

Education Process and Development of Environmental Design Project

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ABSTRACT The environmental design process can be described as designing and sustaining the places where people live in the external environment. Within this concept, the stages in the Environmental Design course at KTU and their outcomes will be addressed in this study. The project education process starts with the determination and analysis of the current situation and ends with defining the subject, developing ideas for design and shaping this option. It will be attempted to show how to create different options for the same subject by providing from student works and how to develop the project education process of environmental design. The purpose of this education and paper is to regulate knowledge and to help the designer reach and use correct information at the right time. The eigenvalue of this study is to teach the preparation of environmental design projects approach in landscape architecture education and to explain the benefits of education.

INTRODUCTION

The design process, under normal circumstances, begins with the interview of the employer with the designer for a project task and with the signing of the contract (Demir 2015). The design education process at Karadeniz Technical University, Faculty of Forestry, Department of Landscape Architecture starts with the gathering of the instructors who will administer the project course and the assistants who will assist them and with the selection of a proper field by complying with the subject of the term. While making the selection, multilateral thinking is required and special attention is paid to the selection of a project field from which students will benefit in every way.

Research and analysis phases follow the field selection. At this stage, the inventory and analysis of the current state, specifying the requests of the employer or the user carry a great significance. In the design, in addition to the data such as topographic structure, environmental conditions, existing flora and infrastructure, the life-style and requests of the user are carefully assessed. Otherwise, the design process begins

problematically (Pazarlioglu 2016). A project, the starting point of which is based on a faulty design cannot be realistic. At Karadeniz Technical University, Faculty of Forestry, Department of Landscape Architecture, it does not carry much significance that the projects that are carried out and developed for 5-6 months in the Environmental Design Project course are applicable. Especially in the projects of lower grades, in other words, 1st and 2nd grades, the applicability part of the project is not dwelled upon for the purpose of improving students' imagination and creativity. However, in the projects of the last term, the criteria of applicability are given significance for the purpose of adjusting students to their career.

Following the research and analysis phase, within the framework of the acquired data, the design phase is completed with the successive stages such as the space use, concept plan, form studies, predesign, production of alternatives and final design as a result of developing the selected offer.

After the acceptance of the final design, the preparation of other documents begins. At this phase, environmental design project education

is completed with the floor covering, vegetation and accessories, construction details regarding this plan.

Objectives of the Study

This training and the purpose of the paper is to teach students how to design information on architecture beyond the landscape architecture students, and to teach them how to use the right information at the right time. This research provides environmental design project education provided in the department of Landscape Architecture. This process will be explained together with examples in the research.

Environment and Open Space

The term “space” is used to identify any of three-dimensional area surrounded by the surfaces of encircling elements in a design. Space is determined with tiling, walls, folding screens and ceilings in the building; with the physical landscape elements such as flooring, plants, walls, natural or artificial fences or coverings, tree trunks and crowns, gazebos and pergolas outside the building (Seçkin et al. 2011). The basal plane that defines the outer space consists of earth, aggregate, concrete, asphalt, natural or artificial stones, wood, rubber, grass, mulch or floor covering plants; profile planes, walls, natural or artificial fences or coverings, earth mass, slope, climbing or winding plant, bushes and trees; ceiling plane of roof, tree crowns, even clouds or the sky (Lawton 1970; Rapoport 1977).

Indoor space is the first to be perceived from the term “space”. Since outdoor spaces are mostly a whole of trees, bushes, artificial fences or coverings and buildings, perceiving the volumes formed among them as space is difficult at first sight for those outside the occupation. Because perceiving these volumes as space requires education and experience.

In a good environmental design, the health of all the living organisms is protected, improved and the benefits and damages of natural events are evaluated as a whole. A successful design must consider bigger environmental issues that affect the region, country, and even the world (Kucuktamer and Uzunboyulu 2015). Such a design approach is named landscape design (Mel-

by and Cathcart 2002; Booth and Hiss 2008; Baner et al. 2015).

