



FLEXIBLE DESIGN IN URBAN FURNITURE

KENTSEL DONATIDA ESNEK TASARIM

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ABSTRACT

In landscape architecture discipline, the systematic use of furniture elements designed as spatial components is as important as creating a space. Furniture with correct design improves the quality of life and provides comfort by fulfilling occupant requirements. Thus, the designed furniture elements should be compatible with the spatial identity and occupant requirements. At this stage, the concept of flexibility becomes a factor. The occupants, who constantly change and develop physically and psychologically, desire to alter their environment based on the transformations they experienced. This could be made possible via flexible design. The aim of the present study was to analyze flexible design approach in furniture designed for urban open spaces. The study was conducted in two phases. In the first phase, flexible furniture models developed in Furniture Design Course in KTU Landscape Architecture Department were analyzed based on flexibility and functionality, while in the second phase, a survey was conducted with 68 students to determine their levels in learning the concept of flexibility with respect to furniture. In the first stage, it was determined that the furniture designed by the students were movable based on the space and the type of activities conducted in that space, and these designs were movable in certain cases, fragmented, modular or integral in others. In the second stage, the survey findings demonstrated that the students' learning level was very high in the concept of flexibility, they could design flexible furniture at a good level, however they experienced problems in reflecting the concept of flexibility to designs functionally. It was considered that this problem could be solved with experience. T-test was conducted to determine whether the survey question responses were statistically significant. It was determined that the students learned the concept of flexibility at very high level, that is, they scored the highest points in this area, they learned to design flexible furniture at a high level, in other words, they scored high points in this area, however they experienced difficulties when reflecting functional flexibility concept to the furniture they designed, hence they scored moderate points (positive). In conclusion, the designer's objectives should include creating open-ended landscapes that are accessible by occupants and can fulfill their needs. Landscape designed to fulfill these needs could connect with the occupant and possess multiple functions and meanings. The present study findings would shed light on flexible urban open space furniture design and could promote the design of such products.

Key Words: Urban open space, furniture, flexibility, design education.

ÖZ

Peyzaj mimarlığı disiplinde; mekânın bileşeni olarak tasarlanan donatı elemanlarının sistematik olarak kullanılması da mekân yaratmak kadar önem taşımaktadır. Doğru tasarlanan donatılar yaşam kalitesini artırır, kullanıcı ihtiyaçlarını karşılayarak konfora olanak sağlar. Buna bağlı olarak tasarlanan donatı elemanları mekânın kimliği ve kullanıcı ihtiyaçları ile uyumlu olmalıdır. Bu aşamada esneklik kavramı devreye girer. Hem fiziksel hem de psikolojik olarak gelişen, değişen kullanıcılar, çevrelerini de bu değişime bağlı olarak değiştirmek isterler. Bu da esnek tasarımlar sayesinde mümkün olabilir. Bu çalışmada amaç KTÜ Peyzaj Mimarlığı Bölümü "donatı tasarımı" dersinde tasarlanan



