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Systems approach in landscape design: a studio work

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Abstract Landscape architects design the environment, which is an organic part, an outdoor extension of the building, according to the various functions of buildings. One of the most important objectives in design is to create a strong organization which forms a whole by combining different parts. While creating this organization, it is essential to establish relationships, make the designed elements related and obtain a unique design product. This relationship can be established only with the systems approach. It is a difficult process. For this reason, it was aimed in this study to teach Landscape Architecture students how to achieve designs meeting both creative and user needs. Thus, students will learn how to create successful open spaces with the high level of use which is one of the most important problems nowadays. In this respect, this article has two purposes. The first purpose is to create a study diagram by suggesting the systems approach theoretically. Student works will be evaluated according to this study diagram. The second purpose is to investigate the contribution of the course conducted with the systems approach to the design education. In this study, the systems approach was explained to the students of the Department of Landscape Architecture at Karadeniz Technical University and they were made to design the residence and its immediate surroundings within the scope of the 3rd semester. Then, the effect of the systems approach on the creative and applicable designs of the students was determined with the survey study conducted. The results of this study reveal the importance of the systems approach for both design education and urban designers.

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Introduction

A large number of disciplines such as engineering, urban and regional planning, fine arts, natural sciences, architecture, Landscape Architecture are based on design. Nevertheless, the most important feature that distinguishes Landscape Architecture from these disciplines is designing outdoor space as a whole in accordance with people's needs and activities, depending on different indoor functions (Stewart 2007). Within this context, the design concept and process are addressed in this study as a part of Landscape Architecture.

The design is usually defined as "the preparation process of schemes and plans that are needed for an activity", and also, can be addressed as a "creative process". Design is a part of constant problem-solving process (Newell and Simon 1972) and in this direction, design has been explained with various definitions such as "decision-making in the face of uncertainty" (Asimow 1962), "decreasing the variety" (Best 1969), "finding the correct components of a physical structure" (Alexander 1964). In brief, the design is a process of selecting among various solution options (Özkan et al. 2017). These are the approaches that designers take into consideration to start a design action. However, one of the most important purposes of design is to create a strong organization that forms a whole by combining different parts (Pile 1997). By this mean, system setup in design is formed with the association of the designed elements with each other. The designer can unite the parts and establish a connection between them finding out the part-whole relationship with regard to the structure (Sarıoğlu Erdoğdu 2016; Yilmaz et al. 2016). Additionally, the system perception in design is required for something to correlate with something else. So Landscape Architecture needs to develop research methods that are discipline specific and academically accepted (Lenzholzer et al. 2013).

In the direction of these acceptances, environmental design project courses are given within the education program at KTU Landscape Architecture Department. Environmental design project courses aim to reveal integrative (systematic) designs that meet user needs by using design principles and elements together. Therefore, it is required to determine design elements and principles enabling the system by examining the literature on the systems approach to reveal the first purpose of the study. Students are expected to create design products with the systems approach by explaining these determined principles and elements to them in the context of the course. After the final products are evaluated by an expert group, it will be revealed whether the systems approach, which is the second purpose of the study, has contributed to the education process of the students.

System: general systems theory

The philosophy of the systems conception was first discussed by Aristo, Paracelsus, Boethius, Farrabi, Ibn-i Sina, Ibn-i Haldun, and Auguste Comte (Aristotle 1943; Checkland 1981; Tecim 2004). Thereafter, this philosophy was developed and the 'General systems theory' started to be formed at the beginning of the nineteenth century. In the twentieth century, a great number of researchers addressed the systems theory (Kohler 1924, 1927; Lotka 1925; Redfield 1942; Singer 1946; Sommerhoff 1950). However, Bertalanffy

developed the systems theory, which he applied in biology, and revealed the 'General systems theory' in 1950. In this way, he suggested that mutual principles for various disciplines were available and developed a general analytical model that could be applied to all of them. In the general systems theory, Bertalanffy asserted that the examination of every event as being related to other events in a specific environment is more effective for understanding, estimating and controlling the events (Bertalanffy 1951, 1968; Stradal 1968; Boulding 2004; Basaran and Çinkir 2012).

In the second half of the twentieth century, this approach was addressed with the purpose of developing a theory between sciences and putting human activities under an order (Aksoy 1975). The general theory of communication and control developed by Norbert Wiener formed the basis for the today's "Systems analysis" information discipline. It affected the design phenomenon of the systems concept in the following years and revealed the concepts of systematic design and analytical design (Öke et al. 1978). The aforementioned explanations regarding the emergence of the systems approach are repeated in the publications related to various disciplines, and the studies based on the systematic point of view increase with each passing day (Aksoy 1975; Çinar and Erdönmez 2008). The systems approach, to which many disciplines had paid attention since the eighteenth century, started to come to the fore in the disciplines of architecture and Landscape Architecture in the twentieth century. Thus, these disciplines with an intuitive creation process have started to gain more concreteness. Due to the lack of the studies related to the systems approach in the area of Landscape Architecture, in this study, it was aimed to explain the benefits of this approach by discussing student works in the context of the systems approach. Therefore, the relationship between the systems approach and design was examined.

