

Evaluation of sustainable schoolyards: “Design your schoolyard” workshops with a practice-based process in Muratpaşa, Antalya

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Abstract

Design of the learning spaces is not only the field of the design discipline. Alternative learning processes such as outdoor environmental learning underline an emerging field that needs to be discussed with interdisciplinary lenses. This study stands in between design, environmental learning, and sustainability. Environmental learning brings the concepts of learning outside and in daily life by sharing and experiencing the knowledge. Educational spaces cannot be handled with traditional design principles anymore. Designers should start approaching the learning spaces not only with aesthetical or spatial values; and start to include curriculum design, sustainable design, and alternative learning processes into this multifaceted process. Designers and education managers should also interpret this “in-between” field with practice-based studies. Therefore, this study is critical because it creates a practice-based process for creating a sustainable design-based curriculum that empowers students to design their schoolyards. The pilot study combines curriculum design, spatial design, and learning about sustainability themes, under “Design Your Schoolyard” online workshops and it includes multi-stakeholders to the process. On the other hand, field research evaluates the schoolyards of the pilot study area, Muratpaşa, Antalya, which aims to expose the condition of schoolyards for outdoor learning. The research first; aims to open a new discussion on schoolyard design in the education and design field. This issue should be handled on a national level by blending various disciplines. Second, it aims to put forward an experience-based process between alternative learning, learning about sustainability, and schoolyard design -for future studies.

Keywords

Curriculum and spatial design, Environmental learning, Learning about sustainability, Sustainable schoolyards, Outdoor learning spaces.

1. Introduction

The learning process and the environment in which learning takes place are strongly linked. The spatial constructs can reshape human behaviors by transforming inhabitants' social consciousness about sustainable living practices and strengthening their connections with nature.

Modern people have lost their ties with nature as a result of the industrialization period, which can be considered a crucial threshold after which anthropo-centric living practices started to dominate the nature and the environment. Industrialization brought along massive urbanization movements, which negatively influenced people's perceptions of the nature. The results of that influence can be seen not only in the physical constructs of the spatial environment but also in the behaviors of the inhabitants. Therefore, raising the ecological awareness of individuals is of utmost significance. With that in mind, the present study is concerned with the cultivation of sustainable practices of individuals, strengthening their connection with the environment, and raising their ecological awareness.

The aim of the present study is two-fold: Firstly, depending on the fact that one's connection with nature and awareness of sustainable practices should be instilled in childhood, the study focuses on the schoolyards as learning spaces that have the potential to cultivate sustainable practices. Considering that, it looks into the informal learning processes and everyday life experiences that can be embedded in schoolyards as learning landscapes, which may cultivate sustainable practices by blending the learning process and the schoolyard design.

Secondly, the study aims to take an interdisciplinary approach to interpret spatial design and associate it with pedagogy and sustainability. Design practices can potentially interpret the spatial constructs as pedagogical sites, blend the design phase with learning processes and pass this ecological-centered social transformation into human behaviors. Socio-ecological transformation starts at the individual level, and schools are crucial places to acti-

vate that transformation.

The theoretical part of this research is associated with a practice-based process. The literature review part focuses on environmental learning and its relationship with learning about sustainability and discusses the potential of schoolyards for informal outdoor learning. Finally, the field study has evaluated Antalya Muratpaşa district middle school gardens, their potential, and their shortcomings as learning landscapes.

The practice-based part of this study highlights the importance of learning about sustainability in schoolyards, introduces the 6th and 7th-grade students to sustainability through online meetings during the Covid period, and later opens them a space to design their sustainable schoolyards where they can learn and share.

Antalya Muratpaşa Dumlupınar Middle School students designed their school garden. They implemented their ideas in a participatory process with the fund/support of ITU Housing UYGAR Research Center and Antalya Bilim University, Architecture department students.

From the field research, the results put forth a poor condition; schoolyards do not contain any spatial feature that can be connected to the informal learning process about sustainability. In addition, within the practice-based process, students discuss and design their sustainable schoolyards. During the design and implementation part, they learn how to apply sustainable practices in their daily lives. Also, we notice that when they learn from each other and the environment, it is the most valuable form of learning. The results expose that majority of the schoolyards need an urgent and operational new vision line that discusses and relocates them as pedagogical sites and blends curriculum, sustainability, and spatial design issues under the learning landscapes.

2. Environmental learning and sustainability

As is suggested by EPA (Environmental Protection Agency), "environmental education is a process that allows individuals to explore environmental

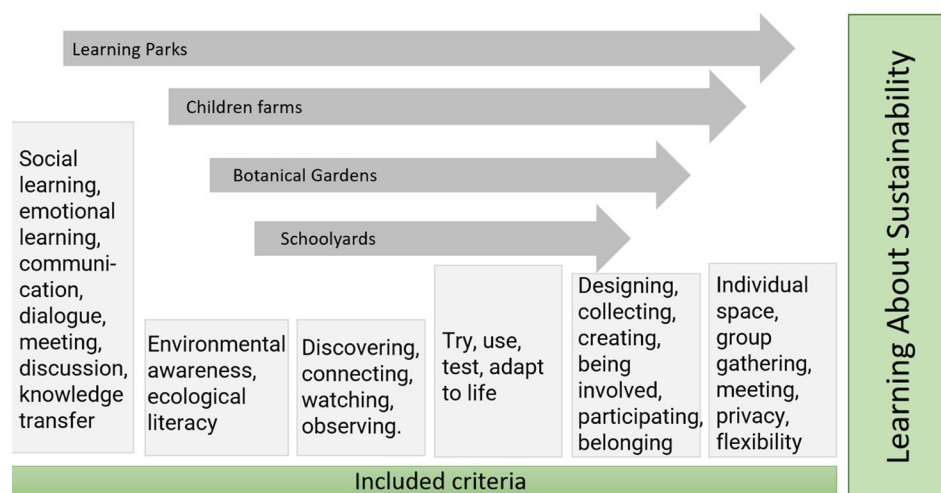


Figure 1. Learning pyramid. Edited and developed by the author from the works of Edgar Dale (1969).

issues, engage in problem-solving, and take action to improve the environment” (EPA, n.d.). It will only be possible through environmental education that individuals make a better sense of environmental issues and challenges and, through such education, they will be equipped with the necessary skills and understanding before they make decisions regarding environmental issues.

