

EDU-CATE TED COLLEGE SCHOOLYARD LANDSCAPE AND VERTICAL GARDEN DESIGN

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ABSTRACT. TED College schoolyard landscape and vertical garden design project in the Güzelbahçe district of Izmir, within the scope of the EDU-CATE project, has been realized under the scope of the "Introduction to Contemporary Architectural Landscaping" course. The area was visited and analyzed before starting the design. In line with these analyses and the needs stated by the users, design decisions were made for different areas in the light of certain parameters. These design decisions were combined with the appropriate choice of materials, plants, colors, and forms, and the final outputs (2D technical drawings, plant schedules, 3D models, and renderings) were prepared and ready for the implementation phase of the design. These final outputs were presented to the school administration of TED College with all the details (technical drawings, 3D visuals, material, and price lists).

Keywords: *landscape, nature, educate, vertical garden, schoolyard*

INTRODUCTION

"We must choose everything we paint from nature and take the most beautiful things from nature." (Leonardo da Vinci)

Since the beginning of history, humans and nature have been linked and nature is an endless source of inspiration for humanity. Even a little interaction with nature could refresh senses and rejuvenate minds. In other words, human beings need nature while performing daily activities. Human-nature experiences, which suggest that humans seek connections between nature and other forms of life, were presented in 1984 by biologist Wilson [1].

Childhood and adolescence periods are the most active periods in considering human physical and mental activities. As Lilian Fried et al. explained in 2003, although human development is nowadays generally understood as a lifelong process, there is hardly any stage that does not reach the extent of progressive change as in early and middle childhood [2]. The development of basic skills in motor, cognitive, and social development during the childhood and adolescence periods was identified by Prof. Dr. Renata Zimmer in 2007 [3].

The healing and positive effects of spaces that imitate and are integrated with nature on human health and well-being have been proven in the field of architecture and design [4].

As Pile (1993) highlighted, the designer aims to ensure that the needs of users are combined with the designer's wishes for the areas to be designed to be conveyed in appropriate ways. Since the image is the first element that people feel, it reaches the

person before the design and ideas; this is called visual perception [5]. Schools can be given a common example for these areas. Schools are crucial educational institutions where children spend most of their time with their peers to gain healthy competence and build their future.

Besides, at school, children create some interactions with the school's environment unavoidably and all of these relationships affect children's personalities and psychologies. As Vural (2017) in XXL Design magazine clarified playing outdoors increases children's physical activity, stimulates their imagination and creativity, and improves their immune system. Well-designed playgrounds help children's physical, emotional, social, and intellectual development. Children's world starts with toys in the playroom and takes shape in kindergartens, schools, hospitals, public spaces, and parks. Architecture and design closely affect children's daily lives, psychology, education, and physical development, and can even play a vital role [6].

Unfortunately, children today are increasingly growing up in spaces with limited access to nature [7]. Greening schoolyards offers an opportunity to increase children's contact with nature while providing environmental benefits such as stormwater control, and air pollution filtration. In addition, heat island reduction makes an important contribution to global climate action [8].

Considering all these analyses, it is an undeniable fact that an effective area design based on natural elements under the supervision of environmental benefits can support children's creativity and performance. Based on this design concept, the landscape design project for TED College located in the Güzelbahçe district of Izmir, Project has been realized under the scope of the "Introduction to Contemporary Architectural Landscaping" course with the main title "EDU-CATE".

There are different areas within the EDU-CATE Ted College schoolyard landscape design project. With the help of the designed areas, such as vertical garden areas, balustrades, different sports activity areas, and green workshop areas, the project aims to answer different user needs. In the materials and methods part, the overall school garden design and the vertical garden design, which is the most important part of the overall design, are presented with a detailed pre-design site and SWOT analysis, conceptual planning, and 3D modeling stages. Afterwards, in the results and discussion part, the results of the design are obtained and discussed under the two sub-headings of plant schedule and final version.

