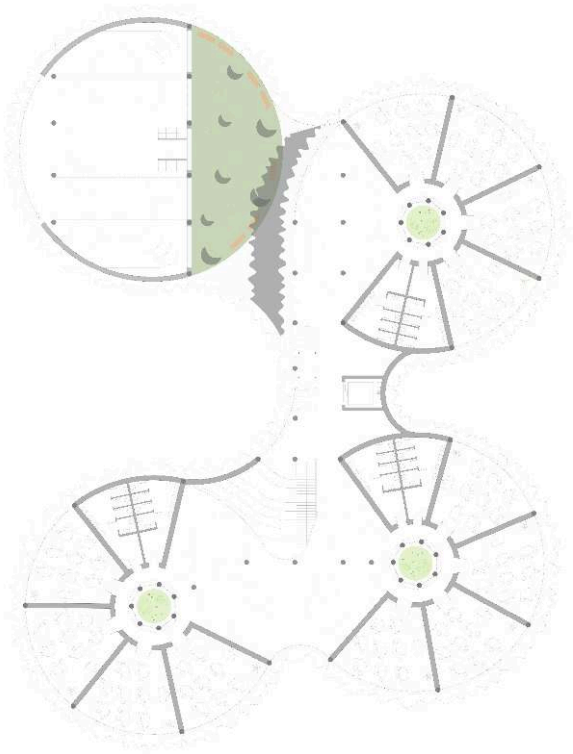
school, but there are tools and methods that let us listen to the [children's] needs and wishes, to decode their words and to confront them with those coming from the teachers and parents."[48] This suggestion in the recent study for the renewal of Italian school architecture gives much more importance to the complexity of the design process, stressing that a given school can answer the needs of a given community only in this manner. For example, the recent studies and school projects led by Beate Weyland involved the local community (teachers, parents, and children) in the process of designing new schools in the Province of Bolzano in Italy.[49] Through this participative design model, she claimed, school architecture moved closer to the actual needs of both educators and children. However, whereas this aspect is indeed of great importance in practice, its limits when applied to teaching architectural design at the time of the pandemic will be discussed in the following sections.

From Mental Wellbeing to Green Spaces

20 The importance granted to new models for educational spaces is also closely linked to the interest in mental wellbeing. Along with the growing importance given to different senses called for by designers, such as the Finnish architect Juhani Pallasmaa,[50] new studies have emerged showing that not only does mental health influence the appreciation of a space, but also children's capacity to learn. An extensive survey of various scientific publications led by the British Government Office for Science pointed to several aspects which impact mental health, such as acoustics, spatial organisation, access to green areas, and safety. A range of proposals in the students' works relate to these issues, attempting to engage with them in order to create a friendlier learning environment.[51]

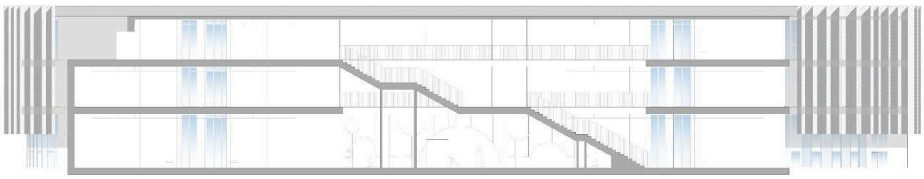
21 Noise is amongst the most negative factors, which can impair mental health and, by extension, the resistance to stress and illness.[52] In the case of the area around Piazzale Tripoli, traffic-related noise was one of the issues tackled by some of the groups. For example, Dediulia-Foissard-Valla worked on the morphology of green areas in order to create natural visual and acoustic screens, separating both the school and the square from the most jammed streets. However, in the context of the school's interiors, only a handful of groups made sound-related considerations, such as the suspended acoustic ceiling proposed by Bozushka-Colacion-Faccin (fig. 8, 9), or in the acoustic solution for the auditorium proposed by Dong-Sayin-Usta. In other cases, on the contrary, extensive glass surfaces could create reverberation that would amplify unwanted ambient noises, especially during the breaks.