Through environmental education, which can be formal and informal, people are supported to learn how they are connected to their natural environment. Observations in ecological areas, birdwatching, visiting a science museum, observing the rehabilitation of a wetland, or cleanup of a river can be given as examples of what constitutes environmental education.

Sauvé (2002) notes that environmental education connects human to the environment; and “which is known by various names, is at least a century-old idea” (Louv, 2010:243). It integrates the principles of ecology, biology, economics, and various other disciplines under an interdisciplinary framework. Children gain awareness through environmental education being part of processes and activities; they gain knowledge about environmental problems and skills and attitudes about how to act on those problems. Also, by participation, they become involved in environmental problems. As Sauvé declares, the connections that can be built by environmental education can encourage people to learn about their

surroundings and this knowledge can foster a sense of belonging and environmental responsibility, which can lead us to “become guardians, responsible users, and builders of Oikos, our common “home of life” (Sauvé, 2002: 2).

Learning about sustainability is under this broad umbrella of environmental education. “Since sustainability is a cultural process, it depends on the everyday actions of ordinary people” (Van der Ryn & Cowan, 2007:82).

Everyday actions and activities hold a crucial value in the learning process. Therefore, environmental learning is an important learning style that combines Place-Based and informal methods. Environmental learning can be categorized under environmental education and the umbrella of informal learning. In this learning style, knowledge is gained by daily life experiences which can take place at home, while traveling, in everyday life, or be gained through books, radio, and museums. Hence, the “place/environment” where the learning happens holds a significant value. Formal learning is a planned and systematic process under a specific educational structure or institution. On the other hand, informal learning involves random and spontaneous processes that permeate life. The knowledge is not organized, not systematically poured; instead, a person gains knowledge in life through experiences (Coombs & Ahmed, 1974:8). Therefore, as a lifelong experience, environmental learning has strong ties

with informal and Place-Based learning styles.

The figure above describes the various places where learning about sustainability can happen as part of an environmental learning process. The criteria express and declare the activities that hold importance to this informal learning process. Schoolyards are crucial nodes where everyday life passes in schools and where environmental learning can occur.

In this study, environmental learning and learning about sustainability are highlighted, and sustainable schoolyards are focused on as the places of the socio-ecological transformation and where informal and Place-Based learning processes can happen in the everyday life of students.

2.1. Sustainable schoolyards and learning about sustainability

The learning processes take place in and out of school environments with informal as well as formal processes. Cities are becoming increasingly urbanized; and the green spaces -where we connect with nature- are decreasing, and the chances of encountering nature, connecting, and exploring in cities are falling. In this sense, school gardens as a laboratory space can be a base for learning in daily life and experiential learning about sustainability. On the other hand, the potential of the place to teach through experience is excellent. Therefore, schoolyards should be treated as three-dimensional and experiential maps or books, and hidden curricula should be embedded in them by the design practices.

The spatial design dimension of the pedagogical-based program studies is lacking. In this sense, the present study discusses pedagogy-design-ecology disciplines inter-relationally under the title of “learning landscapes” with an interdisciplinary and holistic approach following the systems view.

“An effective environmental education requires students to leave the classrooms” (Sobel, 2014:11). Learning is a process that requires application, interaction, and sharing. As has been explained in the previous section, we can benefit from informal learning

processes to provide such experiences. “Studies show that children become desensitized when urban children on different continents are told about the Amazon jungle or similar global ecological issues” (Sobel, 2014:15). If children cannot create bondage with their environment and nature, they can grow up as future individuals who ignore environmental problems, cannot act in an eco-conscious way, and cannot apply sustainable living practices.

With Place-Based education and informal learning processes embedded into places (schoolyards) where students’ everyday life passes/happens, explaining environmental problems with examples from the immediate environment and developing practices that allow them to establish bonds by experimenting are essential. In this regard, schoolyards are essential. These areas are places where students meet, interact, share, play, and learn from each other.

Figure 2 below explains the learning processes. Learning is strengthened and becomes more efficient through sharing and applying what you have learned rather than merely reading and remembering what you have read. In other words, if students have the chance to experiment and learn by applying and experimenting, the knowledge becomes more stable. If they apply what they have learned to their daily lives, their rate of learning increases.

Therefore, Place-Based learning and environmental learning are essential. Learning sustainable practices by applying and practicing in schoolyards is crucial, and the practical part of the present study also constructs the works on that idea.

There are several approaches to Place-Based learning: One of them is proposed by the Children & Nature Network, under the “Green Schools” movement. The organization defines outdoor learning spaces as “multi-functional spaces for play, learning, discovery, and development” (Children Nature Network, n.d.).

These learning spaces provide space for relations and interactions, encounters, and sharing, and establish a relationship between the interior and exterior environments of the school

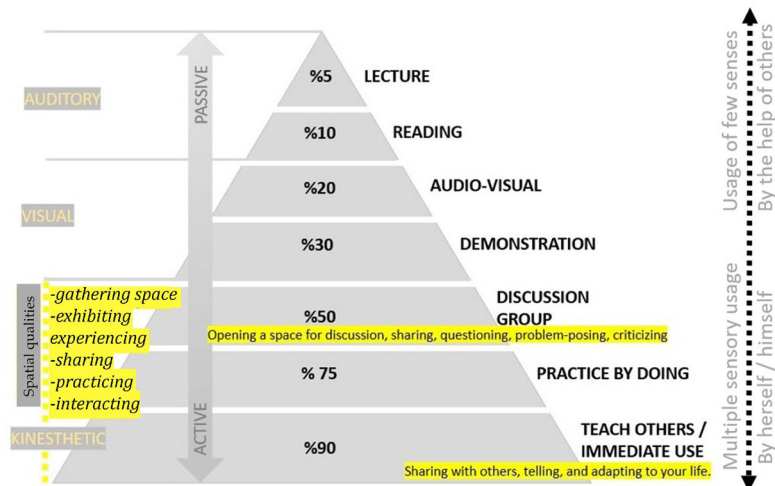


Figure 2. Spaces and necessities of Learning about Sustainability. Developed by the author.

building, not only with spatial relationships but also with community engagement. As for the organization, green school gardens should include outdoor classrooms, local and pollinated gardens, rainwater harvesting, traditional playground equipment, nature playgrounds, edible gardens, paths and walkways, trees, shrubs, and other planting elements.

