

# DESIGN TO THRIVE

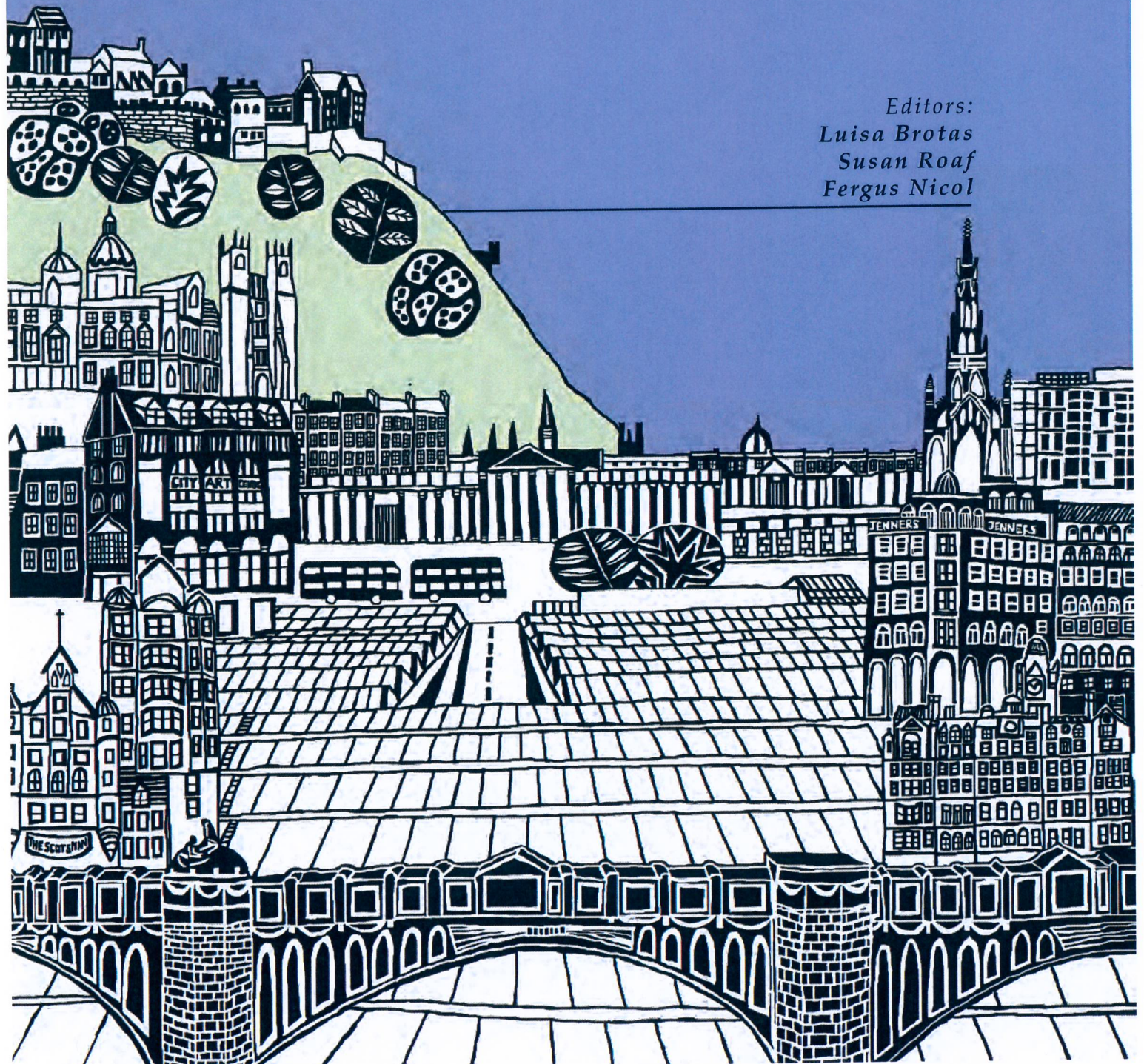
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## *Proceedings Volume II*

*PLEA 2017 Conference*

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# Design to Thrive - PLEA 2017

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Contributo specifico della prof. ssa Valentina Dessì alla pubblicazione

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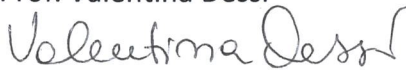
La prof.ssa Valentina Dessì ha curato i seguenti paragrafi:

- "Introduction"
- "Possible activities to do in the schoolyards"
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- "Conclusions"