Figure 8. Students: Bozushka-Colacion-Faccin, school first floor plan showing the central learning street connecting interior and exterior spaces, classrooms organized around inner courtyards, and the acoustic suspended ceilings



Kamelia Bozushka, Rachelle Colacion, Giulia Faccin, 2022

Figure 9. Students: Bozushka-Colacion-Faccin, section of the school building showing the shading solution for the elevations, the suspended ceilings for acoustic performance and the central stairs connecting the communal spaces



Kamelia Bozushka, Rachelle Colacion, Giulia Faccin, 2022

22 In relation to mental wellbeing, the question of spatial organisation was addressed more clearly by the students in a manner that prevents alienation and promotes wayfinding, which is not only beneficial for the proper use of the building, but also for the mental health of its users.[53] The importance of this aspect in many designs can be seen in the clarity of the layout. For example, Banda-Banog-Cortorreal organised the school along a straight communication axis, which serves not only as an enclosed corridor on the upper floor, but also as a true school's fulcrum on both levels: a social catalyst, which offers spaces for pupils to sit and spend time (fig. 10).

Figure 10. Students: Banda-Banog-Cortorreal, ground floor plan of the school site showing the connection between the site and the nearby public square reinforcing the role of the community facilities within the school and strengthening school's role as a social catalyser. Hovering above the organic path, a straight communal hall connects the different volumes of the educational community

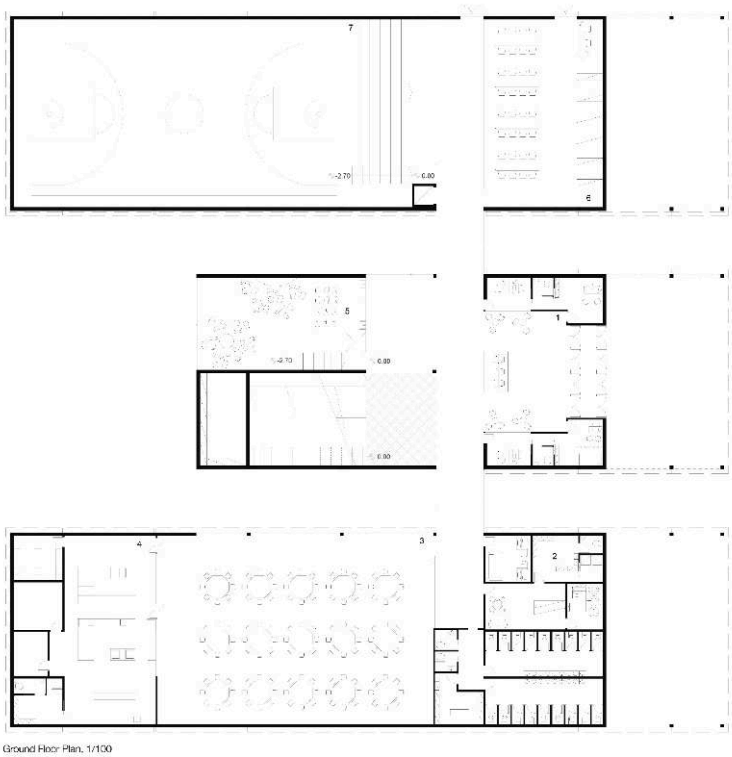
Mateo Banda, Herbert Banog, Jose Cortorreal Aquino, 2022

23 However, amongst the different aspects identified by the above-mentioned study, much more attention was given to both safety-related questions and the connection with green spaces across the entire design studio, both of which contribute to improving the mental wellbeing of users. Not only in the educational context, but in general, visual and physical proximity to green areas has been proven to be a relevant factor in improving mental and physical wellbeing, thanks to the capacity to mitigate air and noise pollution and to regulate temperature.[54] In addition, the positive impact of living close to green areas has been claimed to improve the possibility to "manage major life issues" for the city's population, thanks to stress reduction.[55] In the more detailed context of educational architecture, through a structured review of academic research on the impact of green spaces on the results of pupils, it has been proven that simple facts, such as the presence of trees next to the school and views of greenery from the school's windows, could improve academic performance in terms of exams and grades.[56] Moreover, the possibility of teaching outdoors[57] – which became further developed during the pandemic – proves to be a beneficial factor in the learning process, which can improve not only the results, but also the students' genuine interest.[58] Interestingly, most research proving these conclusions is based on qualitative methods, such as observation,[59] which can genuinely indicate that awareness of the positive impact of the green areas naturally comes to one's mind.