Systems approach: design relationship

The systems approach is a process consisting of certain components (subunits), with the certain relationship between these components, and the components of which are related to the external environment at the same time. In addition to this, it is addressed as a whole formed by more than one components, physical or conceptual, to achieve a goal and result (Klir 1969; Koçel 1984). In another aspect, the systems approach is a whole consisting of small interrelated parts, functioning as a part of a larger system (Hodgetts 1991). Components in the system are dynamically interrelated or interdependent. Elements remaining outside the system form its environment (Stewart 2007). The regular and harmonious operation of the system is in question. The systems approach is a complex or indivisible whole formed as a result of the combination of parts or more than one thing or bringing them together (Koçel 1984). It is possible to increase these definitions. However, a system, with its most comprehensive definition, is an integrity, the limits of which are determined, with inputs and outputs formed by multiple physical or conceptual components (elements) being together and having relationship between each other, and operating in coordination in order to achieve one or more purposes or results (Ackoff 1960, 2010).

Designers who want to create successful and usable designs in architecture organize parts in such a way that the integrity (system) appears itself before the parts (Jackle 1987; Alangoya 2015). Moughtin (1999) said that architectural integrity (system) could not be created by disorganized elements unrelated to each other. In order to be able to present the whole idea in architecture or urban design, it is required to place all parts side by side in a systematic way. All parts of the system are coherent with each other; all parts intertwine with each other with a proportion and connection in such a way that nothing can be added

and removed or changed (Moughtin 1999). In other words, the system consists of elements, there is a relationship between elements, the system is intended for a specific purpose (Cohen 1931). However, in order to be able to mention system in a design, only the association of elements should not be considered. For, not every association of elements forms a system. It cannot be said that this integrity presents a system if this association does not have a function and if the elements do not perform a function when they come together. Gür (1996) divided the components of the systems approach in architecture or urban design into three groups: human needs, activity-behaviors and space determinants.

As a result, in the architectural disciplines, in order for a whole to be able to become a system, its elements should respond to human needs and activities when they come together, they should be understandable, clear and readable, the distance between them should be;

- close enough to establish a relationship,
- far enough to maintain the original form (Kepes 1944; Özbilen 1982).

One of the most common problems in design is the failure to solve forms creating a system and inability to make designs for the needs. The 'Signs theory' was developed in order to solve this problem. Signs are examined in two groups, space signs and time signs. A sign in the architecture discipline is a relationship between the components and elements of space. This relationship is revealed by considering the syntactic function, semantic function and pragmatic function (Aksoy 1975). Pragmatic function (need-effectiveness), which determines how many people and for what purpose will use the space, and syntactic function provided by a good space organization were addressed as the elements determining the systems approach in this study (Fig. 1). Due to the fact that semantic function is an abstract dimension related to the perceptual and cognitive situations of people, student projects were not examined from this point of view.

Pragmatic function in the systems approach

Pragmatic function means that design is functional—usable. In other words, design or space is not just a mathematical space. The real value cannot be revealed by the measurements of length, area, and volume on their own. What adds the real value to space is the evaluation of user experiences in the most accurate way (Akkul 1998).

Ünlü (1998) also emphasized that designs were not just a physical arrangement, but physical environments that could meet all human physical and psychological needs at the individual and social levels and in which necessary activities could be performed. In other words, the spatial forming is the response of the spatial needs. When the elements forming design meet user needs and requests, the pragmatic dimension of that space will be provided (Creswell and Clark 2011).

As a result, designing of a "place" by a designer depending on human needs and requests and according to the activities suitable for that place reveals the pragmatic function. In design, it means solving the first stage of the systems concept.

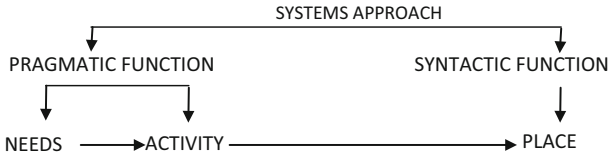


Fig. 1 Basic concepts of the systems approach

In this study, at first, user profiles are required to be determined by students in order for their designs to be able to fulfill the pragmatic function. Thus, the activities for the individual and social needs by which users differ will be determined in the housing environment. It will be possible to obtain the syntactic function by creating spaces suitable for these activities at the final stage.

The characteristics determined for the students to convey the pragmatic function, which is the first stage of the systems approach, to their designs in the projects are indicated below (Fig. 2).

Syntactic function in the systems approach

Syntactics in the systems approach is a fundamental element of the design (Cherry 1967). It examines the logical organization of the system without considering for what purpose, in accordance with what needs the design will be made (Morris 1938). When the logical setup is provided, quality and creativity is achieved in terms of aesthetics (Kowaltowski et al. 2010). While evaluating a design in terms of aesthetics, it is argued that people grown up in different environments, with different backgrounds, with different understanding and experience of the world and living in different social environments will react differently. Therefore, ensuring the aesthetic quality and different approaches to the effect created in people (evolutionary theory and cultural preference theory) have been suggested (Tuan 1974; Appleton 1975; Kaplan and Kaplan 1989; Carlson 2001). However, due to the common evolutionary history of people, it is suggested that there are common features that will provide the consensus in their aesthetic evaluations (Fry et al. 2009). As it is also understood from this, considering the aesthetic quality of a design, designing in accordance with the systems approach forms such positive emotions in people as common taste, pleasurableness, attractiveness. In this study, it was aimed to determine the common characteristics forming the aesthetic quality in order to evaluate the syntactic function in the systems approach.

Designing the visual elements (forms) in landscape syntax (syntactic) in a compatible–consistent way with each other (including the unity of characters) makes that landscape systematic and integrated (Stewart 2007). Wong has also said (1993) that the display of form repetition or similarities is effective in the creation of a systematic design in a direct way. However, a continuous repetition may make a design boring and monotonous. Bell (2004) has emphasized that repeating or harmonious forms increase the vitality and attractiveness of a design, contrast layer. Nevertheless, too much contrast may spoil the integrity of a design (system) and, as a result of this, cause visual chaos. In order to take this under control, a measured contrast in the repeating forms may be provided (Bell 2004).