MATERIALS AND METHODS

General Ted College Schoolyard Design

Site and SWOT Analysis

Before we began the landscape project for the TED College school garden, we visited the site to analyze the terrain and make initial observations. Several problems were identified during this visit. First of all, in the design of the school garden, which serves as an outdoor corridor between the school building and the entrance gate, it is noticeable that large areas have been created with the activity needs of the students in mind (basketball court, soccer field, etc.). However, as these areas are not planned in detail, there are some problems. For example, there is no direct access to the school building in bad weather except via the school garden. In addition, the use of concrete and the lack of

green space dominating the school garden is another issue that needs to be addressed. In the site analysis diagram (Fig. 1), which was created by analyzing the course of the sun and the direction of the wind, these areas were examined in detail.

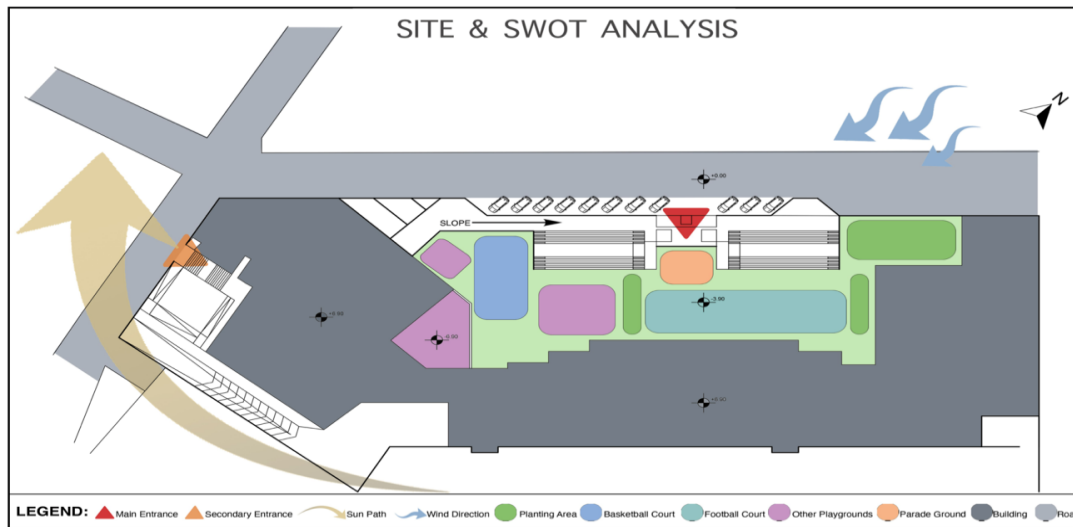


Fig. 1. Site and SWOT analysis diagram of TED Collage schoolyard

Conceptual Plan

The design concept is developed based on the site and SWOT analysis and aims to improve the insufficient green area in the school garden with the design of shaded areas that are well integrated with seating and resting areas which are quite insufficient in numbers and design alternatives. Additionally, to transform the large, unused concrete wall, approximately four meters high and sixteen meters long, a design proposal has been created by benefiting the elevation difference of the existing land, to enable a direct visual relationship with the main building of the school. This wall is designed as the core of a green courtyard with a vertical garden design and aims to reclaim the idle area in the school garden as a green workshop area where students can experience plants. The selection of materials and plants, which are the most important factors to support this design concept, is based on sustainability, suitability to the existing site, and adaptability to seasonal conditions.

The shade created by the integration of vertical wooden elements and cypress trees in the seating areas was designed while retaining the position of five existing palm trees (Fig. 2) in the TED College school garden. At the same time, these favored elements are intended to prevent possible accidents with the ball, as they serve as both a three-dimensional and two-dimensional separation between the different areas for sports activities. The fern used in the general landscaping is integrated into the edges of the seating areas due to its adaptability to temperate climates, its perennial nature, and its healthy development in partial shade.

For the children's playground, marked number six in the upper left corner of the conceptual plan (Fig. 2) of the TED College school garden, a flexible and soft floor material was chosen that prevents slipping, is durable, and minimizes injury in the event of a fall. The tezzo pebble coating material used in sports and walking areas not only drains water underground but also supports comfortable walking and activities.