24 Arguably, it was one of the reasons why these aspects were addressed in most of the designs: students first looked at the connection with the outdoor spaces and, in particular, with Piazzale Tripoli (which was a major design assignment requirement). Many groups wanted to provide open-air areas for learning within the school, making use of the plot area and introducing green roofs to their designs. For example,

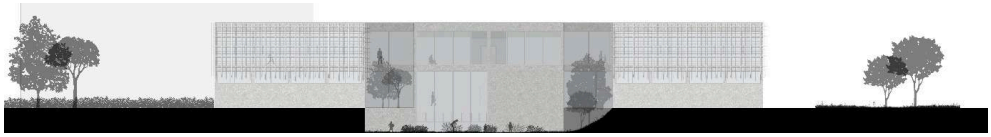
Marinovic-Pagliarello-Veneziani included a recessed garden in their design, which remains a central area, easily accessible from the art studio and visually perceived from many classrooms (fig. 11, 12). Similarly, Bozushka-Colacion-Faccin (fig. 9) and Dediulia-Foissard-Valla (fig. 13) included accessible roof garden areas and ground level landscaping, which – even though they need more developed research into their spatial definition – testifies the need to guarantee a close contact between pupils and nature. All of these areas were thought of as possible outdoor learning spaces, where children could not only attend lessons, but also learn more about and interact with the surrounding nature and environment. In addition, in many cases, the layout of the surrounding streets and open areas was modified to provide a better connection between the school and the nearby park, with no need of crossing a heavily used street. For example, Celli-Guven-Pilia focused on creating a green and accessible park area in the northern part of the square, moving most of the traffic south, and creating a much more direct connection between the school and the green area – at present separated by Viale Caterina da Forlì. Clearly, these groups were stating the willingness to create a tangible connection between the school and nature, which proves that none of their decisions were random.

Figure 11. Students: Marinovic-Pagliarello-Veneziani, school ground floor plan showing the community facilities and the entrance to the school



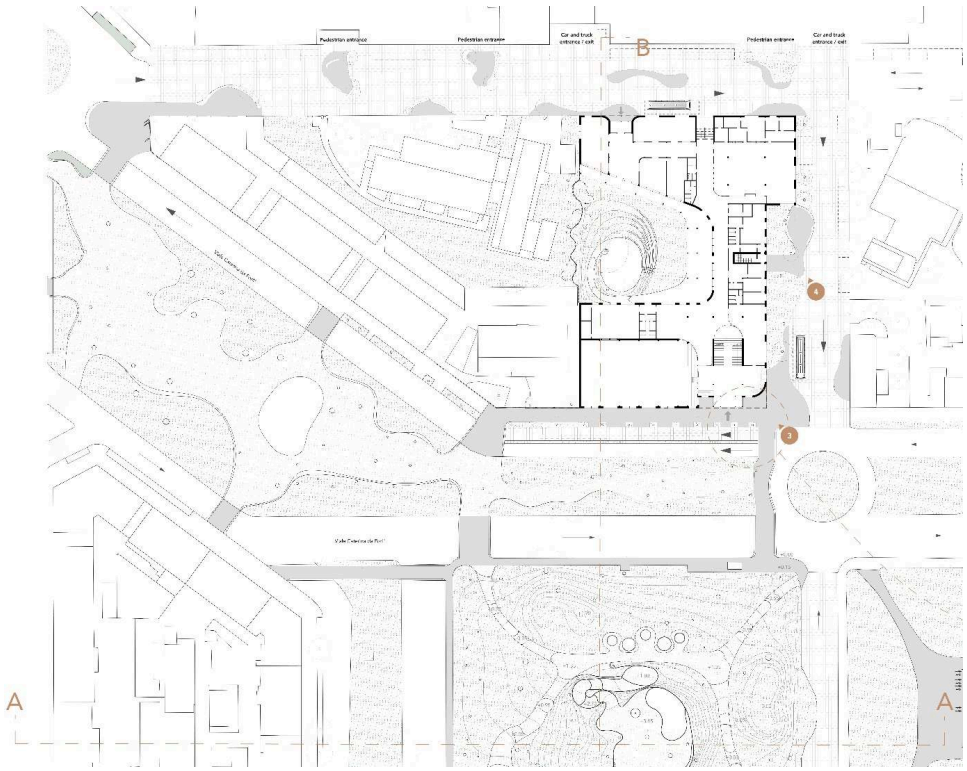
Jana Marinovic, Matteo Pagliarello, Sofia Veneziani, 2022