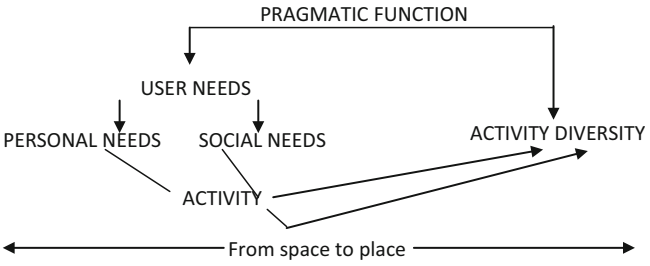


Fig. 2 The elements of the pragmatic function

Variations in the measurements create dominant (focusing) areas in the design. This ensures that balance is put forward in the design (Wong 1993). Finally, in order for a design in the landscape syntax to be systematic and integrated, an impression of disorganization should not be included considering the orientation of forms, their proximity-distance to each other.

To sum up, it has been often mentioned that design elements of point, line, direction, size, form, value, texture, colour would provide the (integrity) of a system in design by interacting with such principles as repetition, harmony, contrast, hierarchy, domination, unity and balance, i.e. by interconnecting with them (Graves 1951; Wong 1993; Gürer and Gürer 2004). It can be said that size, form, direction are the most effective common elements among them in providing the integrity of a design and creating the aesthetic quality. The characteristics determined for the students to convey the syntactic function, which is the second stage of the systems approach, to their designs in the projects are indicated below (Fig. 3).

It is possible to create successful open spaces with the high level of use by using the systems approach in design. This also provides the correct association and organization of both pragmatic and syntactic functions. The functioning of the design processes in Landscape Architecture education aims at providing individuals with a problem-solving style with system understanding and adopting a model that can be used life-long with Landscape Architecture training. In line with this aim, the application of the study consisted of two stages. At the first stage, the spot diagrams, working sketches and design project obtained from the students as a result of teaching the course were evaluated in the context of the systems approach. At the second stage, it was attempted to determine the contribution of the students to the course taught with the systems approach.

Materials and method

First stage

The design project, sketches and schematic diagrams of the student projects "Single residence" (EDP II) in the 3rd Semester at KTU, the Department of Landscape Architecture, were used as a material in this study. Ali Özbilen residence located in Akyazı district of

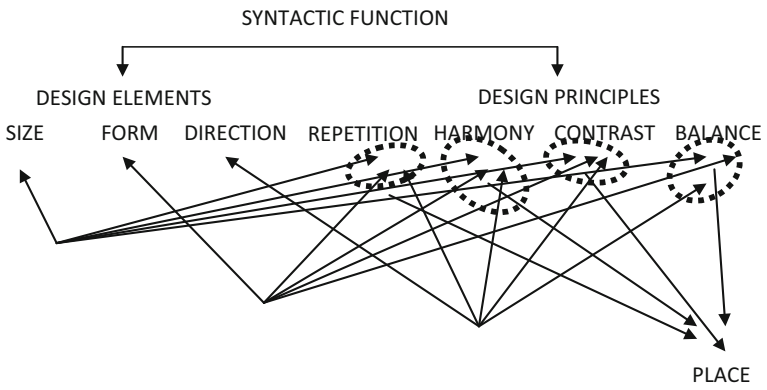


Fig. 3 The relationship between elements and principles forming the syntactic function

Trabzon province was given as a study area to 45 students receiving the course during that period. Forty-five students in total enrolled for the course, therefore, the subsequent stages of the study were conducted with these students, and no selection was made in the survey study. Forty-five students studied this area and conducted projects in accordance with the systems approach. The instructors evaluated the works of these 45 students in the context of the systems approach at the end of the semester. However, since the works of all students cannot be used in this article, the projects of 4 students were selected and the systems approach in the design was examined.

In the education program, the concepts taught to students abstractly in the 1st Semester are transformed into the concrete design in accordance with human needs and activities during the project courses. This design process consists of 16 weeks.

Revealing the pragmatic function, which is the first stage of the systems approach, is expected between the 1st–7th weeks. In the 1st–2nd weeks, each student is asked to determine the user profile (occupation, age, marital status, whether he has children or not), to determine individual and social needs in accordance with this user profile and to create a needs list. In the 3rd–4th weeks, it is expected that they will create activity lists depending on this list of needs. In the 5th weeks they are asked to write a Scenario, in which activities establish a relationship with each other, in the 6th weeks they are asked to convert this scenario into a Relationship Diagram, and in the 7th weeks they are asked to make a schematic diagram, which determines what activity will be performed where depending on the slope, its location, proximity and distance to each other and transportation in the study area. Thus, the design product, in which the pragmatic function will be evaluated, is obtained. These schematic diagrams will be used as a material at the 1st stage of this study. At the same time, this will also create the starting point of the syntactic function, which is the 2nd stage.