Table 1: Environmental design project process and developmental stages

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1. *Stage: Project Area Determination*
 2. *Stage: Research and Analysis*
 - Procuring the prepared map
 - Land survey
 - Land analysis
 3. *Stage: Design*
 - Land use
 - Function diagram
 - Stain/Concept Plan
 - Form Design
 - Predesign
 - Production of alternatives
 - Final design
 4. *Stage: Preparation of Other Documents*
 - Hardscape-Softscape plan
 - Planting design
 - Details design
 - Sections and aspects
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Following the project field determination phase, preliminary sample research for the field analysis and design is carried out. The design is carried out fundamentally in three stages; concept, predesign and final design (Table 1) (Collins and Adleman 1988; Reid 2002; Molnar and Rutledge 1992; Booth and Hiss 2008; Bertauski 2008).

Objectives

The environmental design process can be described as the art and technique of designing, arranging and sustaining the places where people live in the external environment (Krukaset 2016). This process requires not only the creative talent of the environmental designer (landscape architecture) but also utilizing all relevant disciplines, collection of the necessary knowledge and extensive knowledge on incorporation, and having experience, opinion and comprehension properties. Therefore, the approach which is to teach students to prepare environmental design projects in the landscape architecture education will be elaborated in this study (Alpak et al. 2017).

Research and Preparation

This phase is the first step of the design problem solution process, which includes the stages of the preparation of the base map, field survey

and analysis and development of the design program.

Preparation of the Base Map

Before beginning the design, a base map (prepared map) which shows the present environmental conditions and the characteristics of the project field is procured from the related departments of the municipality. A scaled plan which shows all the physical elements such as borders related to the project field, topography, present buildings, roads, yards, infrastructure, and plants is created. This plan is used in the following stages of the design. Therefore, it is profoundly important.

Land Survey and Analysis

The student, while examining the project field for the base map, carries out the survey and analysis of the present physical and cultural conditions and environmental characteristics of the field, which is called the field survey. The survey includes collecting information and documents; analysis covers the assessment of these documents and information. In that case, at this stage, information about natural conditions such as the location of the present project field, its past, environmental conditions, facilities, topography, drainage, soil, flora and climate; transportation and infrastructure facilities is collected. Key strategies and tips regarding how the design solution suitable for the special conditions of the project field can be reached are determined. The success of the study depends on knowing the method for collecting inventory and analyzing it, on comprehending the role of the analysis in landscape design and on the whole and complete examination and comprehension of features, problems and potentiality of circulation, scenery and project field. Most of the information and documents collected in the field survey are acquired by means of strolling and scanning the field and recording everything visible carefully. In these studies, the camera is very important; in this way, the whole scope of the project field and its vicinity or its significant and specific various parts are displayed (Walker 1985).

In the tree inventory, the locations of trees are specified. The expressions used in the field survey must be really plain, as to the expres-

sions in the field analysis, decisions and actions must be emphasized. The effective presentation of survey and analysis is carried out via plotting techniques.

Design Program

It can be defined as a written list or draft of all locations, elements, needs and requests required to create a design solution (Düzenli et al. 2017). The needs and requests of the user and analysis results are combined in accordance with the purpose of the design.

Land Use Plan (Stain Plan, Concept Plan)

The first step of the design phase is the preparation of a plan called function plan or land use plan. It is a settlement plan which shows the locations of all function fields and other design elements determined by the designer namely the student on the project field suitable for the special conditions of the field, in relation to one another, present and/or planned structures and to the environment by means of stains and plotting. This plan is the design frame. In this plan, the ideas are expressed formlessly in the form of stains. In addition to approximate field sizes and capacities, circulation among locations, scenery, direction and other aspects are taken into consideration. These stains are generally rough sketches which reflect the foreseen features of the design. Functional stains are linked with one another; elevations, borders, and curbs are examined. It is paid attention that there are no unidentified spaces. Land use plan is improved by the student for at least two or three classes in accordance with the criticism of the teachers. In this way, new, creative and interesting solutions can be acquired. This plan is a product of intense thinking and examination (Walker 1985; Imbernon et al. 2016).