donatıların esneklik açısından incelenmesi ve dersin faydalarının belirlenmesidir. Dersin öğreticiliğiyle ilişkili olarak geleceğin tasarımcıları olan öğrenciler; kentsel açık mekânlarda kullanılan donatılar için esnek tasarım yaklaşımına sahip uygun tasarımlar ortaya koyabilir. Çalışma 2. Aşamadan oluşmuştur. İlk aşamada KTÜ Peyzaj Mimarlığı Bölümü Donatı Tasarım dersinde yapılan esnek donatı maketleri, esneklik ve işlevsellik açısından incelenmiş, 2. Aşamada ise esneklik ve donatı kavramlarının öğrenme düzeyini belirlemek amaçlı 68 öğrenciyle anket yapılmıştır. İlk aşamada öğrenciler tarafından tasarlanan donatıların mekânın uygunluğuna ve etkinliğin türüne bağlı olarak yer değiştirebilir şekilde düşünüldükleri, kimi zaman şekil kimi zaman yer değiştirebilen, bazen parçalı, modüler, bazen bütüncül oldukları belirlenmiştir. 2. Aşama olan anketin sonucunda ise öğrencilerin, esneklik kavramını çok iyi düzeyde öğrendikleri; esnekliğe uygun donatı tasarlamayı iyi düzeyde yapabildikleri; esneklik kavramını donatılara işlevsel açıdan yansıtmada ise biraz zorlandıkları belirlenmiştir. Bunun da deneyim kazandıkça aşılabileceği düşünülmektedir. Sorulara verilen cevapların farklılıklarının istatistikî açıdan anlamlı olup olmadığı değerlendirilmesi için T-testi yapılmıştır. Esneklik kavramını çok yüksek düzeyde öğrendikleri yani en yüksek değerleri aldıkları, esnek donatı tasarlamayı da yüksek düzeyde öğrendikleri yani yüksek değerleri aldıkları, esnekliği donatıların işlevine yansıtırken ise zorlandıkları, orta değerleri (olumlu) aldıkları belirlenmiştir. Sonuç olarak, kullanıcılara ve ihtiyaçlarına ulaşabilen, onlar tarafından algılanarak kullanılan açık uçlu peyzajlar yaratmak tasarımcıların amaçlarından olmalıdır. Bu ihtiyaçları karşılayabilmek için de tasarlanan peyzajlar kullanıcıyla bağlantı kurabilmeli, çoklu işlev ve anlamlara sahip olmalıdır. Çalışmanın sonuçları da tasarlanacak kentsel açık mekânlarda kullanılacak esnek donatı tasarımlarına ışık tutacak, tasarımlarına önyak olacak niteliktedir.

Anahtar Kelimeler: Kentsel Açık Mekân, Donatı, Esneklik, Tasarım Eğitimi

1. INTRODUCTION

Landscape elements that are used in different areas and provide comfort and environmental quality indicators, support basic functions such as sitting, shelter, protection, enclosure, transportation, advice, lighting, communication, description, games and sports, and facilitate social and individual life are called furniture elements. In brief, furniture include elements that are placed to fulfill various occupant requirements in that particular space (Düzenli et al., 2017: 134).

The furniture should facilitate personal and social life, and occupant communication, assign functional and aesthetic meanings to the space, and define the space. Thus, it should be functional, original and aesthetic (Güney et al., 1996: 147). The space should be flexible enough to meet the changing user requirements, while providing integrity between the space, activity and furniture in the design process that begins with the concept of furnishing.

Numerous urban furniture that are encountered in urban spaces, which are the most frequently occupied spaces following the home and workplace, should be designed and placed for the occupants in the most beneficial manner and provide the right service for the occupants. Thus, the current approach to furniture and ergonomics is a holistic one. Ergonomics is a technique that aims harmony between urban environment and all vital and



functional elements used in this environment and human beings. A quality open space could only be created with ergonomics principles in mind. Humanitarianism, economy, social adequacy for the protection of health, and technical and economic rationality could be considered as the goals of ergonomics (Bulut et al. 2008).

It is also important to prevent a conflict between the furniture and aesthetic values of the space and that the furniture possess the flexibility and quality to serve the spirit of the area (Güneş, 2005: 94; Aksu, 2012: 375). Furniture, which possess social, cultural and economic properties, should have flexible functionality that could serve various occupant requirements and should be designed based on established standards (Harris and Dines, 1998: 112; Celbiş, 2001: 176; Molnar, 2015: 120; Kurdoğlu and Çelik, 2016: 194). The furniture elements should be compatible with the location, size and meaning of the space, and possess the flexibility to provide psychological comfort for the occupants, as well as reflecting the character of the environment (Yücel, 2006: 23; Bayraktar et al, 2008: 106). Instead of a standard application, furniture should be designed with a flexible and original approach based on the features and functions of the location (Şatıroğlu, 2016: 116; Düzenli et al., 2018: 131; Mumcu et al., 2017: 14). In order to construct quality spaces, the design approach should emphasize design elements such as size, form, color and texture and be flexible to respond to the habits, reactions, and instincts of the individual. Thus, the space could attain perceptibility and sustainable availability (Çınar and Çetindağ, 2009: 107). In the following section, the relationship between the concept of flexibility and furniture will be discussed.