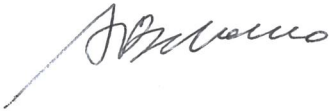
Il paragrafo "School in Milano (Italy): a representative case study" è stato scritto dalla prof.ssa Valentina Dessì sulla base del progetto realizzato dall'arch Bellomo

In Fede

Prof. Valentina Dessì



Arch. Antonella Bellomo





# PLEA 2017 EDINBURGH

## *Design to Thrive*



### **The schoolyard: an opportunity to learn, play and make community**

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**Abstract:** The relationship between places of learning and training programs is well known for a long time. From the 17th century to the present days to the physical space has been recognized the role of defining the educational projects, and just to mention one of the more recent definitions, according to the Italian educator Loris Malaguzzi, the space can be considered "third teacher". The paper proposes an approach for the enhancement and use of school space of the middle school (11-14 years old), for three key areas: education, extracurricular activities (recreational and neighborhood) and experimentation and implementation of environmental resilience. It reports a part of basic research funded by the Department DASStU of Politecnico of Milano in Italy, entitled "Back to school", aimed at identifying strategies and simplified methods for physical and functional adaptation of school space (both internal and external) to the training course that has evolved through time, without being reflected in the confined space. In order to do this, it is proposed an approach that starts from the identification of possible activities to do outside, which must be compared with the characteristics of a specific school in order to verify real correspondences between the morphological characteristics of the space and the activities. What requirements must have the space to accommodate the activities? The proposed case study in the metropolitan area of Milan retrace the steps of this process and come to identify a set of guidelines and equipment to support identified activities.

**Keywords:** Outdoor space, schoolyard, space for community, rethink schoolyards

#### **Introduction**

In the early 1900s the so-called open-air schools, real outdoor classrooms, spread over Europe and America, preferably located in the woods, where fresh air, good ventilation and a suitable orientation, contributed to improve the health of students and in particular to decrease the risk of tuberculosis. On the other hand, the well-known relationship between the physical space and the quality of the training course, as effectively synthesized by Franca Zucconi (in: Fianchini M., 2017), is even more evident when it is related to external space, a place of direct experience of the aspects of nature, which can be transferred to most of the school subjects. In the schools where the most important education methods are put in practice, based on the inductive method, mainly primary schools, (like, for example, the Montessori Method, and the Rinnovata Pizzigoni method, to limit the field in Milan), a significant part of the teaching activity takes place outdoors. The Milanese school *Casa del Sole* (House of the Sun) who was built inside of the Trotter urban park, was conceived and shaped in pavilions (as well as the above mentioned school Rinnovata Pizzigoni) to allow the children to have a direct connection with all the natural elements of the park. The Trotter Park is a public space accessible to people and it's a resource who belongs to the whole neighborhood.

This is another aspect to highlight: the outdoor space of the school can be considered as a public space, open to the neighborhood in times and modalities that do not interfere with the regular educational path. For their strategic location in the neighborhood

schoolyards can be also considered ideal spots where to play free game as well as to start the environmental renewal in urban areas.

In some cities and neighborhoods the educational spaces could be a valuable resource of permeable surfaces as to allow the application of environmental adaptation strategies to climate change. Talking about Milano, the increased permeability of the areas would be an effective strategy to absorb, at least temporarily, the excess rainwater, and thereby reduce the flooding of streets. These three elements, the outdoors teaching activities, the free game after school and the space treatment for the urban environmental resilience, are the three topics covered in the basic research of the Politecnico of Milano "Back to school ", particularly focused in the first level of secondary school, which deals with the various aspects of the relationship between the built environment and the educational programs. In particular the focus on the use of the school outdoor space, discussed in this paper and developed by the authors, is based on some case studies in the Metropolitan area of Milano in Italy, which suggested possible strategies to treat surfaces in external space of the school.

### Possible activities to do in the schoolyard

There aren't educational training programs in Italy that implicate the use of the school's outer spaces. And when this occurs it is by choice of the teacher.

What we can observe is that the offer of outdoor activities from a school mostly depends on the type of the school buildings, as well as on the configuration itself of the external areas, and not less important, on the number of floors on which the school building develops what can encourage or discourage to carry out any activity outside in the schoolyard. In some of the studied cases we have observed that those teachers whose classroom is on the second or third floor often feel discouraged from taking their students to the yard, gather them and change the class settings rules. Turned out, actually, they consider excessive the amount of time it takes to do that all if compared to the whole time devoted to the subject. Neither, in many cases the outer space is used for recess time, usually not longer than 15 minutes.