Harvesting rainwater from the roof against the danger of water scarcity, learning about the carbon footprint by recycling, and practicing planting in

schoolyards connect students directly with sustainable practices and can have a significant potential to change their habits and cultivate eco-friendly thoughts and practices. In this sense, learning in life by experimenting, observing, and discovering is an issue that needs to be underlined, and learning spaces should be designed considering such processes. Below, some good practices from Bali Green school are explained and exposed.

In Green School Bali, schoolyards carry an essential role in learning and



a



b



c



d

Figure 3. Green school in Bali. Example of a good practice, a schoolyard design that support environmental learning about sustainability.

practicing sustainable lifestyles. They include rainwater harvesting, permaculture gardens, alternative energy applications, and solar panels that produce the school's energy. Figure 3a exposes the alternative energy use of the school. Students familiarize themselves with these applications during their daily lives in the schoolyard (ITT Technology Arts Sciences TH Köln, n.d.). Figure 3b shows the time that students spend in the outdoor environment, connecting with nature and agriculture, sharing, and learning by practicing (Green School, n.d.) Figure 3c shows the permaculture gardens where students practice and learn (Meinhold, 2014). Figure 3d shows the hydroelectric turbine of the school where students learn sustainable energy and water usage systems (Green School, n.d.).

The schoolyard has a hidden curriculum behind the schoolyard applications and design. Students have the chance to meet with sustainable practices, analyze and learn; hence, this opens a space for them to use and apply this knowledge in their daily lives. These outdoor learning spaces cultivate eco conscious individuals of the future.

The environment is a "silent curriculum" that can provide positive (or negative) learning experiences. The answer lies in seeing the physical environment and the quality of the environment as active and indispensable parts of the learning process (Taylor, 2008:25). In approaching schoolyards as learning landscapes and designing them for learning about sustainability, informal learning methods play a vital role and establish a link between the place and the curriculum. The practice-based part of this study uses those informal learning processes and attempts to apply them to space design. In the following sections, the practice-based part of this study will refer to the informal learning processes and how to include them with space design.

"Education for Sustainability develops the knowledge, skills, values, and world-views necessary for people to act in ways that contribute to more sustainable living patterns. Sustainability education is future oriented, focusing on protecting environments and creating a more ecologically and socially

just world through informed action. Actions that support more sustainable living patterns require consideration of environmental, social, cultural, and economic systems and their interdependence" (Australian Curriculum, n.d.). Sustainable schoolyards support and cultivate sustainable patterns; therefore, they should be handled holistically and in an interdisciplinary manner.

Sustainable schoolyards as learning landscapes stand at the intersection of education, sustainability, and space design. These areas are like three-dimensional books where knowledge is spread and gained. And, they have a silent curriculum, hold a space connecting students' daily lives, curriculum, and learning as a third teacher. The space where the learning experience takes place has an essential connection with learning. Therefore, curriculum, space design, and stakeholder relations should be engaged and planned together. If the education system or teachers, and school principals do not support the sustainable schoolyard design or perspectives, these ideas cannot develop in the school environment. Alternatively, if the curriculum is not embedded into schoolyard design, the informal learning process cannot work. Therefore, designers should engage with the curriculum and school managers, and the sustainable schoolyards should be handled as a multi-stakeholder process. Environmental education programs that can be embedded into schoolyard designs need to be planned with the cooperation of all stakeholders; that is, school management, students, teachers, and designers.

Throughout the practical-based process of this study, multiple stakeholders are included in the practice-based and participatory process. The methodology and process will be explained with diagrams in more detail in the following sections.

3. Methodology

As is asserted by Takashi (1999), if we adopt learning environments beyond a building, our vision of school and learning will expand. For this reason, schoolyards need to be interpreted

not only as gardens, but also as nodes that cultivate learning and interaction. This interaction opens a space for learning together. One of the fundamental issues to be considered in the design process of a learning environment is to move away from the idea that education takes place only inside the building. The relationship between indoor and outdoor spaces, as well as the relationship between curriculum and schoolyards, should be handled together, with a holistic and interdisciplinary educational perspective.

For learning to take place outside the building and to transform gardens into learning landscapes, various experiential design applications can be applied to schoolyards: Open-space classrooms, islets where different numbers of groups can work, applied areas such as a laboratory where they can observe applications on agriculture, biodiversity, renewable energy, areas such as poultry houses, crop gardens, and rainwater harvesting can be used as learning landscapes.

With that in mind, the present study constructs its fieldwork and a participatory process in these crucial spaces where informal learning may happen. The study has two research phases. The first one is the practice-based workshop and application process; the second one is the fieldwork that scans the schoolyards of the Antalya Muratpaşa district. The two phases of the study complement each other. The field study results expose that the schoolyards need to be interpreted and taken into consideration in an operative way with interdisciplinary approaches where the design creates connections with learning processes and curriculum design. The practice-based pilot study mainly focuses on that issue and aims to create connections between curriculum design, sustainable design, and schoolyard design.

Informal learning, environmental learning, and learning about sustainability are examined in parallel with the literature study, and as the first limitation, the research area is limited to schoolyards. Another limitation has been determined on learning about sustainability, focusing on how learn-

ing about sustainability will occur in schoolyards.