Pre-design Plan

It is a plan created on the basis of the land use plan. The Environmental Design Course develops step by step, from the analysis to land use plan, from land use plan to pre-design and final design. At the pre-design stage, the most significant design principles, unity, dominance, and balance are very important in ensuring the visual and aesthetic order in design. These prin-

ciples play an active role in the extensive design fields such as architecture, landscape architecture, interior architecture, industrial design, and photography.

Final Design Plan

The final design plan (master plan) is a result of all these design stages. While design studies are near completion, despite the possibility to undergo a change, the final design plan is a largely completed final design solution.

The difference between the final design plan and predesign plan is that the information in the final design plan is more precise, more defined and more detailed. For instance, while only the materials of a specific structural element are defined in the predesign plan, in the final design plan, the type of these materials is examined and lining material and tiling models are improved. According to the final design plan, hard-softscape plan, planting plan, their details and sectional views are prepared.

Hardscape-Softscape Plan

Tiling is an important design element on which pedestrians and vehicles move and perform gathering actions. It has a function of providing action comfort and carrying action load. For action comfort, a suitable flooring; for action load, a sound foundation are required. In that case, tiling generally consists of two layers; the first one is flooring, another one is a basic or bearing layer. Structural (basic, drainage and material quality) and aesthetic features (such as colour, texture, line, form and measurement) are related to the principal integrity and beauty of the design (Beazley 1960; Evyapan and Tokol 2000; Munson 1970; Çilingir 2000; Allahverdiyev and Yucesoy 2017).

Planting Design Project

The plantal design is such a systematical job that it requires logical consecutive decisions based on the combination of objective and subjective information like in any phase of the landscape design process. Plant material must be evaluated with the same method as any construction material which becomes integrated with basic design principles and which has specific functions. Plant material and plant design must

not come to mind at the end of the design job in order to cover construction faults or to add cosmetic value in terms of decorating the surroundings of buildings. The plantal design is a component part of the functions related to other physical elements of the landscape such as earthworks (levelling), tiling, walls, roads, light and water features. As stated before, at the phase of the field survey and analysis, ecological/environmental parameters of the project field are also assessed in order to determine the features of the field and needs of the design, and also to collect information about horticultural requests on the basis of planting. The importance and availability of the present flora in the project field are determined. Plants are used for architecture, aesthetic, engineering and climate control (Walker 1991; Carpenter and Walker 1998; Seçkin 2003; Booth and Hiss 2008). Plant names are important in the planting plan. Every plant is known with its scientific (botanic) and local names. Scientific names are in Latin and must be certainly used. Because confusion is prevented with the use of the scientific name in identifying the plant. In the planting project plan, circular models are used. Large leafed plants are mounted on each other lightly in order for the visual integrity to be lodged in terms of graphics. Plant symbol, its abbreviation, and number are written on the plan. For the plan to be read or in terms of reference convenience, a list of all the plants used in the planting plan must be prepared. In this list, there must be: scientific and local names of the plants, plant abbreviations, total plant numbers, planting height (cm), stem circumference (cm), other particulars (branching height, pot size, plant root condition, flower, leaf, stem characteristics) (Table 2).

Plant uses can be performed in different ways in environmental design projects. These are; architectural use, space making, concealing unfavorable scenes, aesthetic use, making an emphasis, completing the structures, use in terms of engineering, erosion control, directing movement, shielding light, controlling noise, climate control, providing shade, shielding wind and filtering air (Çepel 1988; Kairouz and Atala 2015; Özkan et al. 2017).