1.1. The Concept of Flexibility

Flexibility is described as undergoing formal changes such as elongation, contraction and bending under the impact of an external power, and then returning to the original form (Hasol, 2005: 165). Flexibility in design could be defined as the ability to adapt easily to innovations through change. The concept of flexibility in open space design could also be described as the ability of the current dynamic public open spaces to adapt to changing conditions (Gürler, 2016: 56), and a similar description could be used for furniture design.

Open spaces allow for the formation of various social relationships and are constructed based on the activities that would be conducted in that space. The spatial planning, design and the available furniture based on the activities that would be conducted in the space should be flexible to accommodate spatial changes. The designer should consider the future of the



design, possible future users, their questions and outcomes. This approach is possible only if the design is flexible. In the current era, where everything develops faster, sustainable flexibility is the only solution for designers to capture the requirements of the time and construct sustainable solutions. Since flexibility is a sustainable and future-oriented concept in design, it is the designer's task to consider scenarios that could occur in the predictable future (Kızmaz and Cimşit Koş, 2015: 116-117).

The concept of flexibility appears in various typologies in urban open spaces:

- Surface flexibility
- Functional flexibility
- Occupancy flexibility, and
- Experiencing diversity and transience

Although the above-mentioned classification indicates that flexibility could be utilized with different methods and for various purposes, it is important to note that these typologies are used often in conjunction in design (Erbaş Gürler, 2016: 53).

The preference of flexible approaches in design is due to the need to control various possible scenarios and to solve the problems before they occur. Flexibility in furniture design aims to prevent the termination of the use of a furniture after its control is delegated to the occupant, in contrast, allow its use to continue as long as it is occupied, and to extend this period as long as possible through flexible approaches. Since the users are not uniform, the furniture should also be flexible, but not uniform. The concept of flexibility is possible through approaches such as adaptation, modularity, mobility, change and transformation due to changing user types.

The most important concept in establishing an accurate relationship between occupant requirements and the space, adaptation of the spatial organization to changing conditions, functions and techniques is flexibility. Flexibility aims the maximum adaptation of space and its elements-components in time to changes and developments, and effectively fulfilling changing demands, thus keeping the quality value at the highest level throughout the life of the space (İslamoğlu and Usta, 2016: 1-12; Senem and Arıdağ, 2016: 23). The main reason for the need for flexibility in design is to allow the occupants to control their environment based on their needs. The requirement for flexible design is based on user requirements.



However, designers should consider the concept of flexibility as a user requirement and produce adequate solutions. Although the occupant requirements are the main reason for flexibility, the designers should take the flexibility as a user requirement and produce adequate solutions. Thus, the aim of the present study was to design flexible furniture that would fulfill various occupant requirements and to analyze flexible furniture design process.

2. MATERIAL AND METHOD

The study material included flexible furniture element models designed by sophomore Reinforcement Design course students for different activities in KTU Landscape Architecture Department. Landscape architects create habitable spaces for occupants through environmental design based on occupant requirements and desires. Landscape architecture spatial design should entail ergonomic functional flexible and highly creative aesthetic-original designs that would fulfill occupant requirements. Thus, the above-mentioned course aims to provide students with an understanding in developing creative and flexible furniture design at an adequate size, using adequate material and for adequate activities. In this context, the study was designed in 2 stages.

1st Stage: The students were expected to interpret the selected activity and to design flexible original furniture, creating a harmony between form and function in the open space. At this stage, models of flexible original furniture designed by the students for various activities were analyzed.