The practice-based part aims to support learning about sustainability and create an interactive and sharing environment where students can exchange ideas and think about their schoolyards and sustainable designs together. As explained in the literature review, the efficiency of learning increases when an outdoor learning design is integrated into and intertwined with the curriculum. Therefore, this pilot study supports, strengthens; and encourages students to design, discuss, and make decisions about their schoolyards in sustainable manners.

Moreover, the field research scans the Antalya Muratpaşa District, where the practice-based workshops took place in a school and aims to evaluate the schoolyards regarding whether they are efficient or not for learning about sustainability.

The fieldwork and the practice-based process are intertwined. The fieldwork supports the pilot study and confirms the suggestion that schoolyards are not enough for learning about sustainability. New perspectives and holistic interpretations are emerging in this multi-faceted field between design, pedagogy, and sustainability. The results will be shared in the following section.

This research is part of a Ph.D. thesis project, and one researcher is involved in this process as the research team; the researcher's background is in the urban design area.

3.1. Practice-based pilot study;

Design your schoolyard workshops

"Design your schoolyard" online and face-to-face workshops started in January 2021 and ended with a participatory project in July 2021. During the six months, weekly online meetings focused on education about sustainability. The pilot study was held with sixth and seventh-grade students from Antalya Muratpaşa Dumlupınar Middle School.

In the first phase, the researcher designed the curriculum for online workshops and applied it through online workshops with the attendance of the schoolteacher.

These workshops initially started for an Erasmus+ project (This international project focused on the Global Environmental Awareness Raising -GEAR- topic, and the researcher joined this team later; these works evolved, developed, and continued by the researcher as the pilot studies of her Ph.D. thesis.)

The researcher was a voluntary educator at the beginning of the process. However, after the experience of these initial workshops, the researcher developed "Design Your Schoolyard" meetings and their curriculum. Thus, the pilot study has been developed and started after the trial process with an Erasmus+ project.

These online workshops were held during the Covid restrictions and lockdowns; therefore, they remained formal and online. Afterwards, İTÜ UYGAR Research Center supported this study with a fund, and the students' ideas were applied to the schoolyard.

3.1.1. Curriculum design

Sustainable practices become essential in schoolyards in parallel with the approaches such as planting gardens, school orchards, and edible gardens. Learning happens in locations that provide space for practice and trial processes. Also, the learning place should open a space for communication and dialogue. Therefore, outdoor learning spaces should be evaluated following such relations. During the curriculum design of online and face-to-face workshops, literature review and previous good practices are taken into consideration together with each part of this pilot study.

As the first step of the design, the researcher developed a six-month curriculum, for approximately ten to fifteen students; the group gathered online every weekend for three hours. After each subject, students designed posters, models, and drawings to support the ideas and subjects they had learned. Learning by design, built environmental education, and sustainability education concepts have been researched and applied to this process. Arın's (2015) doctoral dissertation about the built environmental education and its workshop structure inspired the design of the curriculum of this pilot study.

Table 1. Online and face-to-face meetings, the curriculum and on-site applications.

January-March 2021	ONLINE WORKSHOPS	The problems of our cities, neighborhoods, and our solutions.	Model making, sketches, digital works
		What is sustainability? Environment and Ecology. Sustainable cities. Sustainable Transportation.	
		Recycle, Reuse. Our carbon footprint.	
		Compost application examples. Making our own compost at home.	
		Healthy Eating, Agriculture in the City, Food. Community Gardens, Crop gardens. DESIGN YOUR SUSTAINABLE NEIGHBORHOOD.	
		Permaculture principles, sister plants.	
		Energy, Water, Waste, renewable systems.	
		Design your sustainable home.	
		Plant and Animal Diversity, biodiversity. Insect, bee hotels. ecosystems.	
		Basic Design, Eco-art and re-use.	
April 2021		Mind maps. Garden maps. Schoolyard discussions.	
May 2021	Decision and Discussion	Design your schoolyard with sustainable principles.	
		Self-criticism, discussion, taking decision as a group. Deciding on the projects to apply to garden. -Design of application process. Decision of materials. Meeting with architecture students.	
June-July 2021	Schoolyard	APPLICATION PROCESS (Sharing the process with online social media page.) -Material selection and procurement. - Organization and orientation of students, distribution of tasks. -Application and design on site as well.	

Also, education for sustainability programs for children helped to develop the curriculum. After each workshop, students developed and designed a project on the week's topic. In other words, the weekly workshops were not merely classes, but project-and-design-based workshops.

The table explains the structure and curriculum of the pilot study. Students were introduced to the topics above and created projects and designs on those issues over the course of six months.

The first topic focused on the discussion of environmental problems around us. The students were encouraged to discuss environmental issues, centralize on the problems of their close environment such as their neighborhood and school, identify the main problems, and think about solutions

to those problems. The study was enhanced using new technological tools. For example, students used the Padlet tool to discuss and interactively share their thoughts on an open board.

During the second topic, students were introduced to the sustainability concept. What is it, and how does it affect us? In what scale? Where do we use this concept? Sustainable cities and transportation were discussed. This week created the base of the pilot study. Students used Canva program to create posters and videos on their imaginary sustainable city perceptions.

Following the sustainability concept, the third topic focused on recycling, re-usage, and our carbon footprints. Students drew their carbon footprints by discussing daily habits; they also learned about re-usage and recycling to apply these principles in their daily lives. They created posters for themselves and their families to hang on their walls at home to remind them to use less and reduce their carbon footprints.

The fourth topic was a continuation of the previous issue; focusing on compost and how they can apply this to their home. After learning about this topic, firstly, they investigated their garbage at home and evaluated the stuff in their garbage. Then, they prepared posters with Canva about how to manage and compost their garbage. Afterwards, a basic DIY composting kit was introduced to the students, and they did a compost experience at their homes for one month.