The availability of different color options helps to differentiate the areas. The natural pebble flooring used in the workshop area, shown in number five (Fig. 2), provides a natural look and feel in keeping with the overall concept of the space. In addition to other areas, the workshop area is a space that requires minimal movement. For this reason, natural pebble stone was preferred and a holistic design was sought to suit the purpose of the area.



Fig. 2. Conceptual diagram plan of TED Collage schoolyard 1/500 scale

3D Modelling and Renders

As a third step in the research and design methodology in this article, 3D models and rendering images of the areas designed according to the TED College School Garden landscape design concept were created. The seating areas, which serve as dividers between the different activity areas in the school garden and are supported by wooden elements and cypress trees, are brought to life for users (Fig. 3). While the existing soccer area in the school garden was retained, the material of the existing ground was changed and replaced with a tezzo gravel surface to allow water to drain more easily to the ground and make activities more comfortable (Fig. 4). Due to the elevation difference created by the land on which the TED College school garden is located, the railings that generally dominate the school garden were provided with potted plants and planting details and incorporated into the design of the green space in line with the holistic design approach (Fig. 5). A vacant area in the schoolyard was designed as a workshop area where students can experience vegetation and plant materials in a form appropriate to the design approach of the EDU-CATE project (Fig. 6).



Fig. 3. Seating area



Fig. 4. Football field area



Fig. 5. Balustrades



Fig. 6. Green workshop area

Ted College Vertical Garden Design

The large dull concrete wall (Fig. 7), which exists due to the difference in elevation of the existing land of the TED College school garden and is directly visible from the school facade, was to be transformed into a green area with a vertical garden design.



Fig. 7. Existing large dull concrete wall in the schoolyard

The aim was to transform this wall, which plays only a structural role in the space, into a more interactive area for school users such as students and teachers. This design idea created a composition by combining plants of different types, textures, and colors with organic forms.

Interactive Design Aspect of Vertical Garden

In this composition, in addition to the plants, the students were interactively introduced to the details of the wood panels that are an important part of the vertical garden. The wood-like composite material was preferred for these panels since it is resistant to water and weather conditions, additionally, it can be written on and wiped clean, has a glossy surface, and is cost-effective. The wooden panels used do not require additional production costs as they are available in standard panel sizes.

The preferred installation of this material, which has several installation options, is the clip-on (interlocking installation method) (Fig. 8). The main reason for this is that it provides easy access to vertical garden elements (drip irrigation pipes, planting pockets, etc.) when needed.

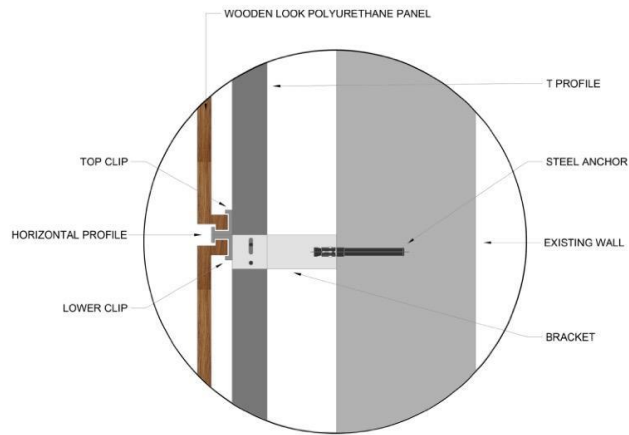


Fig. 8. Vertical garden wooden panel of installation detail 1/10 scale

The Elements of Vertical Garden Design

When the technical details (Fig. 9) of the irrigation system for this green wall were worked out, two rows of water pipes were used in the irrigation system to take advantage of the two rows of water pipe holes already present in this wall, which is four meters high and sixteen meters long. In this design, drip irrigation was the most efficient irrigation system. Considering the water requirements of the plants favored in the vertical garden, a two-hundred-and-fifty-liter irrigation water tank was chosen.