Figure 12. Students: Marinovic-Pagliarello-Veneziani, inner courtyard elevation showing the garden area directly related to the glassed art studios



Jana Marinovic, Matteo Pagliarello, Sofia Veneziani, 2022

Figure 13. Students: Dediulia-Foissard-Valla, site ground floor plan showing both the concept of shared streets around the school plot and the importance of landscaping in creating spaces for social interaction



Sofia Dediulia, Clara Foissard, Chloé Valla, 202

Safety and Shared Streets

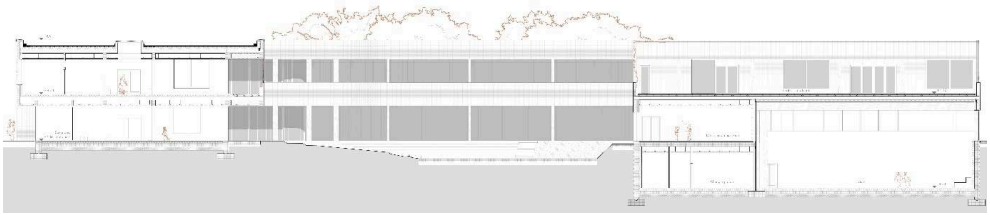
25 Whereas the different aspects of the issues related to safety within the school enable us to later move the discussion forward, it seems natural to first consider traffic-related questions, which impacted the design decisions of many groups. The present-day situation, with Viale Caterina da Forlì as a heavily used street acting as one of the accesses towards the city centre of Milan, along with the axis Via Sandro Pertini-Via Ferruccio Parri-Via Zurigo-Via Berna-Viale Legioni Romane, puts the school in a position of moderate risk. Even if the main street is divided into two lanes with a green area in the middle, the heavy traffic during rush hours can pose a risk, as it coincides with the time of the beginning of the day's classes. This needs to be taken into consideration when planning a space for the school bus stop and when positioning the main entrance. As a result, in the first phase of the design, several groups considered a

revision of the traffic layout of the surrounding area. Based on the analysis of the traffic intensity and of the existing public transport network, new proposals were given, most of them referring to the concept of shared streets.[60]

26 The theme emerged in the study *Traffic in Towns* from 1963, redacted by the British Ministry of Transport as a reversal of the modernist architecture and planning-influenced separation of different types of traffic.[61] The modernist approach, still visible in cities such as Chandigarh and Brasilia, makes cities car-based, due to large distances and zoning. Le Corbusier explicitly suggests that traffic should be divided according to a systematic categorisation of streets into seven types.[62] Differently from this standardised approach common to CIAM urbanism, *Traffic in Towns* reintroduced the idea of mixed-use streets and limited traffic zones in city centres, opening towards the possibility of streets shared between vehicles and pedestrians (stating, "up to a point, a mixture of pedestrians and vehicles is not seriously harmful").[63] The concept was first applied in the Dutch Woonerven, shared residential streets, which not only brought pedestrian and vehicle traffic together, but gave more importance to on-foot traffic after years of planning being dominated by vehicles. Based on these premises, shared streets started to be defined by the lack of clearly identified spaces for car lanes, parking places, and pedestrians; by a much slower and less intense vehicle traffic; by giving the priority to the pedestrians; and by urban furniture and the general streetscape encouraging socialising and using the space.[64]