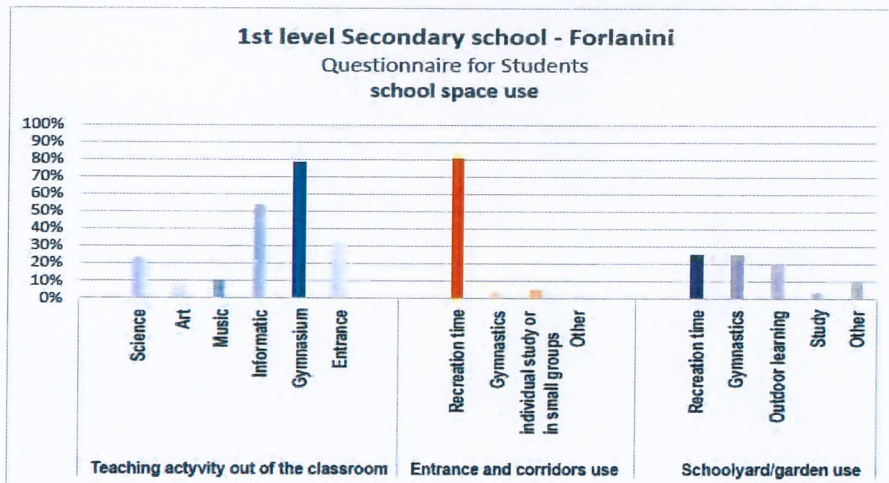


Figure 1. Space use in the school Forlanini near to Milano, Italy. On the right the activities in the schoolyard

The graph of figure 1, derived from the study carried out by the group coordinated by Maria Fianchini within the research "Back to school" on the use of different educational spaces, highlights this aspect. The situation related to the courtyard of the Forlanini School in Sesto San Giovanni (Mi), particularly significant, shows that the available outer space is not adequately valued. Despite several limitations and constraints that each school actually has,

in general we may say that the identified activity can be attributed to two main areas: educational activities and free game, both during school hours and extra-curricular time; at the same time the external space of the school is a resource for implementing environmental resilience strategies, stimulating environmental awareness of students (environmental education) and for mitigating the effects of climate change at the neighborhood level (and, if included in a larger network, at the urban scale).

The identified activities may involve several scholastic subjects: the opportunity to observe from life and carry out laboratory activities using the natural elements and environmental resources available on site can be useful for different subjects.

The outdoor activities, based on direct experience of the natural elements, may therefore represent the opportunity for students to move to conceptualization, starting from experience, according to the different way to face the subjects included in educational curricula. The activities that may be done outside during school time and after school, can be grouped as follows:

Table 1. Specific activities for each group and environmental resilience goals

Teaching activity	Recess time/leisure activity	Extra-curricular activity	Environmental resilience and climatic mitigation
Lectures (any subject)	Free game	Free game	Run-off reduction
Laboratory (Math, Science, Art, Technology)	Recess	Rest activity	Air and radiant temperature control
Observation from life (Science and Art)			Solar radiation control
Cultivation for educational purposes or for horticultural production			
Sport activity			

With regard to extra-curricular activities the external space of the school may also be used as urban open space in the neighborhood mainly addressed to the free play, or to elderly who need a break or to people who just need to stop halfway along the path back home.

Interesting in this regard the experience of some municipalities in Italy, such as the City of Turin, where the council issued the Regulations aimed at managing the activities in the municipal schoolyards; in the document the art. no 1 states: "The courtyards of the schools owned by the City of Turin (...), after the school hours, are public spaces available to the entire population and subject to the applicable municipal regulations."

Similarly the city of Bolzano, in the Regulation no. 46 for the management of the schoolyards by the District Councils, approved in 1999, states that the schoolyards, except for teaching hours, have to be considered urban spaces open to the public.

Regarding the fourth aspect, related to environmental resilience, it is well known that most of the Italian cities, as well as the city of Milano, are subject to more frequent extraordinary meteoric precipitations, due to ongoing climate change.

This is the reason why it is important to "equip" the city in order to have a greater number of permeable areas which could reduce the run-off, i.e. the mass of water that

gathers in a short time on impermeable surfaces and flows into the sewer system. Another indirect positive effect associated with the increase of the permeable surfaces is the restraint of the phenomenon known as "urban heat island".

The increase of permeable surfaces, possibly treated with vegetation, water and appropriate materials, limits the overheating of both vertical and horizontal surfaces and consequently contributes to mitigate the urban microclimate.