Following the planting project, the environmental design project is completed and cross and longitudinal sections related to the whole project are received. The purpose here is to make the invisible parts of the project, namely sec-

Table 2: Plant legend

Code	Plant legend						
	Latin name	Turkish name	Number	Planting height (cm)	Stem circumference (cm)	Crown height m	Other particulars
Acsa	Acer saccharum	Seker akçaaaci	2	390-400	20-22	2.40-2.50	Formed

tions such as floor and underground layers, indoor layers, visible and measurable. Thus, the environmental design project is completed.

METHODOLOGY

Junior students attending Karadeniz Technical University Department of Landscape Architecture during 2014-2015 academic year fall semester participated in the study. The researchers determined the stages included in the 5-month long environmental design project process. Based on these stages, the final products (survey, land use, hard-soft ground plans, planting plan, model, etc.) that each student developed for each stage during the semester were interpreted. In other words, the utilized research model was the examination of the products of the environmental design project course. It could be also expressed as document review. The document review is the examination of written and visual documents about the target phenomenon.

The main material of the present study where the process of creating different choices in the same topic by presenting a wide range of student work produced in the environmental design project education in KTU Department of Landscape Architecture and to reflect the development of the environmental design project is the environmental design projects and phases developed by the students during the 5-month long education and instruction period.

RESULTS AND DISCUSSION

Samples chosen from the projects developed in the environmental design project courses taught in the 2014 and 2015 academic year, during 5-6-month fall or spring terms at Karadeniz Technical University, Faculty of Forestry, Department of Landscape Architecture are included in this section. Theoretical explanations given in the previous section about the developmental processes and stages of the projects have

been visualized with the project photographs in this section (Table 3).

In the present study, it is necessary to understand the completion processes of the projects in order to really appreciate them. Briefly, this process involved the analysis of the problem, and designing and examining a solution. Every project has its own problems, contradictions, and challenging aspects that provide opportunities for constructive and creative solutions. Each concept is based on detailed location analysis and logically formed ideas. Therefore, in the present study, the students' sketches, plans and sections were included to better understand the design process from the concept to the application. Landscape design offers certain visually stimulating perspectives.

Sisman et al. (2008) determined and re-projected the unsuitable characteristics of one of the most important environmental design work in Tekirdag province urban center in their study. Accordingly, the said area was a public space with ceremonial and parking functions. That study included re-projection and related processes of this space and authors prepared current status analysis (survey and literature review), proximity analysis and function diagram, structural diagram, preliminary project and application project (Sisman et al. 2008). In a study they conducted in 2013, Yasar and Düzgün integrated the environmental design process with the concept of sustainability and presented examples from their studio works during the application phase. According to that study, environmental design stages included the determination of the requirement program, feasibility study, preliminary design and detailed design. The criteria determined to ensure the integration of environmental design with sustainability were effective use of microclimate, energy and waste recycling, development of energy and material resources, effective use of topography, use of natural resources, and utilization of plant cover (Yasar and Düzgün 2013). In fact, these criteria should be examined and effectively assessed

Table 3: Environmental design project samples and stages at KTÜ

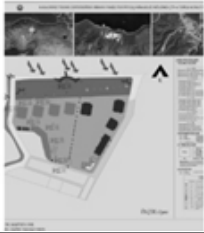
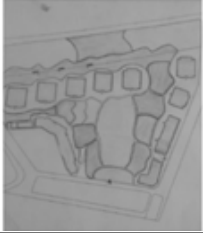
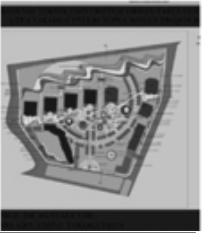
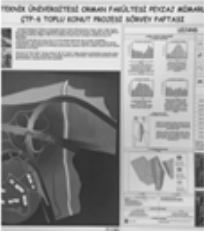
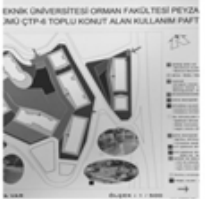
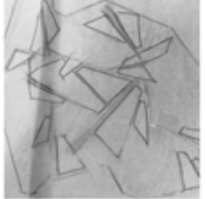
<i>First Environmental Design Project Samples and Stages</i>				
				