Revealing the syntactic function, which is the second stage of the systems approach, is expected between the 8th–14th weeks. In the 8th weeks, the students are asked to find tangible (the examples in which walking paths, activity areas and equipment are solved) and intangible (examples providing harmony in terms of forms in design, i.e. representing the unity of characters) quality examples. In the 9th–10th weeks, the students are taught in the space of what dimensions an activity (sitting, dining, swimming, sunbathing, gathering, exhibition, etc.) can be done with the examples of activity areas and equipment solutions. Afterwards, the students are expected to make a sketch, in which they will determine the dimensions of activity areas in accordance with both equipment-activity and design principles (repetition, harmony, contrast, and balance) on the schematic diagrams. The measurement study conducted by a student on a sketch will be used as the first material at the 2nd stage. In the 10th–14th weeks, they are asked to select a form imitated among the examples of character unity and to study this form, to solve it (repetition, harmony, contrast and balance between the forms) and transfer it to the sketch, taking need-activity and measurement study conducted for weeks as a basis. That the example of character unity selected by each student is different from each other aims their achieving an original form by adding their own creativity in this way. This original work study performed by a student on a sketch forms the second material of this stage. The final sketch work that is asked from the students is to make a setup in the transition of forms into each other, relationship (repetition, harmony, contrast and balance) between the directions of activity areas and position, in other words, activities, in accordance with all studies conducted (need-activity, measurement and form). The direction and position study performed by the students on the sketch forms the third material of this stage. As a result of all these stages, the systems approach in design will be achieved by building interrelated spaces responding

to user needs and activities. Thus, the final products, which are unique and different from each other, in other words, design projects will be obtained. This forms the main material of this study. Because it is a difficult and powerful process, the longest study duration was given to this stage. The last 2 weeks are intended for performing these studies approved by an instructor, making a planting design by the students and sectional views, transferring the drawings to the computer environment and completing the model study. Because the design process is examined in this study, this stage is not discussed. The systems approach model for the evaluation of all these materials is presented below (Fig. 4).

Second stage: survey study

At the end of the semester, the survey was applied to 45 students who took the course to determine the acquisitions of the course. The survey was conducted to determine the effect of the systems approach method on students in understanding this course, improving designing skills, increasing creativity, making the design process enjoyable, identifying the problem and achieving the solution more easily. The questions asked to the students in the survey are presented in Table 1.

Findings

Findings for the evaluation of the student projects

In this part, the works of the students were evaluated in terms of schematic diagrams (pragmatic), study sketches and design projects (syntactic) and it was revealed by an expert group whether they completed the course successfully and understood the systems approach in design. The expert group consists of the faculty members and assistants working at Karadeniz Technical University, Department of Landscape Architecture, and giving EDPII course.

Findings of study no. 1

All students were asked to determine users with different characteristics to make the final products creative. Thus, students were taught that the same area could be designed differently for different needs with the same design principles and elements.

Study no. 1 belongs to student 1. In this study, the student identified his user as a violinist which is different from the other students. The student built a scenario in such a way that the violinist would use the residence together with his spouse and two children, and he also determined the user's social and personal needs. He selected dining, sitting and relaxing, sunbathing, swimming activities for children as personal needs. Giving concerts, song presentation, cocktails, open buffet, greeting guests and farewell activities were selected as social needs. Accordingly, transportation and interrelated activity areas were put on the schematic diagram. The dimensions of the activity areas that determine the places on the schematic diagram according to the slope and relationship between the activities were determined according to the equipment appropriate for the activities (Fig. 5).

The student completed the first stage of the systems approach in the scheduled time and continued with the second stage which is the syntactic function. The dominant area was

