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Araştırma Makalesi / *Research Paper*

Readability of Karadeniz Technical University Kanuni Campus, Trabzon-Turkey

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ABSTRACT

Physical environments that are perceivable and readable help the users to reach their destinations without getting lost on the one hand and cause them to internalize the environments in which they reside and to identify themselves with the environments on the other. This study discusses the notion of "readability" of the campus settlements that have multifunctionality, open and closed areas, etc. The study employed Lynch's mind mapping method, and the Kanuni Campus of Karadeniz Technical University (KTU) was chosen as the pilot area and its readability was investigated.The study consists of three sections. The first section is a literature review on readability, image, mind maps, and Lynch's image elements. In the second section of the study, the maps drawn by the 1st, 2nd, 3rd and 4th year students of the Department of Architecture were transformed into a separate mind map for each class. The third section presents the analyses. The study exposed the similarities and differences in the mind maps of the students in different classes. Based on the results The readability of a campus is an important design problem in campus design. While doing this, the designer should organize the image elements that create a strong image effect in everyone.

Keywords: Campus, image elements, mental maps, readability

Karadeniz Teknik Üniversitesi Kanuni Kampüsü'nün Okunabilirliği

ÖZ

Kullanıcılar tarafından algılanan ve okunabilen çevreler, kullanıcının kaybolmadan istediği yere gidebilmesini sağlarken yaşadığı çevreyi benimsemesini, kendini oraya ait hissetmesini sağlamaktadır. Yapılan çalışmada çok işlevlilik, açık, kapalı alanların bir arada olduğu kampüs yerleşmeleri üzerinde "okunabilirlik" kavramı tartışılmıştır. Çalışmada Lynch'in kullandığı zihin haritalama yöntemi temel alınmış ve pilot bölge olarak KTU Kanuni Kampüsü seçilerek kampüsün okunabilirliği araştırılmıştır. Çalışma üç bölümden oluşmaktadır. Birinci bölümde okunabilirlik, imaj, zihin haritaları ve Lynch'in imaj öğelerini içeren literatür çalışması yapılmıştır. Çalışmanın ikinci bölümünde Mimarlık Bölümü 1. 2. 3. ve 4. sınıf öğrencilerinin çizdiği haritalar, her bir sınıf için ayrı birer zihin haritasına dönüştürülmüştür. Son bölümde ise tüm bu veriler ortaya konmuştur. Çalışmada sınıfların kampüse ilişkin zihin haritalarındaki farklılıklar ve ortaklıklar ortaya konmuştur. Elde edilen verilerle deneyimle birlikte kampüs algısının değişip değişmediği tartışılmıştır. Sonuç olarak, bir kampüsün okunabilir olması kampüs tasarımında önemli bir tasarım problemidir. Dolayısıyla tasarımcı herkes tarafından güçlü bir imaj elemanları düzenlemelidir.

Anahtar Kelimeler: Kampüs, imaj öğeleri, zihin haritaları, okunabilirlik

INTRODUCTION

How users perceive their physical environments are the end data of the design. Environments that are readable to the user allow the user to go wherever they want without getting lost, to internalize the environment in which they live, and to feel that they belong there. Together with the social and ideological developments in the educational domain in Turkey in the 20th century, new universities are established or new buildings are built within the present universities in line with the ever growing needs. However, the designs are made without considering the concept of readability. Yet, readability is important for students in the perception of the campus, in reaching all the spaces on the campus, in feeling themselves safe on the campus and therefore in adopting the campus. A campus and a city show some similarities in terms of size and having such space types as open, semi-open, closed spaces, public, semipublic, private spaces, and of having many functions. The study is based on Lynch's work *The Image of the City*, a study on the readability of the cities, and discussed the "readability of a campus" based on the image elements that Lynch put forward in his study on the readability of cities.

According to Lynch (1960), the urban texture is a complex structure and it must first be visualized in order to work on it. In order to visualize the city, Lynch set out from the urban image. Lynch emphasized that an area can be a readable city only when the image elements can easily be distinguished and grouped in a whole of a texture. Lynch (1960), an image is a picture in which an individual generalizes the outer world in his mind, and the formation of an image is based on a bidirectional process between the observer and observed. According to Tuan (1975), an image is something that is seen without an environmental stimulus.