The fifth topic was permaculture and planting. They have learned the plant siblings and how plants should be cultivated by these principles. They have learned which plants live together and support each other. Then, while designing their schoolyard and planting areas, they used these principles to select the plants they were going to plant in their schoolyard.

The sixth topic covered energy, water, and waste management on the city scale. They were introduced to rainwater harvesting, waste management, and how these applications can heal the cities.

On the seventh topic, they designed a sustainable dream home with all that

information and background. Students used the Tinker cad tool, which helped them to design their sustainable homes with a 3D tool.

The eighth topic focused on biodiversity and the systems approach. They discussed the food chain and the interdependence of every animal and system on the earth. Also, bug hotels, bee hotels, and their relationship with aromatic herbs and permaculture gardens were discussed. They created an aromatic garden for their bug hotels. Then, this knowledge was used in the design and application of their schoolyard; they created bug hotels and herb gardens.

The ninth topic focused on basic design principles and eco-art applications that they can use to design their schoolyards. They met with yarn bombing, nature art applications, and eco-art applications that they could use for recycling; they made birdhouses from recycled materials.

After the sustainability workshops (between January-March 2021), students were encouraged to develop ideas and design their schoolyards during April and May 2021.

Finally, the tenth topic focused on discussing the conditions of their schoolyard, evaluation of the outdoor space, how sustainable the garden is, and how it can become more sustainable. In this process, they prepared various drawings, ideas, and models that illustrated how their schoolyard could become more sustainable. The process was supported by the model preparation, poster, and drawings. During this stage, they developed designs and ideas for their schoolyard by using the knowledge they gained from the online workshops. For two months, this process continued. At the end of this session, through a democratic meeting, we discussed the ideas and chose the best ideas that could be applied to the schoolyard by using the Miro open board. At the same time, the schoolteacher joined us in choosing the ideas, and meetings were held with school principals about the design and application of those ideas.

After that process, Covid lockdowns were over; therefore, students could meet in the garden for face-to-face

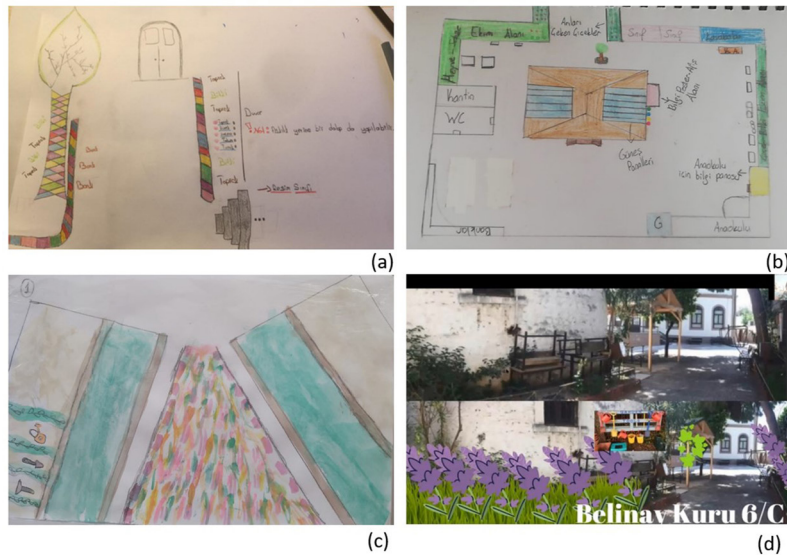


Figure 4. Drawings and collages of the students from the design process of the schoolyard. (a). Student sketch on eco-art and permaculture design of vegetable garden. (b). Student work for the schoolyard as a plan. (c). Student sketch expresses the planting area, eco-art, sensory path ideas. (d). Student digital work expressing aromatic garden and organization of the backyard during the online workshops.

applications. The application and the stakeholder processes are explained in the following sections in detail.

The students used the knowledge that they had learned about sustainability and imagined their schoolyards in more sustainable manners. At the end of this phase, online meetings were held, and the students discussed their design and implementation ideas. Together, they selected the ideas that would be implemented.

During June and July 2021, the face-to-face part of the process started as part of the final phase. During that period, Covid lockdowns were not that strict, so the students and the researcher could meet and apply the phase in the schoolyard. The other sample group (architecture students) were also involved in the project in this step. Middle school students, who designed their school garden in parallel with the workshops on sustainability, implemented the selected ideas with the support of the ITU Housing UYGAR research center fund and with the help of Antalya Bilim University, Architecture department students.

Human change is not a sudden process; it happens gradually by experimenting, interacting, learning, and sharing in different and creative ways. Learning about sustainability and out-

door learning space design requires interdisciplinary views and connections. Therefore, curriculum design, informal learning, space design, and sustainability should be interpreted holistically. Thus, the results of this process and projects designed and applied by students might refer to this idea: Space becomes a third teacher and a supportive environment in students' everyday lives.

As it can be noted from the photos of the application process, a recycling station, a permaculture garden, a composting station, vertical gardens, bug hotels, aromatic gardens, and sensory gardens were applied to the site. They developed and relationally located these ideas. As a result, the composting station is located next to the permaculture garden, or bug hotel relates to the aromatic herb garden. There is a hidden curriculum behind these spaces, where students can take responsibility, take care of the garden, spread knowledge, and teach other students. Also, an open classroom was applied to the garden to share the ideas of these sustainable applications.

3.1.2. Sampling

The middle school was selected as the continuation of an ongoing project. The researcher participated in



Figure 5. Applied ideas and designs on schoolyard.



Figure 6. Middle school students and university students working process on site.

sustainability education programs that the middle school carried on under an Erasmus+ program.