The conscious adoption of these strategies has a positive effect also on the training: firstly, by understanding what role trees and vegetation may have as shading systems and, as a strategy to reduce the possible overheating of open areas, students for example, learn how to sustainably manage some environmental emergencies; on the other hand they have the possibility to have direct experience about flows of material and energy in the their environment, for example by understanding that the sun produces shadows and sunny areas are different according to the seasons; by studying how the solar systems generate power and heat, students understand how to use them in order to improve the efficiency of the school system and, to a larger scale, of the built environment.

### Necessary requirements to carry out outdoor activities in schoolyards

Once the outdoor activities have been identified, it is necessary to determine whether the area matches the essential requirements to host them, and, in case of negative answer, to find out the feasible solution to get those requirements.

Table 2. Physical requirements of the space and/or furniture for the learning activities

Activity	Curricular activity
Lectures	<p>Spatial requirements and equipment</p> <ul style="list-style-type: none"> <li>- Suited area for gathering the class (1.5 m. x25 students)</li> <li>- Seats</li> <li>- Shaded/sunny area according to the seasonal requirements</li> <li>- quiet area</li> <li>- accessibility</li> <li>- Deposit for blackboards on easel and other stuff.</li> </ul>
Laboratory Science Art	<ul style="list-style-type: none"> <li>- fenced and appropriate areas to the presence of a class.</li> <li>- tables</li> <li>- seats</li> <li>- storage</li> <li>- water intake</li> <li>- power supply (warehouse)</li> <li>- instrument for the analysis of some environmental parameters (air temperature, wind, solar radiation..)</li> <li>- different species of trees, shrubs and herbaceous</li> <li>- pond for the analysis of idrofauna.</li> <li>- rigid vertical support for decoration (mosaics)</li> <li>- armor for the temporary exhibition of students works</li> </ul>
Observation from life	<ul style="list-style-type: none"> <li>- different species of trees, shrubs and herbaceous</li> <li>- seats (on the meadow or movable seats)</li> </ul>
Cultivation for educational purposes or for horticultural production	<ul style="list-style-type: none"> <li>- Protected area, fenced</li> <li>- Area for the cultivation and growth of edible plants (vegetable garden)</li> <li>-water intake (by aqueduct or cistern for collecting rainwater)</li> <li>- storage</li> </ul>



Sport	<ul style="list-style-type: none"> <li>- paving with materials which reduce the overheating (cool materials)</li> <li>- proximity to the gym</li> <li>- colored surfaces for easy identification of the functions</li> </ul>
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Table 3. Physical requirements of the space and/or furniture for the recreation and leisure activities

Recreation and leisure area	
Activity	Spatial requirements and equipment
Free game	<ul style="list-style-type: none"> <li>- meadow, trees (no conifer)</li> <li>- Localization in areas far from the classrooms to prevent acoustic and visual interferences</li> </ul>
Recreation	<ul style="list-style-type: none"> <li>- Area for seated activities (eating, reading, chat...)</li> <li>- Some shaded and protected from the rain seats</li> </ul>

Table 4. Physical requirements of the space and/or furniture for the extra-curricular activities

Extra-curricular activities	
Activity	Spatial requirements and equipment
Free game	<ul style="list-style-type: none"> <li>- Control accessibility to educational areas and equipment (fences)</li> <li>- Independent access to the schoolyard from outside.</li> <li>- Signage for the identification of functions in the available areas</li> </ul>

The theme of environmental resilience and climate mitigation is treated in a different way. As summarized in the table reproduced below, the target is associated with the strategy.

Table 5. Strategies for improving environmental resilience and climatic mitigation

Environmental resilience and climatic mitigation	
Goal	Strategy
Run-off reduction	<ul style="list-style-type: none"> <li>- increase of the permeable surface (areas with sand for the game, mulches, green roofs), by reducing to the minimum required the impermeable areas where necessary (paths, sports fields)</li> <li>- <i>rain gardens</i> e humid zones</li> <li>- rainwater harvesting for educational purposes, watering and cleaning paths in non-rainy moments</li> <li>- increase of the vegetation (trees, green areas for the study)</li> <li>- green parking</li> </ul>
Air and radiant temperature control	<ul style="list-style-type: none"> <li>- Use of vegetation</li> <li>- Use of bodies of water</li> <li>- Use of cool materials</li> </ul>
Solar radiation control	<ul style="list-style-type: none"> <li>- Trees and shading devices</li> </ul>

By associating activities with spatial requirements and equipment it becomes easier to pinpoint the most suitable area within the whole of the outer space.