27 The sum of these aspects contributes positively to the safety of an area surrounding a school, and could thus explain the popularity of shared streets amongst the students' proposals. In most cases, it meant that the immediate surroundings of the school were to become shared space. Depending on the location of the main school entrance, it would be either Via Massaua (as in Di Giacomo-Macaluso-Piatti design, fig. 15), Via Mogadiscio (as in Marinovic-Pagliarello-Veneziani design, fig. 11) or Viale Caterina da Forlì. Especially in the latter solution, it is necessary to consider the implications for traffic of such a decision. As it has been pointed out,[65] design of a shared street combines transport engineering, city planning, and urban design. The students thus needed to consider these aspects so that their proposals were not only viable with regard to the school and urban design, but also regarding daily traffic. Lack of such a consideration led to some groups being "seduced" by the idea of shared streets without proper understanding of the different-scales of implications. For example, in some proposals, Viale Caterina da Forlì continues to act as an important traffic axis, but it is also a shared street, which would clearly lead to problems during rush hours. Errors in such an approach have been explained in the study for Naples, which concluded that introducing a shared street without traffic restrictions would result in a lower quality of the surrounding soundscape.[66] In other cases, however, the idea of shared street has been well developed, enabling a stronger link to be created between the school and the surrounding areas – in most cases, Piazzale Tripoli. With the use of elements typical of shared streets, providing the opportunity to stop, to sit, and to spend time, in some of the proposals (as in the work of Dediulia-Foissard-Valla) it is possible to see the basis of liveable spaces explained by Danish urban planner Jan Gehl in his studies (fig. 14).[67] All of these elements contributing to the liveability of these public and shared spaces not only increase their attractiveness, but also decrease danger related to intense traffic.

Figure 14. Students: Dediulia-Foissard-Valla, inner courtyard section showing the importance of landscaping in creating a common outdoor space as an extension for the school' social life



Sofia Dediulia, Clara Foissard, Chloé Valla, 2022

School as a Community Centre

28 However, the question of safety is not only linked to the design and management of the public and shared areas, but naturally leads the discussion towards the inherent conflict between risk and overprotection. On the one hand, it needs to relate to parents' expectations and to teachers' ability to manage pupils, and on the other hand, it is necessary to give enough liberty for the children not to be isolated from what is behind the school's walls.[68] In the first place, it means that the school area needs to be clearly defined, with limited public access to it. At the same time, the importance of the publicly available functions within the school, and a close relationship with the neighbouring urban context has been of crucial importance to the Municipality (as it was part of the protocol signed by Politecnico di Milano), and has been a core argument for many design reviews with several groups. The importance of this aspect comes from the present-day situation where most of the schools do not have any sports or cultural facilities, which could be made accessible to the local communities. This stems from the previous public policy for schools, from an era when school design was based on the concept of 'classroom,' and spaces were conceived as an answer to quite a rigid functional model (dating from the 1975 Ministry Guidelines),[69] and when the relationship with the social urban context was not amongst the design's priorities. In fact, the functional mindset in many designs does not allow them to easily adapt to the changing teaching models and practices, to introduce new activities, or to integrate the existing activities with outdoor teaching. Moreover, as most school buildings are located within a dense urban context, there is no space available for them to expand and include new facilities to be shared between schools and neighbouring communities. Because of that, most of the old schools are unavoidably 'cut out' from their local context and cannot attract external users. In fact, only 90 out of 265 schools in Milan have an auditorium, and only 119 out of 265 schools have a gymnasium that is also accessible from the outside. Nevertheless, students were challenged to do this within the existing plot boundaries, their new school designs considering the flexibility of use of three school spaces (library, gym, and auditorium) as facilities open to the community after school hours and over the weekends.

29 This broader issue, common to many schools within the city, has been amongst one of the reasons for launching the already mentioned programme "Open Schools." In fact, it is claimed to reinforce "the founding principle of the community," by transforming each school in the city into an actual local civic centre.[70] A school would then be open

outside the normal teaching hours for children, their families, and others, providing a number of public services, thereby catalysing social interactions and becoming a reference point for local associations' activities in a given neighbourhood. Such an opening of a school would thus bring full meaning to the words "civic education."[71] This idea, however, should not appear as a revolutionising approach to the school-city relationship. Already within the Italian Constitution, there is a clear reference to the principles that define such a concept of school, stating explicitly, "school is open to all."[72] This defines a fundamental principle in the social value of the institution that should be the basis of the management and enhancement of school buildings. Today indeed it is necessary to overcome the concept of school closed to the community: a school "must go beyond, integrate initiatives and teaching moments with the life of the street, the history of the city with the stories of the neighbourhood, knowledge of art and beauty by recognizing their signs."[73] This issue relates to a long-discussed connection between the child, the city, and the artist, taking us back to some of Team 10 architects whose ideas are still valid. As Aldo van Eyck underlined, a child's imagination and creativity are a fundamental part of the human condition: "we cannot conceive of civilization today if we withdraw the child – ourselves – from its built counterform: the city. Nor can we come to terms with cities if we cut ourselves away from the force which alone can humanise them: imagination."[74] Between the lines, one can read two basic aspects: first, a school can be considered as a "miniature town,"[75] following van Eyck's concept of "a city is a big house"; and second, a child's imagination and its creative force, without adults' reality constraints, should not be limited by teaching models or spaces. Within a school with no borders, free expression of childish creativity and the possibility for children to learn not only from the teachers, but also from the community members could be a beneficial factor for their education.[76] A school can thus be defined as "a relational, anthropoid place, with a history, and as such will always have a dual significance: as identity and as a public territory."[77]