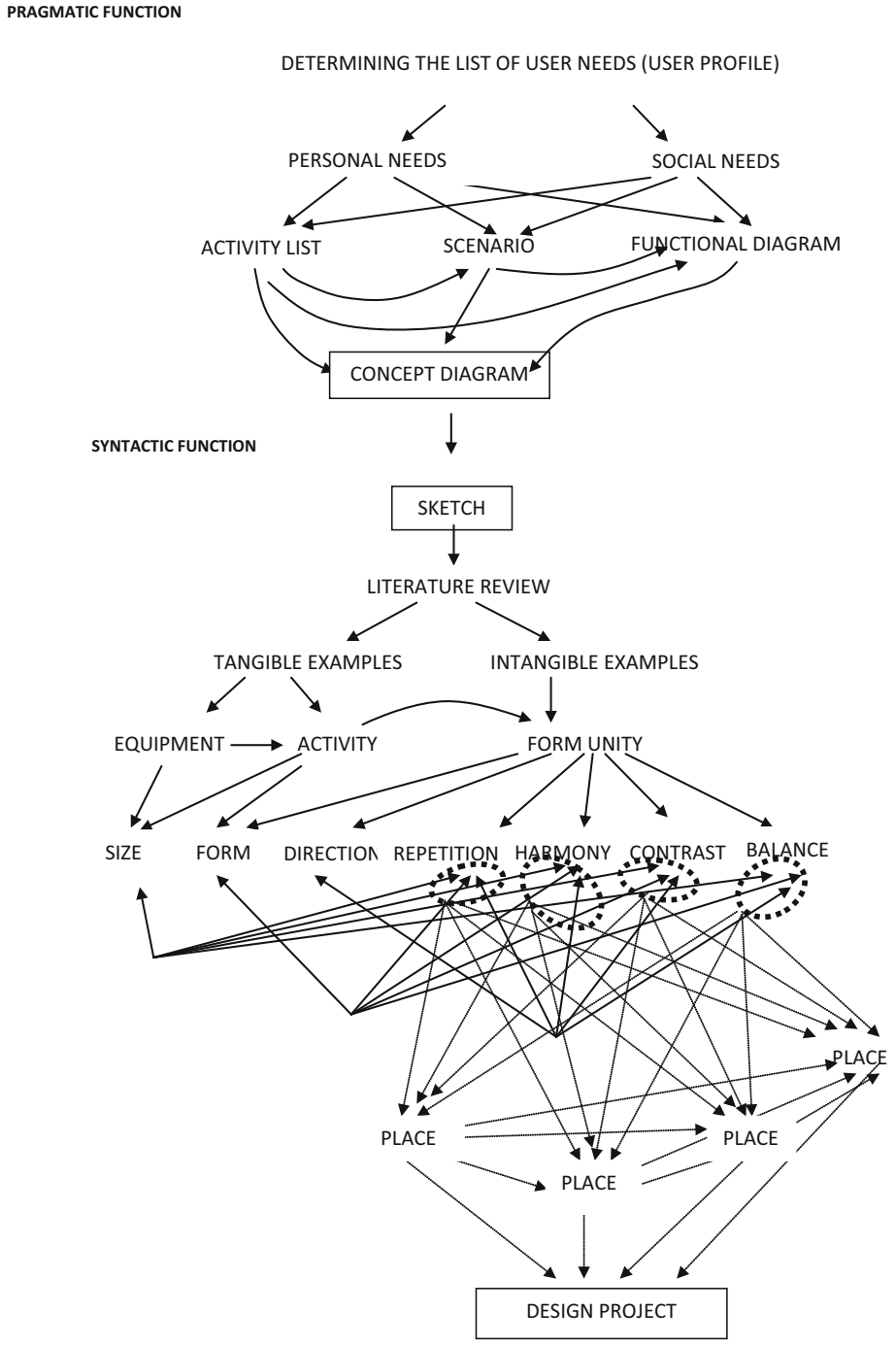


Fig. 4 Diagram of the systems approach methods

Table 1 Survey questions

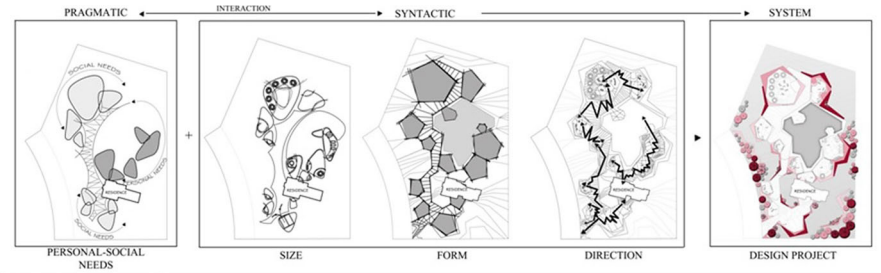
Question 1	This course contributed to me regarding how to make successful designs from the functional aspect
	1. Strongly disagree 2. Disagree 3. Maybe 4. Agree 5. Strongly agree
Question 2	Designing with the systems approach increased my creativity
	1. Strongly disagree 2. Disagree 3. Maybe 4. Agree 5. Strongly agree
Question 3	I learned to identify the problem in the design, to solve it and to transfer these to the design with the systems approach better
	1. Strongly disagree 2. Disagree 3. Maybe 4. Agree 5. Strongly agree
Question 4	This course contributed to me regarding how to make successful designs from the esthetic (formal) aspect
	1. Strongly disagree 2. Disagree 3. Maybe 4. Agree 5. Strongly agree
Question 5	The design process addressed with the systems approach was complicated and difficult for me
	1. Strongly disagree 2. Disagree 3. Maybe 4. Agree 5. Strongly agree
Question 6	I would like to address the design process in the future project courses with the systems approach
	1. Strongly disagree 2. Disagree 3. Maybe 4. Agree 5. Strongly agree
Question 7	I have understood what I had not understood regarding the design process before and the process of the course contributed to me
	1. Strongly disagree 2. Disagree 3. Maybe 4. Agree 5. Strongly agree
Question 8	I am going to use what I have learned about the systems approach to design successful urban open spaces when I become a landscape architect
	1. Strongly disagree 2. Disagree 3. Maybe 4. Agree 5. Strongly agree

established by contrast to the dimensions of other activity areas in order for the pool to be suitable for swimming activity and in order to create a boundary between personal and social areas. While there is harmony between the dimensions of dining, relaxing areas and the areas covered with the equipment due to the similarity of these activity areas and their person capacity, the dimension of the area covered with sunbathing equipment (chaise longues) is contrasting to other activity areas due to its size. Due to the fact that cocktail and concert area will cover maximum 50 people, the dominant area was established next to the pool by contrast in the dimensions. Due to the fact that the capacity of the open buffet, guest greeting and farewell activities and the areas covered with the equipment are similar, there is harmony between the dimensions of these activity areas (Fig. 5). Considering the interrelation of all these activity areas on the sketch, the balance was established in terms of dimensions.

The student developed form unity sample options as a result of the abstract sample study. However, he chose the form to achieve a creative final product which distinguishes his design from the others (Table 2). In conclusion, the student applied forms inspired from the form unity in his project. In terms of direction, the balance was ensured by using harmony and contrast (Fig. 5).

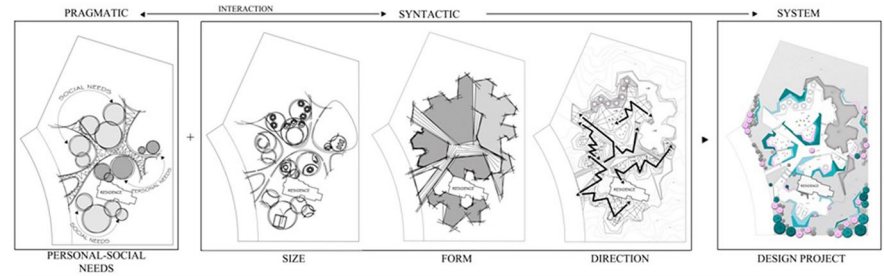
Findings of study no. 2

Study no. 2 belongs to student 2. In this study, the student determined a swimming instructor as a user. The student built a scenario in such a way that the swimming instructor would use this residence together with his spouse and three children, and his spouse is a