SURVEY	LAND USE	SKETCHES	MODEL	HARD-SOFTSCAPE
This project was designed by Vildan Acar and developed in the fall term in 2015. The first stage of the project, namely survey and analysis part, is the same as in the previous project. Survey and analyses were carried out by all the group students collectively. In land use plan; stains related to the entrance to the area, security, passive green areas, active green areas, rock gardens, water gardens, refreshment areas, resting areas, green roads, children play ground, sand pool, fragrance garden, hike roads, colour garden, observation terraces, decorative pools, picnic areas, fitness-yoga areas, bicycle tracks were specified. The stains related to these activity areas were located in accordance with their relations to each other. At the predesign stage, activity areas in the stain form were turned into suitable forms at the final design stage. For planting of the project, as coniferous species <i>Cupressus macrocarpa</i> 'Goldcrest', <i>Chamaecyparis lawsoniana</i> 'Ellwoodii', <i>Picea pungens</i> 'Glauca', <i>Taxus baccata</i> 'Fastigiata'; as large leafed <i>Acer palmatum</i> 'Atropurpurea', <i>Phoenix theophrastii</i>, <i>Tamarix tetrandia</i>; as bushes, <i>Azalea japonica</i>, <i>Cornus alba</i> 'Sibirica', <i>Euonymus alata</i> 'Compacta', <i>Euonymus fortunei</i> 'Emerald n gold', <i>Nandina domestica</i>, <i>Pittosporum tobira</i> 'Nana', <i>Plathyclodius orientalis</i> 'Nana'; as ground cover, <i>Alyssum</i>, <i>Chrysanthemum</i>, <i>Iberis</i>, <i>Lampranthus</i>, <i>Salvia</i> were used.				
<i>Second Environmental Design Project Samples and Stages</i>				
				
SURVEY	LAND USE	SKETCHES	HARD-SOFTSCAPE	MODEL
This project was designed by Ahmet Alper Topaloglu developed in the fall term in 2015. This area is located at northwest exposure, at the altitude of 46-102 m from sea level, in Yildizli neighbourhood, Akcaabat district, Trabzon province, Turkey. It is a collective housing site. The area consists of 1412 storied blocks. At the survey stage, climatic conditions among natural landscape characteristics, precipitation, temperature, humidity, wind, and light; slope, exposure, and elevation among physiographical characteristics; type, depth, ph, nutrients and productivity among soil characteristics were examined. Natural and cultural plant species existing in the field were specified and processed in the survey. The field is between 46m and 102m elevation. The soil ph value is between 6-7, that is acidic. Perceptive landscape characteristics, dominant scenery, unwanted sight, noise zones were detected and added to the survey. Immediate vicinity and circulation analysis were carried out. In space use, vehicle and pedestrian entrance, water show, reflecting pools, semi-yards, open car park, swimming pool, children playground, mini square, sitting areas, lawn terrace, observation terrace, lawn theatre and hobby gardens were planned. At the sketch stage, 2 main circulation lines suitable for the architecture of the structures were created. The elliptical structure of the cafe in the field affected the space pattern and directed the basic formation. In the whole design, organic lines are dominant. When hard floor and soft floor rates are examined, soft floors, namely soil and lawn surfaces, are more, hard floors are mainly press concrete. In planting project, the species of <i>Lagerstromia indica</i>, <i>Cercis siliquastrum</i>, <i>Prunus ceracifera</i>, <i>Pyrus</i>, <i>Ginkgo biloba</i>, <i>Picea pungens</i>, <i>Berberis thunbergii</i>, <i>Pittosporum tobira</i>, <i>Rosmarinus officinalis</i>, <i>Euonymus fortunei</i>, <i>Euonymus alatus</i>, <i>Weigela florida</i>, <i>Alyssum</i>, <i>Iberis</i>, <i>Verbana</i> were used.				