30 In order to comply with this image, a number of bottom-up initiatives have arisen which not only relate to the school's management, but also to the design process. Considering the assumption that the community and school users should be more closely linked, their needs and voices can already be integrated in the school design process, to generate a new school-city relationship, a collaboration that can guide citizens towards a change in their relationship with educational establishments. For example, some school designs in the Bolzano region in northern Italy used a participative process involving not only teachers, but also the larger community and the children themselves. It resulted in a number of interesting design indications, such as the importance of a square in front of the school for the children.[78] In the case of Piazzale Tripoli, the present-day public space is not easily accessible due to traffic intensity on the street, separating it from the school plot, as previously pointed out. Still, a number of design proposals did intend to re-establish this square-school relationship. Even though, during the course of the design studio, the students were not involved in any structured participative process (partially due to the Covid-19 pandemic), the designs were still aimed at responding to the community's needs by making some school facilities accessible for outside users (in particular, the gym, the library, and the auditorium), quite often highlighting the importance of these functions. First, a clearly identifiable 'public sector' of the school can be found in a few proposals, such as in Di Giacomo-Macaluso-Piatti (fig. 15) or Banda-Banog-Cortorreal (fig. 10). In other cases, a clearly separate access was planned for the 'public' sector of

the building, to be used outside of the normal school teaching hours, along with a possibility to separate that 'public' part of the school from the rest, so as to control access to the 'inner' school area.

31 One can say that the students ended up incorporating most of the new pedagogic models by translating those theories into new types of spaces where learning happens. The idea and form of the future school evolved in their minds and in their drawings throughout the process. Similarly, the school was no longer seen as an object, but as a meaningful space, interacting with the surrounding city, opening itself to the community and gaining an extra life over the weekends and after schooling hours. Further, the surrounding urban spaces were considered and redesigned to convey the school as a magnet for community life (which does not happen nowadays).

32 Finally, some extra considerations: in spite of the pandemic-related limitations, some groups undertook basic and rudimentary data collection processes through qualitative data methods, such as on-site observation, unstructured interviews with local residents, and focus group discussions. Even though personal interaction with local users was not a specific requirement during the urban analysis phase, this extra information collected in the process contributed to the urban scale of their design (for example, strengthening the informal use of some areas of Piazzale Tripoli for social gatherings). Given the relevance of this approach, both for the theoretical foundations of the community-school connection and the interesting results, a more structured collaboration could have been developed. In fact, the idea of involving the local community in the early stages of the design process[79] could be an important improvement in next year's design studio dealing with the same design task. For example, a workshop in the first weeks of the fall semester could be beneficial in order to open up the students' horizons and to avoid limiting the vision of a school to their own childhood experience. Such a participative process might be both an improvement for the completeness of the design proposals, as well as a valid experience for the students as an alternative, proactive, and grassroot-based design approach, which would contribute to their understanding of what a design process can be. These new activities within the design studio could help the students to realise that an architect's role should be to offer "not only to the school community, but also the wider social community a product that is both functional and cultural."[80]

Figure 15. Students: Di Giacomo-Macaluso-Piatti, school ground floor plan clearly identifying the community facilities: the auditorium, the library, and the gym

Lorenzo di Giacomo, Alice Macaluso, Laura Piatti, 2022

Conclusion

33 Designing a school can never be intended only for children: besides the other adult members of the school community (teachers and staff), families and friends of the children attending the school will also inevitably develop some degree of personal attachment to the place. It is thus the architect's mission to enhance the positive impact of the school in society.