Later this research evolved as a part of the researcher's Ph.D. thesis. Voluntary students from the 6th and 7th grades joined the project. The rationale behind the choice of the participants is based on Piaget's developmental periods. Piaget (2015) states in his cognitive development theory that children's learning process develops in parallel with their developmental phases. For him, between 0 to 7 years of age, the environmental perception is limited. Therefore, sensory-based learning spaces and programs should be designed in this process. He defines the period between 7 to 11 years of age as the concrete operations period, when environmental perception is developed. The period after 11 years of age is defined as the abstract operations period. The sampling of this research is limited to 12-year-old middle school students. This developmental group has an environmental perception and concrete and abstract thinking abilities. Thus, while designing the curriculum, child development research was embedded in the process and workshop program.

Child development, developmental psychology, sustainability education, and spatial design should all be taken into consideration and integrated while developing a curriculum and spatial design. An intensive rainforest lesson could take place in middle or high school, it has no place in elementary school classrooms (Sobel, 2014:25).

In the face-to-face phase of this pilot study, 3rd-year architecture university students joined the application process. After they joined, middle school students were more active and felt more responsible. They developed ideas on site together, and the canopy of the sensory garden was designed and developed on-site together with university and middle school students.

3.1.3. Multi-stakeholders

The researcher and one counselor teacher from school were involved in this process. The counselor teacher was the connection with the school. After the implementation of the ideas,

she will continue the organization of responsibilities among students, and they will take care of the garden. Also, a sustainability club has been created to develop, spread these ideas, and share the knowledge of these spaces. An open-air classroom supports this idea as a spatial quality and through the use of open-air classroom students will share and teach other the responsibilities of schoolyard garden.

This practice-based pilot study gives importance to its multi-stakeholder structure. Each step of this process includes various stakeholders, as explained in the figure below.

As it was noted earlier, multi-stakeholders joined this process from beginning to end. Even though the researcher developed and designed the curriculum of online workshops, she was not alone during online workshops or site applications. One middle school counselor teacher was involved in all these online and face-to-face meetings. She was also a tie between school management and our project.

In the first phases of these online meetings, various meetings were held with the schoolteacher to explain the curriculum. In addition, the teacher joined all classes and supported students in this process.

In the application process, ITU Konut UYGAR Research Center funded the project. After deciding on the projects that would be applied, the researcher created the budget and all the material lists.

Also, in that phase, the meetings were done with the school principal and students, and the researcher explained to them the site designs and requested permission to apply them to the schoolyard.

Antalya Bilim University Architecture Department 3rd grade voluntary students joined in that process, and they interpreted this pilot study as a social architecture process. It was a crucial experience for them. First, they met with the middle school students and discussed the site design and students' ideas.

Also, they had the chance to work together, apply the designs to the schoolyard, and develop new ideas and solu-

tions with the middle school students -as they have designed the canopy at the entrance of the sensory garden and applied the canopy together with the children on site. (The images and video can be reached from the social media accounts of the workshop.)

The workshop's goal was to strengthen the students on sustainable practices and support them in imagining and designing their school environment.

While working in such conditions and trying to interpret education, learning, sustainability, and design areas together to develop a holistic curriculum for the future, including multi-stakeholders in the process is vital. Creating partnerships on those processes with; NGOs, permaculture designers, universities, architecture, planning and landscape students, social architecture clubs, and researchers would strengthen the schools and education systems. These collaborations can be created strongly by the school and public municipalities.

3.2. Field research: Evaluation of schoolyards in Antalya, Muratpaşa

The field research of this study scans and evaluates the schoolyards in Muratpaşa, Antalya, where the pilot study school is located. This field research is intertwined with

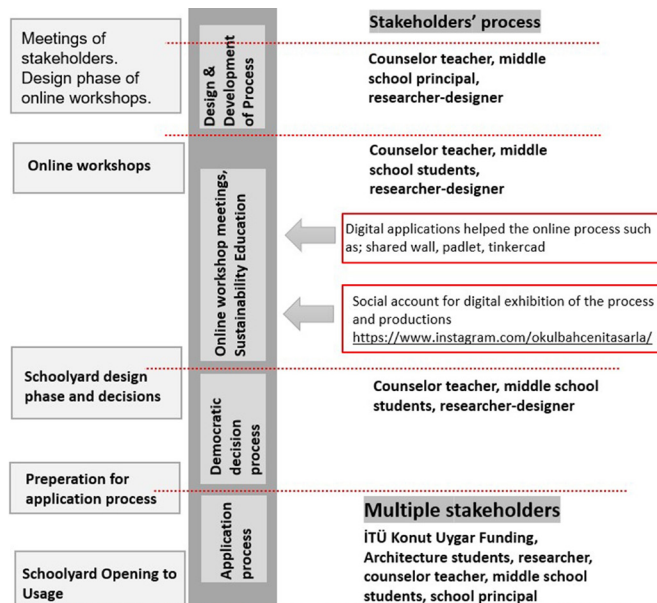


Figure 7. The pilot study process and its relationship with different stakeholders.

Table 2. Muratpaşa district, middle school garden measurements.