When considered from the point of view of the observed, in environments with insufficient sources of environmental stimuli and in a repetitive monotony, individuals have difficulty in remembering and learning that space and in finding direction in that place (Altman ve Chemers, 1980). It is possible for the visual structure to become apparent by arranging all the image elements one by one and together within the framework of certain principles, thus the city becomes physically clear and readable (Aru, 1984). And when considered from the point of view of an observer, such observer differences as age, sex, culture, profession, experience, and familiarity may cause differences in the image. Besides, the observer's immediate senses and past experiences also change the image. In other words, the environment reveals differences and relationships, and the observers select, organize and interpret what they see for their own purposes (Lynch, 1960). Lynch studied the readability of cities over the image of the city formed in the minds of the users, and discussed the visuality of this image on mind maps. The present study employed Lynch's mind mapping technique for cities for a campus area.

Works on the Subject

Man needs to define and comprehend his environment. It is an existential need for man to know his place on earth. Therefore, he has an urge to comprehend his city (Uğurlu, 2004).Cognitive maps can be used to aid people in performing such cognitive tasks as navigating a conceptual or physical space (Spence, 1999; Spence, 2001; Van Dijk et al., 2003), retrieving information about structures, objects, or concepts in the space (Billinghurst and Weghorst, 1995; Portugali, 1996), and updating information about the structures, objects, or concepts in the space (Kearney and Kaplan, 1997; Welling, 2003; Sedig et al., 2005). So cognitive maps are the main tools that are used to identify spatial images and the difference between physical and subjective environments (Milgram,1972).

Lynch (1960) and Milgram (1972) described cognitive maps as "the inner images that are developed by the individual about a place". Downs and Stea (1977) define cognitive maps as an abstraction covering those cognitive or mental abilities that enable us to collect, organize, store, recall and manipulate information about the spatial environment. Tuan (1975) describes mental maps make it possible to give directions to a stranger. they make it possible to rehearse spatial behavior in the mind. He refers to a term mental map and describes it as a special type of image which is even less directly related to sensory experience and states that mental maps, like real maps, are a means to structure and store knowledge. The mental map is like the real map, a way to organize data (Sudes and Gokten, 2012).

Cognitive maps develop by interacting with the space directly, and/or by interacting with its external representations. This internal map or mental construct can then be used, like a real external map, for mental reasoning about and inspection of the space (Downs and Stea, 1973; Billinghurst and Weghorst, 1995; Kearney and Kaplan, 1997; Yeap and Jefferies, 2000).

The information that people acquire about certain environments through environmental stimuli enables

that environment to be recognized and understood first. While giving information to others about that space, the mind map of this information that is stored in the mind as certain images is recalled (Altman and Chemers, 1984).

Differences arising from the characteristics of the environment and the individual affect the formation of the mind map. Because a mind map is formed by the information that an individual gets, it is peculiar to the individual and it differs greatly from one idividual to another (Gould, 1973; Tümertekin and Özgüç, 2002).

The way people react to different environments greatly depends on their perceptions of those environments and the relation with the environment depends on each person's mental images and representations (Cassidy, 1997). Duralı and Köseoğlu (2019) point out that readability of city is higher local users who are familiar with the city than for tourists. The usage rate of the place increases its readibility. İmamoğlu (2000) states that familiarity helps to understand the place. Bozdağ et al. (2020) point out that the spatial legibility of the observer increases statistically with the spatial experience. O'Neill (1992) supports this idea and he states that when the familiarity increases, it will be easier to find the way. In addition, the mental maps created by individuals who have little experience with the place, it is concluded that the general characteristics of the place (Ülkeryıldız et al., 2009).

An individual's experience with the space, in other words, the frequency of the individual's use of the space or the number experince, shortly the "time" is one of the important factors in the formation of a mind map. According to Altman and Chemers (1984), continuous experiences also enable the information to be re-organized and recorded in the mind of an individual, thus the physical environment becomes a more and more known and remembered place.

Lynch (1973) points out that different groups may have widely different images of the same outer reality. However, Lynch also states that there are some common points in the mind maps of all groups and that these common points are the areas of work of the designers. By defining the common elements in the mind maps, he made his study "The Image of the City" on the elements of an image that are effective in the readability of cities. In the study the contents of the city images, which are referable to physical forms, can conveniently be classified into five types of elements: paths, edges, disticts, nodes and landmarks. These elements defined as

- Paths are channelsalong which the observer customarily, occasionally or potentially moves.people observe the city while moving through it, and along these paths the other environmental elements are arranged and related.
- Edges are the linear elements not used or considered as paths by the observer. They are the boundaries between two phases, linear breaks in continuity.
- Districts are the medium-to-large sections of the city conceived of as having two-dimensional extent, which are the observer mentally enters "inside of" and which are recognizable as having some common, identifying character.
- Nodes are points and strategic spots in a city into which an observer can enter and which are the intensive foci to and from which he is traviling.
- Landmarks are another type of point-reference, but in this case the observer does not enter within them, they are external. They are usually a rather simply defined physical object. Their use involves the singling out of one element from a host of possibilities.