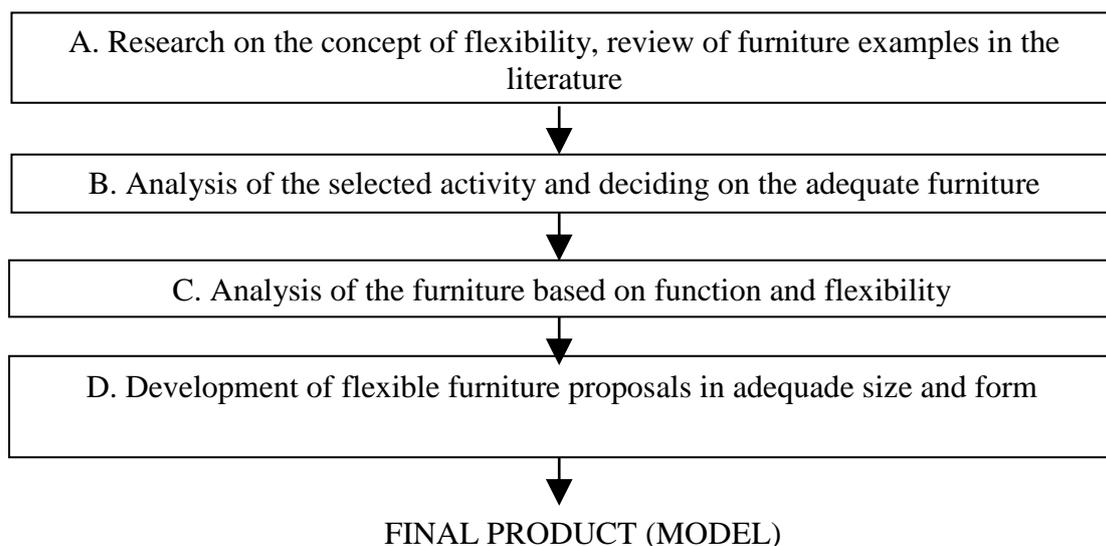


Figure 1. The Furniture Design course process



The students were asked to interpret the selected activity and design flexible furniture in correct size and form that would create a harmony between form and function at the end of the course and in the first stage, selected furniture models were analyzed for flexibility.

2nd Stage: In this stage, a survey was conducted with 68 students who attended the course to determine their views on the concept of flexibility and its relationship with furniture design and their learning level. The questionnaire inquired

- Their learning level about the concept of flexibility,
- Their learning level in flexible furniture design, and
- Their level in reflecting the concept of flexibility to furniture functionality. The survey form was a 5-point Likert-type scale and scored as 1 (very little), 2 (little), 3 (moderate), 4 (good), and 5 (very good).

3. FINDINGS AND DISCUSSION

3.1. 1st Stage Findings

In the findings section, 6 selected student furniture design models were analyzed based on flexibility and functionality and the process approach in design (Tables 1, 2, 3, 4, 5, and 6).

Table 1. Analysis of the design 1

Model 1	Flexibility and functionality analysis
	<p>The student developed a flexible furniture that included three movable pieces. This furniture was conceptualized to move based on the suitability of the space and the spatial activity type. It has flexible functionality and allows various activities based on occupant needs. It was designed to allow activities such as studying, reading books or newspapers, playing games such as backgammon, etc., laying down, sunbathing, resting and climbing for children.</p>

330803 Sedanur Tetik



Table 2. Analysis of Design 2

Model 2

Flexibility and functionality analysis



The student designed an integrated flexible furniture that included multidirectional movable pieces. This furniture was conceptualized to rotate based on the suitability of the space, occupant desire and the activity type. The components of the furniture are movable and flexible; thus, the furniture is multidirectional. It has more stable functionality; it was designed for sitting, resting and reading books.

330850 Gürkan Akdeniz

Table 3. Analysis of Design 3

Model 3

Flexibility and functionality analysis



The student designed an integrated flexible furniture that included rotating movable parts. This furniture was conceptualized to rotate based on the suitability of the space, occupant desire and the activity type. The components of the furniture are movable and flexible; thus, the furniture is multidirectional. It has more stable functionality; it was designed for sitting, laying down, chatting, resting and reading books.

340891 Nihan Çetinkaya



Table 4. Analysis of Design 4

Model 4

Flexibility and functionality analysis



The student designed an integrated furniture that included organic lines. This furniture is mainly flexible in functionality and allows various activities based on changing requirements. It was designed to allow activities such as to lay down, sunbathing, sitting, resting, skateboarding for young adults, and climbing/sliding for children. Furthermore, the cover allows shading.