34 In order to do that, a correct perception and analysis of the school's surroundings needs to be achieved through site surveys, observation, data collection and, most importantly, direct interaction with future users and the local community. Going back to Robinson's concept of education as a living process,[81] to design a school means creating a positive and friendly environment to host real people and their individual, personal lives. This requires flexible solutions, no longer a "one size fits all," but rather adaptable and versatile spaces, so that each individual student can develop a sense of belonging, within a shared communal learning environment, in a daily process of (inner and outer) growth and discovery.

35 In order to create such a stimulating environment, architects need to put themselves "in the shoes of the children," imagining and understanding different needs, keeping in mind that children are not adults, they are little people continuously growing, and that users of different ages and sizes will use and perceive the same space in many different ways. Respecting children's individuality is the noble mission of the teacher, while

creating the sheltering spaces for that individuality is the mission of the architect designing the learning places.

36 As previously stated, a school – or, better yet, a learning community – should not be confined to its walls or to the boundaries of its plot. On the contrary, it needs to become a city magnet, attracting and conveying life and activities from and towards the surrounding community. For children, their learning journey should start outside their front door on the way to school and back again. By this, we mean the importance of designing a friendly and safe urban space in the school vicinity, such as shared streets, but mostly, an inclusive environment where the complexity of urban life can take place, therefore allowing children to deal with it in safe and gradual autonomy.

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ABSTRACTS

The article reflects on recent models for pedagogy and their impact on educational space, from an architectural design point of view. It starts by framing the present-day situation of the existing schools in Milan, built under legal requirements from the 1970s, resulting today in a great number of obsolete educational facilities.
Recent programs and educational policies, both at national and local levels, are presented to frame the new programme "Inventing Schools," a collaborative partnership between the Municipality and the Politecnico di Milano. The goal is to explore and apply these pedagogical models to the design of new educational facilities in Milan, thereby intended to replace or

refurbish the (now) problematic old schools.
Dealing with second year students of the Bachelor Programme in Architecture, the primary school at Via Massaua was selected for their project. The student design proposals are approached by exploring the link between the school and the public space, the school and the neighbourhood, and the school and the street. The students considered different pedagogical models translated into spaces, confronting them with theoretical models and reference case studies, ultimately contributing to the discussion surrounding the school of the future.
The project experiences explore the possible forms and organisation of spaces, so that the school becomes a centre open to the inhabitants of the district, and a space for learning about society and the city.
This requires a clear articulation between safety solutions designed to protect the very young pupils, while providing coherent and autonomous access to adults and other users from the community, so as to share the cultural and sporting facilities of the school. This avoids double investments from the municipality and, of paramount importance, strengthens the sense of sharing and belonging to a social community.

Cet article réfléchit sur les modèles récents en pédagogie et sur leur impact et connections avec les espaces d'apprentissage d'un point de vue du projet architectural. Une première partie est consacrée à l'encadrement de la situation actuelle des écoles à Milan, pour la plupart issues des règlements datant jusqu'aux années 1970, ce qui en fait, dans un nombre important de cas, des établissements obsolètes.
Des programmes et des politiques de formation récents, nationaux comme locaux, sont présentés afin d'encadrer le programme « Inventing Schools », un partenariat entre la Municipalité de Milan et l'École d'Architecture du Politecnico de Milano, ayant l'intention d'explorer et de mettre en pratique les nouveaux modèles de pédagogie dans les projets pour les nouveaux établissements qui remplaceront ou rénoveront une partie des écoles existantes.
Les cas qui ont été objet d'étude et de projet peuvent être reconduits à de différentes conditions urbaines en permettant d'explorer : le lien entre l'école et l'espace public, le lien entre l'école et le quartier, le lien entre l'école et la rue.
Les étudiants ont pris en compte des différents modèles de pédagogie traduits en espaces et ils ont confrontés avec des modèles théoriques et avec des études de cas de référence.
Les expériences conduites explorent les formes et l'organisation possibles des espaces afin que l'école devient un centre ouvert aux les habitants du quartier, un espace d'apprentissage sur la société et sur la ville. Cela demande une relation claire et bien définie entre les questions de sécurité des élèves et le problème d'un accès indépendant pour les adultes et les autres membres de la communauté locale qui devraient partager les services culturels et sportifs de l'école afin d'éviter un double investissement de la part du budget de la ville, mais surtout afin de renforcer la sensation de partage et d'appartenance à la communauté locale.

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Mots-clés: Architecture d'école, Projet urbain, Pédagogie, Enfants, Rue d'apprentissage
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