	School name	total parcel (m2)	building floor area	school garden	soft scape	hard scape	resting sitting area	sports area	parking area	play area	student number	teacher number	class number	soft scape per student	hard scape per student
1	Muratpaşa Ahmet Bileydi Orta Okulu	3.181	843	2.338	95	2.079	172	400	298		666	37	27	0,14	3,12
2	Ahmet Ferda Kahraman İlkokul ve Orta okulu	1.876	484	1.392	46	1.346	53	416	109		724	29	18	0,06	1,85
3	Ahmet Yesevi İlkokul ve Orta okulu	4.129	646	3.483	80	3.403	85	1.014	119		501	25	18	0,15	6,79
4	Atatürk Ortaokulu	4.500	1.000	3.500	66	3.434	66	255	0		1377	68	38	0,04	2,49
5	Barbaros Ortaokulu	5.572	1.279	4.293	910	3.383	360	911	189		689	42	20	1,32	4,91
6	Başöğretmen Atatürk Ortaokulu	3.744	1.063	2.681	500	2.181	225	514	0		1377	68	38	0,36	1,58
7	Cumhuriyet Ortaokulu	2.050	622	1.428	37	1.391	25	660	0		332	24	14	0,11	4,18
8	Dr. Galip Kahraman Ortaokulu	5.267	600	4.667	175	4.492	50	1.400	567		514	39	11	0,34	8,73
9	Dr. İlhami Tankut Ortaokulu	1.732	673	1.059	40	1.019	78	310	43		279	21	14	0,14	3,65
10	Dumlupınar Ortaokulu	2.141	609	1.532	60	1.472	60	220	100	130	233	14	8	0,25	6,31
11	Emel Sevgi Taner Ortaokulu	5.580	1.160	4.420	245	4.175	245	688	0	748	1256	46	30	0,19	3,32
12	Ermenek Ortaokulu	12.077	2.113	9.964	3.112	6.852	522	869	0	907	182	21	33	17,09	37,6
13	Faruk Tuğaylı Ortaokulu	2.782	911	1.871	190	1.681	150	721			583	21	33	0,32	2,88
14	Fatih Ortaokulu	10.153	2.345	7.808	280	7.528	280	1.209	450		397	29	15	0,7	18,9
15	Fatmağül Özpınar Ortaokulu	4.375	1.199	3.176	70	3.106	90	781		311	1083	47	33	0,06	2,86
16	Güvenlik Ortaokulu	3.841	982	2.859	180	2.679	180	569			691	35	30	0,26	3,87
17	Güzelsoba Ortaokulu	9.548	1.626	7.922	2.072	5.850	110	583			860	52	30	2,4	6,8
18	Hamza Taş İmam Hatip Ortaokulu	4.817	825	3.992	150	3.842	115	853		189	729	46	25	0,2	5,27
19	Hanım-İmer Çağırın Ortaokulu	4.488	784	3.704	320	3.384	280	400	396	128	1279	50	36	0,25	2,64
20	Hasan Kaya Ortaokulu	5.474	761	4.713	245	4.468	125	1.910			355	29	16	0,69	12,5
21	İnönü Ortaokulu	3.882	1.386	2.496	130	2.366	70	784	450		485	44	24	0,26	4,87
22	İrfan İlk Ortaokulu	4.584	876	3.748	180	3.568	130	418		239	629	40	24	0,28	5,67
23	İstiklal Ortaokulu	7.677	1.364	6.313	300	6.013	400	1.835		590	766	48	14	0,39	7,84
24	Kamilie Çömlekçi Ortaokulu	5.627	850	4.777	60	4.717	105	1.054		291	597	47	27	0,1	7,9
25	Kazım Şanöz Ortaokulu	4.519	1.012	4.418	80	4.338	60	624		265	712	33	29	0,11	6,09
26	Konuksever Ortaokulu	3.127	696	2.431	80	2.351	240	416		211	970	46	22	0,08	2,42
27	Mecidiye Başakıncı Ortaokulu	5.200	1.466	3.734	140	3.594	40	1.245			1.529	69	35	0,09	2,35
28	Mehmet Akif Ersoy İmam Hatip Ortaokulu	2.743	780	1.963	90	1.873	60	484			273	26	13	0,32	6,86
29	Melahtat Faraçlar Ortaokulu	3.952	1.075	2.877	100	2.777	300	611			1.049	41	9	0,09	2,64
30	Merkez Ortaokulu	4.544	1.154	3.390	50	3.340	50	849			1.016	67	31	0,04	3,28
31	Meryem Mustafa Ege Ortaokulu	3.456	1.060	2.396	90	2.306	200	616			935	59	30	0,09	2,46
32	Muratpaşa Ortaokulu	4.273	1.084	3.189	150	3.039	170	345		345	572	43	21	0,26	5,31
33	Muratpaşa Yenigöl Ortaokulu	1.608	470	1.138	90	1.048	90	408		60	67	9	4	1,34	15,6
34	Mustafa Asım Cula Ortaokulu	4.539	858	3.681	330	3.351	280	208	230	210	483	29	16	0,68	6,93
35	Naciye Havva Manavşak Ortaokulu	4.943	801	4.142	900	3.242	180	583		176	409	34	16	2,2	7,92
36	Nadire Konuk Ve Ali Oğuz Konuk Ortaokulu	11.398	1.788	9.610	560	9.050	350	1.844	886	587	717	51	30	0,78	12,6
37	Namık Kemal Ortaokulu	6.692	1.776	4.916	400	4.516	180	200	783		1221	71	40	0,32	3,69
38	Vali Hüsnü Tuğlu Ortaokulu	5.590	1.524	4.066	165	3.901	110	904		423	728	35	24	0,22	5,35
39	Vali Salim Çotur Ortaokulu	5.034	934	4.100	190	3.910	180	590	112	177	873	59	33	0,21	4,47
Total		190.715	41479	150.187	12958	137.065	6466	28701	4732	5987	28138	1594	929	0,46	4,87

the participatory pilot study. As a supportive phase while scanning the schoolyards, the field research aims to discuss if these spaces are efficient for learning about sustainability and if they include sustainable practices. The results show that an urgent transformation that interprets these spaces together with curriculum, space design and sustainability is needed in schoolyards.

Antalya faced a crucial threshold in terms of urban development in 1980 with tourism development. The city has received a lot of immigrants. Urban space has been affected by these economic changes. Parallel to this urbanization process, natural areas in the city decrease, while the built environment increases.

The population of the city by the end of 2020 is 2.548.308. Considering the 2012 population of Antalya, for 1.073.794 inhabitants, there is 4,2 m² of active green space per person (Manavşak & Ortaçşme, 2016); for the Muratpaşa district, this number is 3,2 m² of active green space per person (Ortaçşme et al., 2005).

The field study aims to scan and analyze the current situation of secondary/

middle schoolyards in the Muratpaşa district. Several points have been analyzed, measured, and evaluated to discuss if these spaces contain any spatial qualities related to sustainable practices.