The educational spaces and the ones for free game (either during the school or the after-school hours), are then defined on the basis of the activities that is possible to carry out in that area; eventually the spatial requirements have to be associated with the equipment.

## School in Milano (Italy): a representative case study

If we look at the types of school buildings in the Milano area (city and province of Milano) it comes to light that the most common ones are basically three: the pavilion type, the variety with the open block (also with the court inside) and in line shaped. To a lesser extent, we can mention the type in a comb shape.

In this paper, it is considered the Forlanini School, where currently the use of the outer space is almost exclusively for sports activities, in an adequately paved area; however, there are other small areas along the perimeter, seldom used by some teacher for workshop activity or for the observation from life.

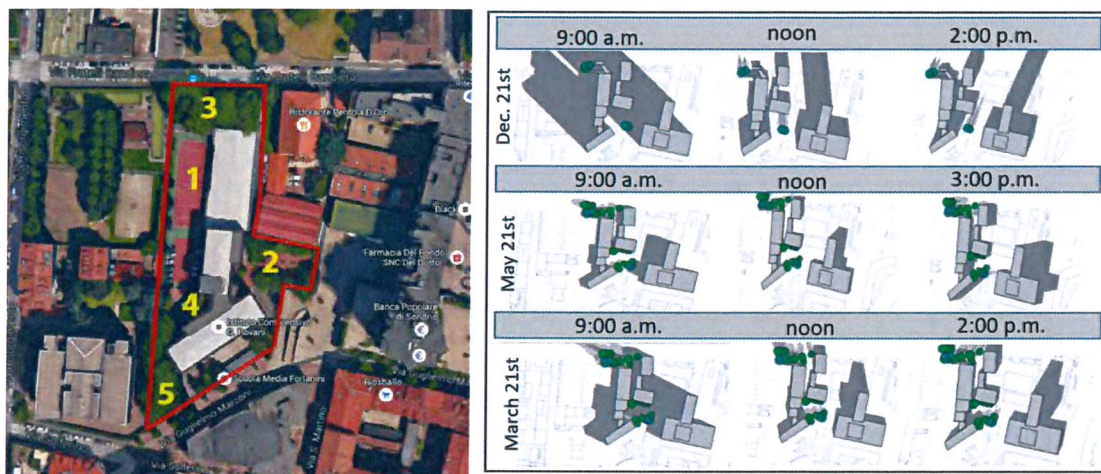


Figure 2. Aerial view of the Forlanini school building and its five different open areas (zone 1. Sport activity; zone 2. Observation from life, laboratory (Science); zone 3. Occasional recreational activity (once a year); zone 4. Any activity; zone 5. Any activity).

Figure 3. Shadow and sunny areas in different days of the year and different moment of the day

On the north side there is another area partially equipped with tables and fixed seats, used only during the end of school events, when students' families are invited. In general, outdoor space is almost never used for recreational activities, which during the school hours usually take place into the building. If we consider the configuration of the outdoors space in distinct areas and their position in relation to the building, we can assess that the outdoor area of the Forlanini School appears to be suitable with many activities, as we observed in similar situation in other countries than Italy, where learning activities are well sustained from adequate facilities.

In this school, as it is possible to see in the image 2 above, four main outdoor areas have been identified, for which there are some proposals of intervention. As shown in the picture No. 2 above, we have identified four main areas in the school, and for each of them we have developed a proposal of intervention. In this paper we take into account the area no. 2, particularly suitable for educational activities, in the form of lecture as well as observation from life and laboratory.



Figure 4, 5. View of the open area n. 2 from the top of the building and from the south.