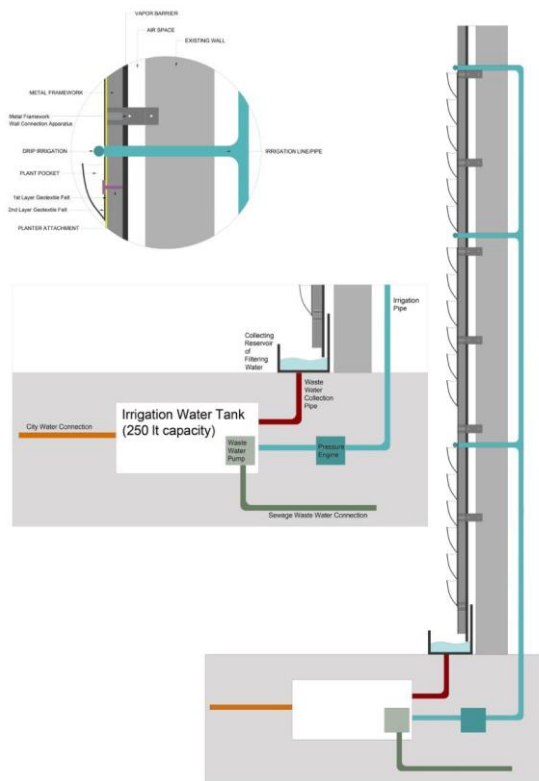


Fig. 9. Vertical garden irrigation system detail drawings

A total of four different types of plants were used in the vertical garden design, taking into account climatic conditions, propagation characteristics, growth levels, size, and

texture (Fig. 10). Three of these plants are very close in size and are small plants suitable for vertical garden applications. These plants are Baby Tears, Sedum Alba Micranthum, and Jackmans Blue. The fern plant, which is the final choice, is used as a border between other plants to create a different texture and is a larger plant in size. Once these plants had been selected to match the design, their positions in the vertical garden, the areas they cover, and their forms were decided and the final form of the design, supported by wood-like polyurethane panels, was detailed. The area calculations of different types of plants in the vertical garden were made and the material and plant chart of the vertical garden (Fig. 11) was prepared.



Fig. 10. Vertical garden area partial section drawing 1/50 scale

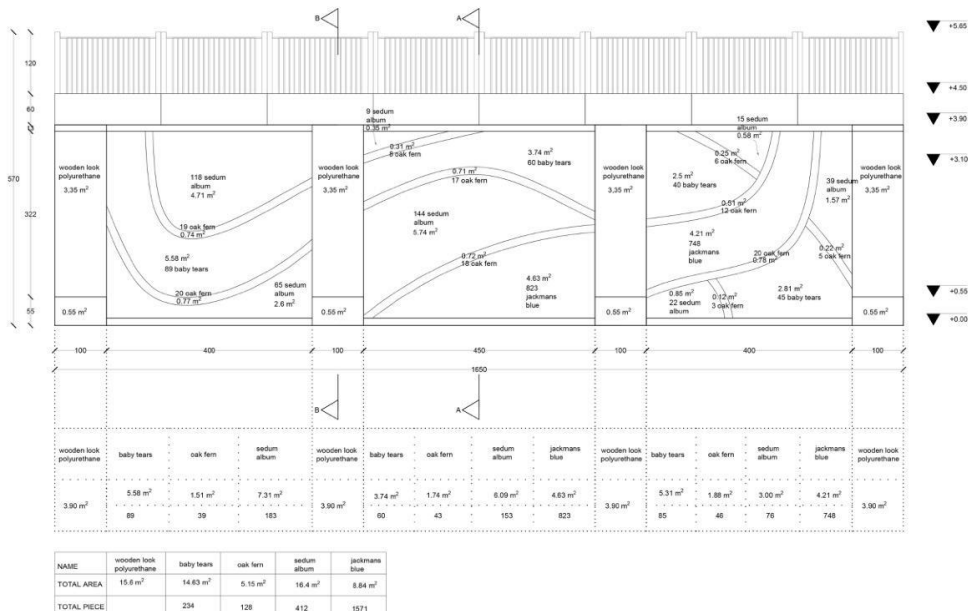


Fig. 11. Vertical garden area front elevation drawing 1/50 scale and material-plant areas chart

RESULTS AND DISCUSSION

Planting Schedule of Ted College Schoolyard Design

In the result and discussion section of this article, the planting schedule (Fig. 12), which was prepared to help finalize the design after all these data were obtained in the general design and vertical garden design of the TED College school garden, explained in detail the visuals, names, quantities, use areas and dimensions of the plants used. The preferred plants in the vertical garden area, which have an important influence on the design of the TED College school garden, are separated by color in the table.