The field study measures Muratpaşa district middle/secondary school gardens with Google earth street view, and on-site visiting methods. Thirty-nine middle school gardens in the Muratpaşa district have been analyzed in terms of some spatial qualities such as parcel area, garden square meters, building floor area, area, soft ground, hard ground, play, sports, resting areas, parking areas, also includes student numbers to find some relations in between soft scape and student numbers.

After the field analysis, the following main problems and missing points of the schoolyards have been identified:

Playground areas of the schoolyards are only two-dimensional areas created by the borders drawn on the ground. There is no three-dimensional play-scape in schoolyards.

Sports areas and playground areas are disconnected from the whole garden; there is no relation or connection between these functional areas and soft

grounds.

There is no relationship between the indoor and outdoor areas of the schools. Also, outdoor areas are designed without any consideration of learning processes or curriculum.

Many schools and their gardens have the same typology. They have a vast hardscape as a garden, and these hardscape areas are used as parking and sports areas; generally, there is no connection with the landscape or soft grounds.

There are no sustainable practices nor any applications in the schoolyards. There are no activities or spatial designs related to learning in the school gardens, such as open classrooms, coops, or planting gardens.

Soft grounds, which are not efficient, are in passive usage. They are positioned around the school borders with 70 cm to 1-meter width, which does not permit active usage. Therefore, soft grounds cannot work as active green spaces.

Parking areas are not limited by borders in the garden. Therefore, any spot in the garden can become a parking lot; thus, they occupy all the functional areas in schoolyards. There is a car dominance in the schoolyards.

The benches are generally positioned on the hard grounds; very thin and useless soft ground areas surround the seating areas. They are arranged in a row throughout the garden without any clustering or organization.

Garden furniture and outdoor elements are mostly fixed to the hard ground for safety. Therefore, no garden furniture is moveable, flexible, or changeable in terms of flexibility and openness to change garden elements and designs.

The research results reveal the excess usage of hard ground and inadequacy of soft grounds per usage and student. The amount of soft ground per student is 0.45 m². Almost no soft ground or green space usage is available for students. The hard ground per student is 4.87 m². These rates are far below the Antalya rates. Hardscapes cover most of the square meters of the garden, and schoolyard functions such as games, sports, and rest are located on hard

grounds. The soft ground ratio is insufficient compared to the garden size.

Innovative approaches and interdisciplinary perspectives that interpret design, education, and sustainability together are urgently needed in school gardens.

4. Discussion and results

This practice-based pilot study underlines that learning by doing, Place-Based learning, participation, and taking responsibility has an essential role in the learning process about sustainability. The fieldwork of this research traces the schoolyards to evaluate if they are sufficient for outdoor environmental learning about sustainability. Moreover, it exposes that the schoolyards do not include any outdoor environmental learning potential. As a result, new approaches are emerging to blend the hidden curricula focusing on learning about sustainability with spatial designs that follow and support the qualities of the informal learning processes. Informal learning processes are presented in this research to combine learning about sustainability in everyday life of students as an outdoor environmental learning style and with a practice-based process.

The practice-based pilot study of this research discusses first, how to transform schoolyards into learning spaces by creating a curriculum to apply spatial design and second, to involve students in the process and encourage them to discuss the problems of their environment and find solutions and design ideas for their schoolyard.

This research also aims to be an example for future studies that would like to generate ideas regarding the disciplines of sustainability, informal learning, and spatial design.

This research is an experimental process that aims to open a discussion on the design of the schoolyards, and it aims to underline that it is not all about the design discipline. Instead, the schoolyard and school design should be managed with multi-stakeholders as an “in between area” that has ties with various disciplines such as sustainable design, alternative learning styles, and

education theories.

The field research part of this study scans the middle schools of Antalya, Muratpaşa district, highlighting the poor conditions of schoolyards. Muratpaşa district analysis is a very small-scale sample. Hopefully, this research will inspire future studies, and more detailed research will be done on evaluating schoolyards on the city and national scales.

The field study exposes that the nature-child connection is missing in almost all schools, and soft ground per student level is shallow (0,45m²). Therefore, there is an urgent need to transform school gardens, looking at them through new lenses. This study aims to give some experience-based solutions and roadmaps for interdisciplinary studies in the design and education field.

The field study achieved its goal, and it proves that the schoolyards need an urgent new approach, and they need to be interpreted with more practice-based and experience-based studies. The pilot study supports these findings and unfolds a practice-based experience with children participation. The curriculum and the stake holders support this process and students are supported to develop new ideas on their own garden.

This practice-based pilot study which is supported with the field study data aims to open a new discussion on schoolyard developments and secondly; aims to be a good practice and example for the future studies on learning landscapes.

Additionally, the research declares that schoolyards are vital spaces for meeting with nature, cultivating sustainable practices in children, and for becoming active citizens. Design methodology of schoolyards as outdoor learning areas is an emerging field -and should be interpreted with multi-faceted approaches to include curriculum, pedagogy, ecology, and environmental education in these learning landscape design disciplines.

The curriculum generated for the practice-based workshops and the ideas developed and applied by the middle school students is important because of its valuable inclusive and

multi-stakeholder process. Below some essential points and findings of the practice-based study are explained:

- Design and project-based online workshops helped students to learn about sustainability principles and practices and supported them while designing the schoolyard for learning about sustainability.
- Students discussed and made decisions together at the end of the workshops. This democratic process supported them in listening to, learning from each other, and making decisions together, a step of the participatory process.
- Students develop and design their schoolyards. This valuable process may also support them in place attachment, sense of belonging, owning their schoolyard, and the sustainable values they created together for their own spaces.
- Families were involved during online workshops, and the knowledge was somehow passed from students to the families. While the students were doing design projects for online workshops, they explained and applied what they had learned to the families. (Creating a composting project at home or designing a poster to reduce the carbon footprint of home usage can play an essential role in transforming families into sustainable practices.)

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Through this link more images and videos can be found: <https://www.instagram.com/okulbahcenitasarla/>

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