Lynch (1960) states that for a successful perception of a city form, the mental image of the city should be readable; the patterns of building blocks, buildings and spaces in the city should be in harmony; and it should be memorable for those who perceive the city space by walking.

MATERIAL AND METHODS

The present study on the readability of the Kanuni Campus of KTU is based on the mind mapping and image elements that Lynch (1960) studied when carrying out his research on three American cities. The aim of the study is to determine whether or not perception differs according to the experience of the observer, and to discuss the characteristics of the elements of an image which is strong for all irrespective of experience.

The study employed the mind mapping method since it reflects flexible, open and potentially deep psychological views. According to Lynch (1960), in determining the readability of cities, the image of the city in the perceiver's mind should be visualized, which is the mind mapping method that results in the sketching of the area. In his study, he created the image map of the city by analyzing the image maps of the individuals, and transformed the image elements into graphical expressions as 75% and above, 50% -

75%, 25% -50% and 12.5% -25%. In the present study, the mind mapping method was used by considering these intervals.

In the study, in order to minimize the variables that will affect the campus image caused by the characteristics of the perceiver, the interview group was composed of students from only one department. The sample was chosen from among the students of the Department of Architecture due to the fact that they are more open to perception, that, as a result of their training in the department, they have the ability to convert the abstract into concrete, and that they have the ability to read the drawings.

Basically, the sample consisted of two groups as 1st and 2nd year students who were new to the campus and spent little time there, and 3rd and 4th year students who knew the campus well and spent more time there. The study was conducted with students who entered the university in 2015, 2016, 2017 and 2018. Based on the 60 participants that Lynch (1960) interviewed in his study "The image of the city", the present study interviewed 30 students from each of the four classes, making a total of 120 student, and assigned them to two groups. A campus map without the place names on it was given to each student and they were asked to mark Lynch's image elements. Each image element was given a symbol and students were asked to mark the specified spaces with these symbols and name the spaces on the map. Data in which places were named wrongly were excluded from the study due to the fact the space did not remain enough in their memories. In line with this, the study set out with the following hypotheses:

- Campus settlements can be considered as cities due to the variety of functions and spaces that they have. Lynch (1960) stated that a good city must be "readable". Therefore, a good campus must also be "readable" for its users.
- Knowing and comprehending their environments is an existential need for human beings. According to Lynch, readability is necessary for a person to feel safe and to have a sense of belonging to that place. Therefore, the readability of the campus is important and should be addressed in order for the users to define the campus, to feel safe there and to adopt it.
- Mind maps are a mental formation in which environmental information is collected, organized, stored and recalled. Therefore, readability must be discussed on the mind maps where the image that the environmet creates in people becomes concrete. For this reason, mind mapping method should be used to determine the readability of the campus. Lynch determined the effective image elements in the urban image as roads, landmarks, nodes, regions and borders, and stated that they support each other.
- In the study, it is expected that these elements in the image maps of the campus be used in a way to support each other. Therefore, the present study expects that the order of the effective elements of the image of the campus be compatible with those of Lynch's.
- According to Lynch (1973) and Gould (1973), the characteristics of both the environment and individual affect the formation of mind maps. Therefore, it is expected that the mind maps of the campus will differ between classes due to the different time and education that students spend on campus, that is, they have different experiences on the campus.
- Regarding the experience, Lynch states that while creating the mind map of the city, individuals who do not know the city well will pay attention to the topographic elements, wide regions, general characteristics, rough directional relations, and only later will the roads be important; and those who know the city very well will pay attention to landmarks rather than the regions and roads. Therefore, while large regions and general properties are expected in the mind maps of first year students who are new to the campus, it is expected that landmarks will gain importance in the mind maps of the students towards the 4th year. Appleyard (1973) states that people initially include many details in their mind maps about the city and that those details disappear in their mind maps over time. Therefore, it is expected that more details will be found in the mind maps of the 1st year students, and that these details will decrease towards the 4th year.
- According to Lynch, a physical object that creates a strong image in any observer has the properties of character/identity, structure and meaning. For this reason, it is expected that the strongest images that all classes have in common in their mind maps be the spaces that can be defined, that are different, i.e., have a character, that have spatial relations (structure), and that are meaningful for the user.