	PLANT SYMBOLS	ENGLISH NAME	LATIN NAME	QUANTITIES	DIMENSION
P L A N T I N G		Ruffled Oak Fern 'Plumosum'	Gymnocarpium dryopteris 'Plumosum'	5.15 m ² used in vertical garden	15 - 30.5 cm height 20 cm width
		Artillery Plant 'Baby Tears'	Pilea Depressa 'Baby Tears'	14.63 m ² used in vertical garden	25 cm width 10 cm height
		Common Rue	Ruta graveolens Jackman's Blue	8.84 m ² used in vertical garden	7.5 cm height 5 cm width
		White Stonecrop	Sedum Album Micranthum Chloroticum	16.4 m ² used in vertical garden	width 15-20 cm height 5-10 cm
		White Flowering Vine	Clematis armandii	It was used enough to cover 5 flower pots on the terrace	It blooms 6.25 cm white flowers
		Star Jasmine	Trachelospermum jasminoides	about 30 flower pots used in terrace	12.5 - 15 cm height
S C H E D U L E		English Ivy	Hedera helix	It was used all plant pot areas	30 height x 20 width meter
		Lawson's Cypress 'Ellwoodii'	Chamaecyparis lawsoniana 'Ellwoodii'	28 pieces	60 height x 20 width meter
		Palm Tree	Arecaceae	9 pieces	25 height x 3 width meter
		Five-fingered Maidenhair Fern	Adiantum pedatum	16.4 m ² used in vertical garden and used in all flower pot areas inside the schoolyard	50 cm height x 50 cm width

Fig. 12. Planting Schedule

Final Version of the Overall Schoolyard Design

As a result of all this research, site analysis, conceptual planning, selection of materials and plants, 3D modeling, and renderings were prepared for the final applications of the EDU-CATE TED College schoolyard and vertical garden design project. In the 3D renderings, which dominate the overview, it can be seen that the two main areas of activity in the school garden, the basketball court and football field, are separated in three dimensions from the other areas by the seating areas located on three sides of the basketball court (Fig. 13 and Fig. 15). While the harmony of wooden materials and plants used in the seating areas creates a transparent canopy effect, the vertical wooden elements also create a dynamic rhythm that reinforces the design language (Fig. 14). The organic form created in the vertical green garden composition aims to create a fluctuating effect on the plants, which are mobilized by the effect of the wind, and to turn the wind, which is a natural external factor, into a design element (Fig. 16).



Fig. 13. Overview of basketball court from football field



Fig. 14. Playground area



Fig. 15. Overview of the schoolyard from the corner



Fig. 16. Basketball court and vertical garden

CONCLUSION

In conclusion, within the scope of the EDU-CATE project, which acts with a holistic design principle in the general design of the school garden of TED College in the Güzelbahçe district of İzmir province; the deficiencies of the school garden design, the details that exist and are intended to meet the needs of the users and their solutions are presented with 2D technical drawings, 3D renderings, and diagrams.

This design study was carried out to meet the needs of adolescence and childhood period which is highlighted by Zimmer in 2007 [3]. Throughout the whole design project, the overall design is based on the requirements of the users, the duration and the way they experience the area, the materials and plants used, the qualities suitable for the area (seasonal suitability, suitability for the sun and wind direction, suitability for the budget) and the self-renewing holistic design approach.

According to Vural, architecture and design play a vital role in children's psychology, education, and physical development [6]. That is why, parallel to the dynamic development of the child, the design of the environment dynamically and harmoniously with nature has paved the way for the formation of a complementary whole. To sum up, it has been experienced throughout the project process that it is an undeniable fact to consider the needs of the inner world of children while structuring the outer world.

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