EVALUATION OF THE SYSTEMS APPROACH

	PRAGMATIC APPROACH (USER NEEDS AND ACTIVITY)				SYNTACTIC APPROACH (GESTALT LAWS) (DESIGN PRINCIPLES)				
	ACCESS ENTRANCE WELCOME WALKING	RELAXING SITTING-WATCHING SUNBATHING	FOOD COCKTAIL FOOD-DRINK	ENJOY-SOCIALIZATION DANCE PERFORMANCE COCKTAIL SWIMMING CHAT	ELEMENTS OF DESIGN	REPETITION	HARMONY	CONTRAST	BALANCE
PERSONAL	+	+	+	+	SIZE		+	+	+
SOCIAL	+	+	+	+	FORM	+	+		+
					DIRECTION		+	+	+



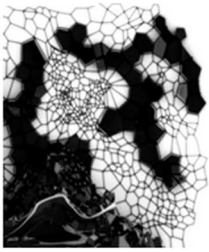
EVALUATION OF THE SYSTEMS APPROACH

	PRAGMATIC APPROACH (USER NEEDS AND ACTIVITY)				SYNTACTIC APPROACH (GESTALT LAWS) (DESIGN PRINCIPLES)				
	ACCESS ENTRANCE WELCOME WALKING	RELAXING SITTING-WATCHING SUNBATHING	FOOD COCKTAIL FOOD-DRINK	ENJOY-SOCIALIZATION DANCE PERFORMANCE COCKTAIL SWIMMING CHAT	ELEMENTS OF DESIGN	REPETITION	HARMONY	CONTRAST	BALANCE
PERSONAL	+	+	+	+	SIZE		+	+	+
SOCIAL	+	+	+	+	FORM	+	+		+
					DIRECTION		+		+

Fig. 5 Determining of design process and evaluation of the systems approach (student 1 and 2)

dancer. Accordingly, the user's social and personal needs were determined. The student chose dining, sitting and relaxing, sunbathing and swimming activities for family members as personal needs. Dance performances, cocktails, open buffet, guest greeting and farewell, as well as swimming activities, due to the giving swimming education to children, were selected as social needs. Accordingly, transportation and interrelated activity areas were put on the schematic diagram. The dimensions of the activity areas that determine the places on the schematic diagram according to the slope and relationship between the activities were determined according to the equipment appropriate for the activities (Fig. 5).

Table 2 Form unity and design project model

Form Unity	Design Project Model
Student 1	
	
Student 2	
	
Student 3	
	
Student 4	
	
Space	Place

The student completed the first stage of the systems approach in the scheduled time and continued with the second stage which is the syntactic function. In order for the pool to be suitable for both the swimming activity, which is the family's need, and the swimming activity, which is the social need due to the providing education to children, the dominant area was established by using contrast in the dimensions. There is harmony between the

dimensions of dining, relaxing and sunbathing areas due to the similarity in the person capacity of these activity areas. However, the training area around the pool intended for swimming education, where children are trained, is contrasting in terms of its dimension. Due to the fact that cocktail and dance area will cover maximum 50 people, the dominant area was established next to the pool by contrast in the dimensions. Due to the fact that the capacity of the open buffet, guest greeting and farewell activities and the areas covered with the equipment are similar, there is harmony between the dimensions of these activity areas. Considering the interrelation of all these activity areas on the sketch, the balance was established in terms of dimensions (Fig. 5).

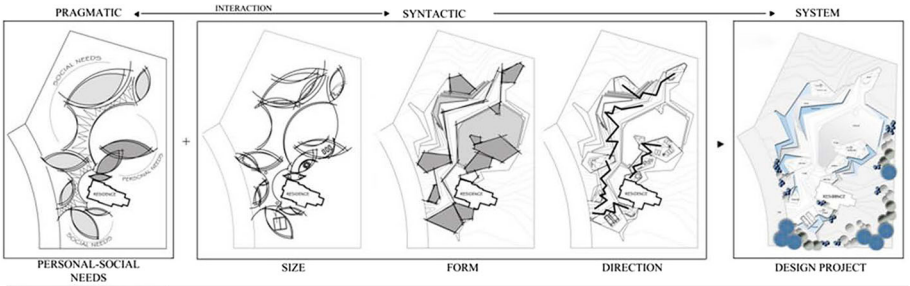
The student developed form unity sample options as a result of the abstract sample study. However, he chose the form to achieve a creative final product which distinguishes his design from the others (Table 2). In conclusion, the student applied forms inspired from the form unity in his project. In terms of direction, the balance was ensured by using harmony and contrast (Fig. 5).

Findings of study no. 3

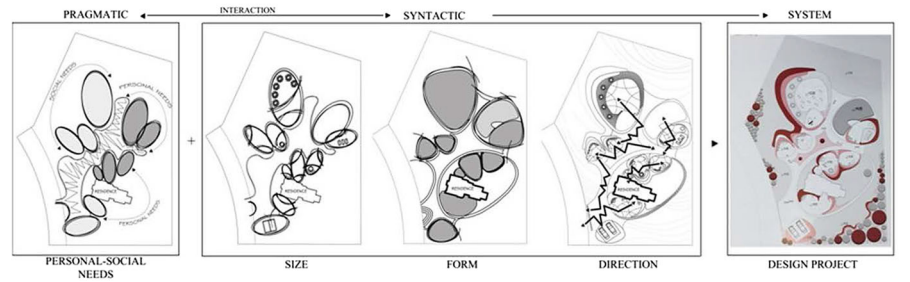
Study no. 3 belongs to student 3. In this study, the student determined a physiotherapist as a user. The student built a scenario in such a way that the physiotherapist would use this residence together with his spouse and two children and determined the user's social and personal needs. Dining, sitting and relaxing, sunbathing and swimming activities for children were selected as personal needs. Hydrotherapy, making presentations about the therapy, greeting guests and farewell activities were selected as social needs. Accordingly, transportation and interrelated activity areas were put on the schematic diagram. The dimensions of the activity areas that determine the places on the schematic diagram according to the slope and the relationship between the activities were determined according to the equipment appropriate for the activities (Fig. 6).