330820 Gamze Erođlu

Table 5. Analysis of Design 5

Model 5

Flexibility and functionality analysis



The student designed a flexible furniture that included three movable parts. This furniture was conceptualized to move based on the suitability of the space and the activity type. It has flexible functionality and allows various activities based on changing requirements. It was designed to allow activities such as studying, reading books or newspapers, playing games such as backgammon, etc., laying down, sunbathing, resting and climbing for children.

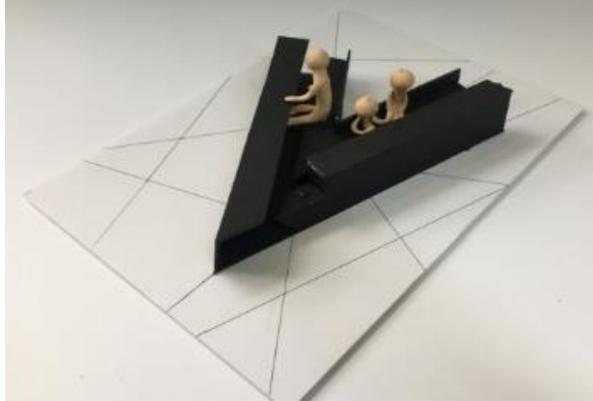
349069 Hatice Tařkiran



Table 6. Analysis of Design 6

Model 6

Flexibility and functionality analysis



The student designed a flexible furniture that included two parts; a desk and a chair. This furniture was conceptualized to move based on the suitability of the space and the activity type. It has flexible functionality and allows various activities based on changing requirements. It was designed to allow activities such as studying, reading books or newspapers, playing games such as backgammon, etc., eating and sitting.

349073 Eda Bakan

3.2. 2nd Stage Findings

At this stage, χ^2 test was conducted with SPSS (v. 23.0) software to determine whether the responses were significant. The χ^2 test findings demonstrated that all categories were statistically significant.

3.2.1. Question 1 Findings

The response frequencies for the question posed to determine the students' learning level in the concept of flexibility are presented in Table 7.

Table 7. The response frequencies for the question “What is your learning level about the concept of flexibility?” (Q1)

	Frequency	Percentage	Cumulative percentage
Moderate	4	5,9	5,9
Good	28	41,2	47,1
Very Good	36	52,9	100,0
Total	68	100,0	

Based on the findings, students stated that they learned the concept of flexibility at a very good level ($\chi^2=24,471a$, 2df, $p<0.01$). It is very beneficial for designers to utilize the concept of flexibility in considering the future sustainable scenarios (Kızmaz and Cimşit Koş, 2015: 116-117) and the findings of this phase were also considered very beneficial in this respect. Because, the transfer of the concept of flexibility to the student demonstrated that



they could create functional, flexible and sustainable designs when they would become practicing designers in the future.

The response frequencies for the question posed to determine the students' learning level in designing flexible furniture are presented in Table 8. Based on the findings, students stated that they learned designing flexible furniture at a good level ($\chi^2=12,118^b$, 3df, $p<0.01$). As reported in the literature, it is quite important to design flexible furniture that fits the space (Güneş, 2005: 94; Aksu, 2012:375). Thus, the finding that the students learned to design flexible furniture was significant for the success of their future furniture designs, and hence open space designs.

Table 8. The response frequencies for the question “What is your learning level in designing flexible furniture?” (Q2)

	Frequency	Percentage	Cumulative percentage
Little	6	8,8	8,8
Moderate	19	27,9	36,8
Good	26	38,2	75,0
Very Good	17	25,0	100,0
Total	68	100,0	

The response frequencies for the question posed to determine the student levels in reflecting the concept of flexibility in the furniture they designed are presented in Table 9.