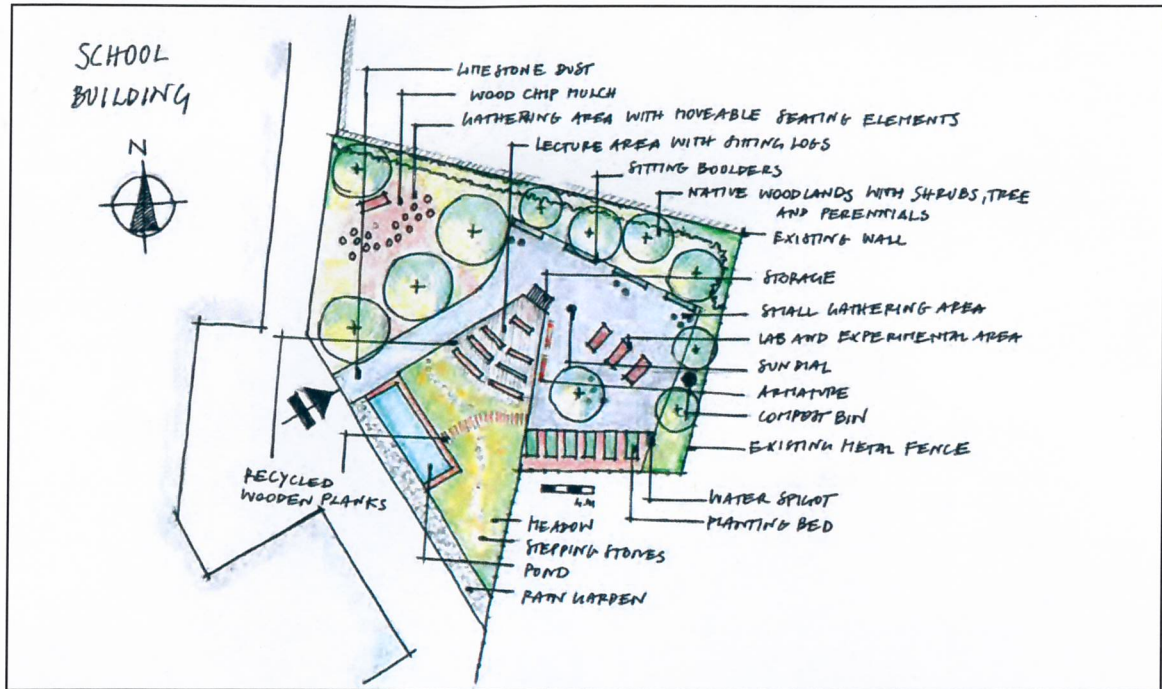


Figure 6. Design concept of the outdoor classroom for the area no. 2.

Table 5. Proposed activity and equipment for the open area n. 2

Spatial configuration	Compatible activities	Equipment/pre-existence/strategies
A rectangular and a triangular areas. Presence of evergreen trees close to the wall on the north and south. Deciduous vegetation on the rest of the perimeter.	Lectures	fixed seats (eg. wood logs, concrete blocks or bricks) Storage (mobile equipment)
	Observation from life (Science and art)	- Planting of different and representative plants. - Pond with photovoltaic panels for water handling.
	Learning and vegetable gardens	- Storage - Water intake - Flowerbeds.
	Collection of material for laboratory	Vegetation, ground, stones, branches

Interventions change

- Removal of evergreen plants present near the south fence.
- Restriction of the impervious surface to the paths for the areas of the activities.
- Modestly sized fence to protect and identify an area solely devoted to teaching.

This is a space that contains fixed and mobile equipment, addressed to the learning activity. Learning in this context is possible either through classes or through observation from life and laboratories; besides it is also possible to learn what the environmental resources are and how to use them. For this purpose, water-collecting systems, composting and rain gardens are provided, as well as different types of vegetation, solar systems for energy production, a green roof for the educational purpose which could be provided with a mini climate station for the survey of environmental variables to put on the tools storage.

## Conclusions

Nowadays, rethinking the use of school space, strengthens the possibility that a neighborhood with its community of children and adults identifies itself with the space that is the place *par excellence* of education, social integration (as recently reported by the OECD statistics "2017 survey on academic skills and on adult skills"), and in general of being together.

For this reason it is important that the possible functions be clearly identified and localized in the outside areas of the schools, and that environmental conditions and equipment be ensured to allow different activities to be carried out.

The presented study aims to identify a methodology, which starts from the identification of the needs dictated by the training programs, students and teachers, to perform certain activities, and, in parallel, from the physical and environmental performance of the space that has to host these activities. The application of the methodology on a case study has given the opportunity to verify that not all the activities are practicable at the same time in all the areas, and consequently each sub-area has to be equipped and therefore has to be recognizable for a particular specificity. In the example is pointed out that equipping a single area, (in this case the outdoor classroom), is an opportunity to bring together the environmental needs of students, teachers (thermal comfort) and neighborhood (strategies for reducing run-off and climate change adaptation), the requirements to communicate how the resources of the site work (water, sun, vegetation, ...) to the potential that the physical configuration offers, as it could emerge from an adequate project.

According to this approach it is easier to find a coherence between the space features and the training programs that can be adapted thanks to the opportunities offered by the available space resources. The space, therefore, the fundamental support of some teaching activities, is more and more recognized as "third teacher", both in primary and secondary school, and not only when we refer to internal space but also to outdoor space.

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