The student completed the first stage of the systems approach in the scheduled time and continued with the second stage which is the syntactic function. The dominant area was established by using contrast in the dimensions in order for the pool to be suitable for swimming activity with both personal and therapy purposes and to create a boundary between personal and social areas. Due to the fact that the person capacity of eating and drinking, relaxing areas and the areas covered with the equipment are similar, there is harmony between the dimensions of these activity areas, at the same time the dimension of the area covered with sunbathing equipment (chaise longues) is contrasting to other areas due to its size. Due to the therapeutic purposes of the therapy areas, the dominant area was created next to the pool by using contrast in the dimensions. Due to the fact that the capacity of guest greeting and farewell activities and the areas covered with the equipment are similar, there is harmony between the dimensions of these activity areas. Considering the interrelation of all these activity areas on the sketch, the balance was established in terms of dimensions (Fig. 6).

The student developed form unity sample options as a result of the abstract sample study. However, he chose the form to achieve a creative final product which distinguishes his design from the others (Table 2). In conclusion, the student applied forms inspired from the form unity in his project. In terms of direction, the balance was ensured by using harmony and contrast (Fig. 6).



EVALUATION OF THE SYSTEMS APPROACH								
	PRAGMATIC APPROACH (USER NEEDS AND ACTIVITY)				SYNTACTIC APPROACH (GESTALT LAWS) (DESIGN PRINCIPLES)			
	ACCESS ENTRANCE WELCOME WALKING	RELAXING SITTING-WATCHING SUNBATHING	FOOD COCKTAIL FOOD-DRINK	ENJOY-SOCIALIZATION DANCE PERFORMANCE COCKTAIL SWIMMING CHAT	ELEMENTS OF DESIGN	REPETITION	HARMONY	CONTRAST	BALANCE
PERSONAL	+	+	+	+	SIZE		+	+	+
SOCIAL	+	+	+		FORM		+		+
					DIRECTION		+	+	+



EVALUATION OF THE SYSTEMS APPROACH								
	PRAGMATIC APPROACH (USER NEEDS AND ACTIVITY)				SYNTACTIC APPROACH (GESTALT LAWS) (DESIGN PRINCIPLES)			
	ACCESS ENTRANCE WELCOME WALKING	RELAXING SITTING-WATCHING SUNBATHING	FOOD COCKTAIL FOOD-DRINK	ENJOY-SOCIALIZATION DANCE PERFORMANCE COCKTAIL SWIMMING CHAT	ELEMENTS OF DESIGN	REPETITION	HARMONY	CONTRAST	BALANCE
PERSONAL	+	+	+	+	SIZE		+	+	+
SOCIAL	+	+	+	+	FORM	+	+		+
					DIRECTION	+	+		+

Fig. 6 Determining of design process and evaluation of the systems approach (student 3 and 4)

Findings of study no. 4

Study no. 4 belongs to student 4. In this study, the student determined a sculptor as a user. The student built a scenario in such a way that the sculptor would use this residence together with his spouse and his only child and determined the user's social and personal needs. He selected dining, sitting and relaxing, sunbathing and swimming activities as personal needs. Working (making sculptures), sculpture exhibition, cocktails, open buffet, guest greeting and farewell activities were selected as social needs. Accordingly, transportation and interrelated activity areas were put on the schematic diagram. The

dimensions of the activity areas that determine the places on the schematic diagram according to the slope and the relationship between the activities were determined according to the equipment appropriate for the activities (Fig. 6).

The student completed the first stage of the systems approach in the scheduled time and continued with the second stage which is the syntactic function. The dominant area was created by using contrast in the dimensions of exhibition and cocktail area. Due to the fact that the person capacity of dining, relaxing and swimming areas is similar, there is harmony between the dimensions of these activity areas. Due to the fact that cocktail and exhibition area will cover maximum 50 people, the dominant area was established by contrast in the dimensions. Due to the fact that the capacity of the open buffet, guest greeting and farewell activities and the areas covered with the equipment are similar, there is harmony between the dimensions of these activity areas. Considering the interrelation of all these activity areas on the sketch, the balance was established in terms of dimensions (Fig. 6).

The student developed form unity sample options as a result of the abstract sample study. However, he chose the form to achieve a creative final product which distinguishes his design from the others (Table 2). In conclusion, the student applied forms inspired from the form unity in his project. In terms of direction, the balance was ensured by using harmony and contrast (Fig. 6).

It was determined in the evaluation of the instructors at the end of the semester that the students successfully performed the pragmatic function on time which is the first stage of the systems approach. The location of the spaces is correct in terms of the slope, activities related to each other are built together, the privacy need of the family is not ignored by distinguishing social and personal needs from each other. These findings reveal that in the future this student will be able to identify the problem in a design, find solutions for that problem and thus solve the problem of meeting the user needs which is the most important characteristic of creating successful urban spaces (Figs. 5, 6).