Table 9. The response frequencies for the question “What was your level in reflecting the concept of flexibility in furniture functionally?” (Q3)

	Frequency	Percentage	Cumulative percentage
Very little	5	7,4	7,4
Little	18	26,5	33,8
Moderate	28	41,2	75,0
Good	17	25,0	100,0
Very Good	68	100,0	

Based on the findings, the students stated that they reflected the concept of flexibility in the furniture they designed functionally at a moderate level ($\chi^2=15.647^b$, 3df, $p<0.01$). The furniture elements with social, cultural and economic properties should possess functions that would fulfill different user requirements and should be designed in compliance with the standards (Harris and Dines, 1998:130; Celbiş, 2001:176; Molnar, 2015:176). Since this is a hard to acquire skill that could only be learned by designing and acquiring experience, the



learning level in the course was moderate and it would improve as the students take higher-level projects and as their experience levels increase.

3.2.2. Comparison of the Questions

T-test was conducted to determine whether the responses were statistically significant. It was determined that the students learned the concept of flexibility at very high level, that is, they scored highest points in that area, they learned to design flexible furniture at a high level, in other words, they scored high points in that area, however they experienced difficulties when reflecting the functional flexibility concept to furniture, hence they scored moderate points (positive) in that area. The analyzes demonstrated that the differences between the responses were significant in each question (p <0.01) and the mean and standard deviation values for each question. T-test findings are presented in Table 10 and the mean values are listed in Figure 2.

Table 10. Response Mean and Standard Deviation and t-test Values

	t	sd	Mean	95% Significance Interval	
				Least	Most
Q1	60,422	,610	4,471	4,32	4,62
Q2	33,886	,923	3,794	3,57	4,02
Q3	26,260	,891	2,838	2,62	3,05

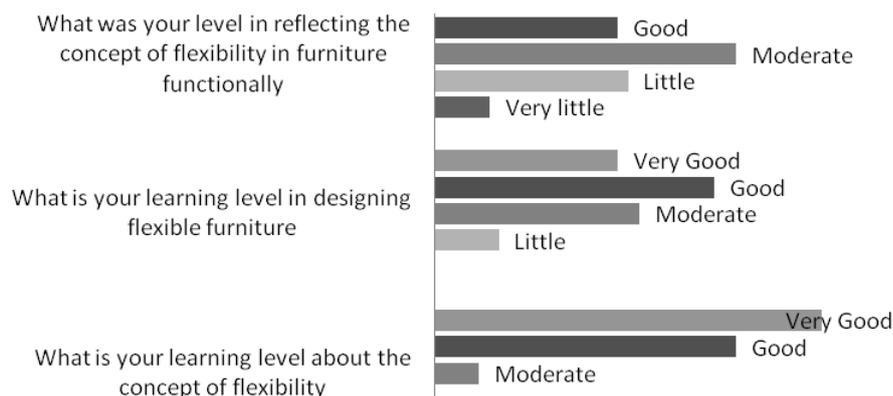


Figure 2. Comparison of Question Mean Values

4. CONCLUSION AND RECOMMENDATIONS

When urban open spaces are designed using highly adaptive furniture for activities that emerge and differentiate spontaneously with changes in the climate, adequate, beneficial, and user-friendly spaces are constructed. Thus, flexibility is a beneficial method in interaction



with the landscape. Thanks to furniture that could be designed uniquely in each case, the communications between the occupants and the open space and occupant belongingness for the space increase (Erbaş Gürler, 2016: 54).

Thus, the furniture models designed in the furniture design course by KTU Landscape Architecture Department students were analyzed to determine design flexibility.

The study findings demonstrated that the furniture designed by the students were conceived as movable and versatile furniture based on availability of the space and activity type, and in certain cases they included various pieces, and they were modular and integral in others. In terms of function, it was determined that the students designed flexible furniture that allowed various activities based on changing user needs. In the present study, the benefits of the furniture design course, which aims the students to construct flexible furniture designs, were also demonstrated. Thus,

- The students learned the concept of flexibility at a very good level,
- The students could design flexible furniture at a good level, and
- The students experienced difficulties in reflecting the concept of flexibility to the furniture functionally in the course.

In conclusion, the designers should aim to design open-ended landscapes that are accessible by the occupants and suitable for their requirements. Landscape designed to fulfill these needs could connect with the user and possess multiple functions and meanings. Landscape design needs to be irregular rather than guiding (Johnson, 1997: 312). This is possible with flexible design. The present study findings would provide insight for the design of future furniture in urban open spaces.



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