Table 1: Contd...

Third Environmental Design Project Samples and Stages				
				
SURVEY	LAND USE	SKETCHES	HARD - SOFTSCAPE	PLANTING PLAN
This project was designed by Egemen Onur and developed in the fall term in 2015. The survey and analysis study is the same as in the previous project. At the space use stage, entrance to the area, vicinity of the buildings, pool, hike roads, rock gardens, sitting areas, healing garden, children playground, sport and entertainment areas, parking garage and passive green areas were specified as land use plan. At the sketch stage, for these activity areas, suitable forms were designed with the help of samples. In planting project, the species of <i>Cercis siliquastrum</i>, <i>Laurus nobilis</i>, <i>Lagerstromia indica</i>, <i>Prunus ceracifera</i>, <i>Acer campestre</i>, <i>Acer cappodocicum</i>, <i>Acer palmatum</i>, <i>Cedrus deodara</i>, <i>Taxus baccata</i>, <i>Euonymus japonica</i>, <i>Rosmarinus officinalis</i>, <i>Spartium juncum</i>, <i>Spiraea x vanhouttei</i>, <i>Viburnum opulus</i>, <i>Weigela florida</i>, <i>Pittosporum tobira</i> 'Nana' were used.				

in every case, not only in the context of the design of environmental projects and their integration with any concept during the design process. As noted in the above mentioned paper, all these analyses are determined during the field analysis and survey stages and the method of activation is identified. They serve as the source for the next stage of environmental design. In another study titled "landscape design on university campuses," the environmental and recreation project for the university campus was designed and the process stages were presented. Based on the above mentioned study, environment design phases were determined as identification of the problem, survey, field analysis, idea design diagram and the design (Ertekin and Çorbacı 2010). Sağlık and Kalkit (2014) presented landscaping project phases for Çanakkale Asmatpe recreational area in Turkey in their study on landscape project for recreation areas. Based on that study, survey and literature review, structural diagram, preliminary project and application project should be constructed (Sağlık and Kelkit 2014). Thus, although the topic differs among the environmental design projects, the process mostly remains the same. Only certain stages are scrutinized in more depth based on the subject matters.

CONCLUSION

The most important subject dwelled upon during the environmental design project educa-

tion is to transfer to the student that there exists a design form in which plantal elements are the main component. This form is an artistic product of the principles and rules peculiar to architecture and engineering, functional and aesthetic togetherness in the ecological sense. The creation and permanence of this form are possible with the continuity of knowledgeable and experienced technical and artistic profession. Landscape design process is understood, gains meaning and importance only when this key rule is comprehended. The applicability of this process constitutes the base of sustainable landscape and richness related to historical landscape.

For someone whose design background is very little, the idea of the design process can seem a little complicated. The creation of the design is really not an easy task; for the design to be carried out, the analysis of the current state, specifying the problem and developing the ideas for its solution, determining the best option among the developed ideas and then forming this option are required.

While environmental design project education is given at Karadeniz Technical University, Department of Landscape Architecture, creating spaces which respond to the needs and necessities of the user is targeted. Since occupational discipline of Landscape Architecture is a new occupational discipline in Turkey, undergraduate education varies among universities. At KTU, in Landscape Architecture undergrad-

uate education program, at environmental design project courses, styles and methods aiming at step by step project preparation and gaining design skill are attempted to be transferred.

RECOMMENDATIONS

This work will be very useful for students who are new to the landscape architecture section. Especially the Technical University of Karadeniz, the landscape architecture department, is a guide for environmental design project courses for students from the second semester to the second semester. The project phases progress in the same way with each other being the subject of environmental design project courses. Only the projects are becoming more detailed. For this reason this study is of special importance to the students in the design disciplines.

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