As a result of the evaluation, it was identified that the students successfully conducted the "scale" study in a given time which is the first part of the syntactic function. According to the dimensions of the equipment in the concrete samples, different-scaled spaces were designed for activity areas. Since sunbathing area includes the action of lying, it was designed bigger than the area for food and beverage activity. These findings indicate that the student used the elements of repetition, harmony, contrast and balance in terms of the scale. Thus, at this stage of the systems approach, the students learned the concepts of utility and efficiency required to design a quality and successful open space when they graduate, in other words, they learned which equipment can be used in which scaled space (Figs. 5, 6).

It was identified that the students who decided on the size of the spaces depending on the equipment and activities in the previous study created balance in terms of the size of the forms in the design by using repetition and harmony between the forms. The students did not distort the system of the character by not using contrast in the form as in the sample of form unity and created an aesthetically successful space design by changing the sizes of these forms not to make the design monotonous and boring. Therefore, the student will be able to design aesthetically successful spaces by applying the systems approach in open spaces when he/she becomes a landscape architect (Figs. 5, 6).

Findings related to the students' answers in the survey

Findings related to the contribution of the systems approach to the student

At this stage, SPSS (v. 17.0) was used to identify whether the relationship between the answers to the questions regarding the contribution of the course to the student and systems approach process was significant and $\chi 2$ tests were conducted. While the results of the $\chi 2$ tests indicated that the contribution of the systems approach to the student was statistically significant ($p < .01$), the answers to the question whether the course was complicated and difficult were not found to be statistically significant ($p > .01$) (Table 3).

The relationship between the contribution of the systems approach to the course and the evaluations of the systems approach

The relationship between the contribution of the systems approach to the course and the concepts with which we evaluated this approach is indicated in Table 4. According to these results, the most important contribution of the course conducted with the systems approach to the student is that it teaches to make creative and functional designs. Moreover, the concepts of function-problem detection, creativity–esthetical (formal) were determined as the most related concepts between each other. It was identified that the student preferred the systems approach process in other design courses and would use it in the designs that he/she would make after graduation.

This survey study was performed on the students by those responsible for the course. Thus, the researchers were concerned about whether students would answer these questions with note anxiety. In order to minimize this, this survey study was carried out after announcing the notes of the students. Therefore, it was attempted to solve this problem in this way.

Conclusion and recommendations

Nowadays what the education process for the discipline of Landscape Architecture, which aims to create spaces responding to the user's needs and requirements by the means of certain design criteria, should be like is still open to debate. Style and methods are of great importance for gaining design and creativity skills by students in the education programs of

Table 3 The contribution of the systems approach to the student

	Functional	Creativity	Problem detection	Esthetical (formal)	Difficult	Preference	Use
Pearson Chi Square							
Value	32.247	55.738	30.503	50.42	2.33	53.052	53.052
df	6	4	6	4	4	4	4
Asym. sig (2-sided)	**.000****	**.000****	**.000****	**.000****	.668	**.000****	**.000****

$^{*}p < 0.05$; $^{**}p < 0.01$

Table 4 The relationship between the evaluation of the systems approach and the contribution of the course

	1	2	3	4	5	6	7
1. Functional	–	.382**	.907**	.299*	.069	.468**	.468**
2. Creativity		–	.382**	.935**	.058	.935**	.935**
3. Problem detection			–	.412**	.007	.468**	.468**
4. Esthetical (formal)				–	−.090	.876**	.876**
5. Difficult					–	.111	.111
6. Preference						–	1.000**
7. Use							–
The contribution of the course	.623**	.649**	.504**	.554**	−.002	.605**	.605**

*Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed)

Landscape Architecture as well as in all disciplines including design and creativity processes.

This study advancing upon the design concepts and the interrelation between these concepts investigated the systems approach in landscape design specific to the studio work on the subject of residence and immediate surroundings in the 3rd Semester at Karadeniz Technical University, the Department of Landscape Architecture. In this study, as well as in the design activity and design education, the way of sorting and matching relationships and concepts forming the systems approach in design was adopted.

Yilmaz et al. (2016), who associated the design elements and principles in Landscape Architecture education and outdoor design with each other, revealed that this was beneficial for students' understanding the design processes. Furthermore, in the design process, it was found out that students produced systematic, creative and original products with the shape-colour-measurement-texture-direction among design elements that were found to be significantly correlated with the concept of unity by examining the formation of the structure-environment unity and which design elements were used in line with which principles.

Özkan et al. (2016) say that in order to produce creative and unique designs, students must become aware of the requirements related to the subject, make a literature review on this subject (find concrete–abstract examples), collect the necessary information and data, solve the problem by assessing these, and thus, colleagues who will create systematic and quality urban spaces can be raised.

Özkan et al. (2017) determined that the designers who want to create successful urban spaces must plan a detailed design process by determining the needs and wishes of users. A systematic product must be produced by associating many concepts and processes with each other. This study supports these results of the previous studies.

The design process is a complex process involving multiple concepts and the relationships of these concepts with each other. It is expected that the systems approach will be revealed in the design that meets both syntactic and pragmatic functions at the same time by explaining these concepts and relationships between them to students in the integrated way. In this study, the designs made by the students were evaluated according to the model of the systems approach. This approach model has an instructive characteristic in the solving mental and cognitive activities emerging in the design process. Thanks to this, while contributing in a significant way basically to the development of design and creativity processes of students, at the same time, it plays an important role in the

understanding the parts of a whole being in the whole—part relationship and their relationships with each other (Koffka 1935).

The students who started the design process with the systems approach understand and complete this process better. Thus, an education type which contributes to the solution of the problems causing the design of open spaces of poor quality that do not meet the user needs has been revealed. The results of this study will be useful for both the educators who want to teach the design process to students in a better way and designers who want to create successful urban spaces.

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