Material: *Kanuni Campus (KTU)*

Karadeniz Technical University Kanuni Campus is located in Trabzon, Turkey. Karadeniz Technical

University is the first university of Turkey established outside Istanbul and Ankara. It is established 1955. In 1963, Faculty of Basic Sciences, Faculty of Civil Engineering and Architecture, Faculty of Mechanical and Electrical Engineering, and Faculty of Forestry were established. Firstly it started its educational activities in Ataturk Primary School. In 1966, it moved to its current campus (URL-1, 2021).

The campus is four kilometeres away from the city center, it is opposite the Trabzon Airport and two kilometers away from the Bus Terminal. The campus is located close to the sea, the city center and the transportation facilities of the city. Due to its location, it can be easily seen both in local and intercity transportation. The campus is located on a sloping land parallel to the sea. It is bordered by the Trabzon-Rize coastal road to the north, Konaklar Mahallesi to the east, and the Hospital Road to the south. The campus has four entrances. Gate A is the main entrance gate. In the campus plan, there is a dominant axis parallel to the topography. This axis is bifurcated in form. This bifurcation is also important in the separation of the regions on the campus. One of these bifurcations connects the campus to the coast, and the other to the university hospital. In addition, this axis is the widest road on the campus and is the only mass transportation route. Functionally, the campus has administrative, commercial and accommodation buildings, has green areas that allow activities such as sitting, resting, watching and chatting, and indoor and outdoor sports areas (Figure 1).

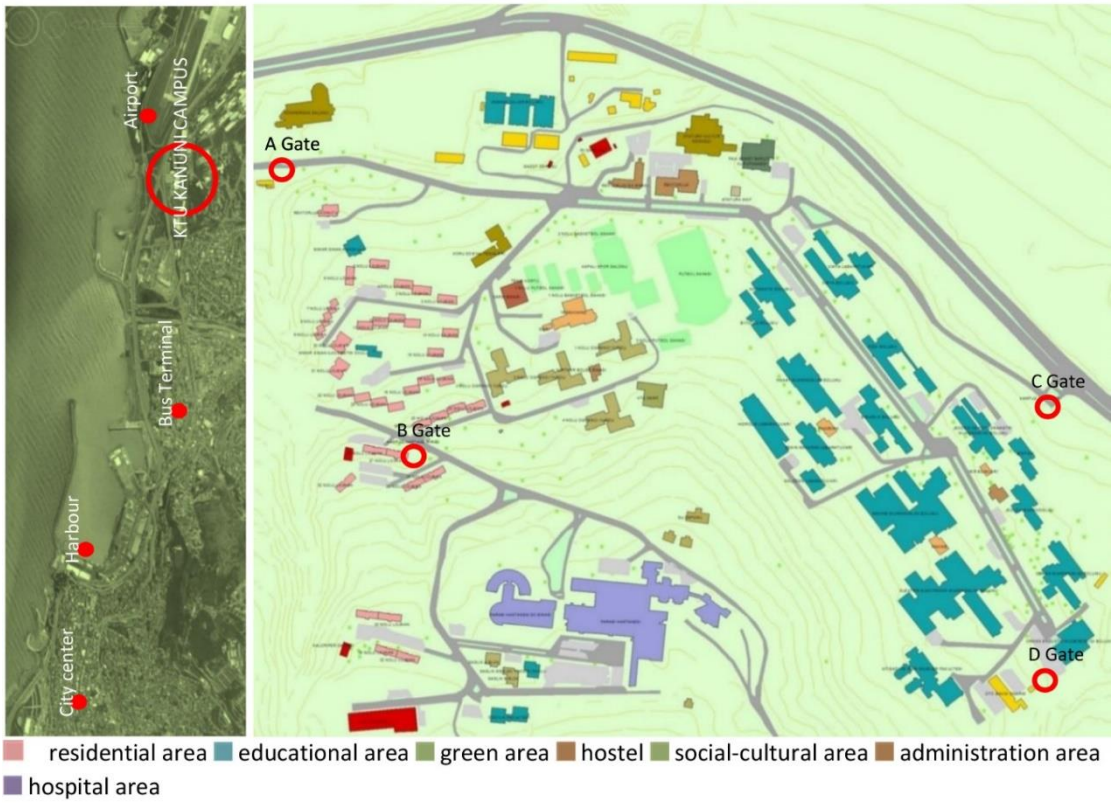


Figure 1. Location of Kanuni Campus (KTU)

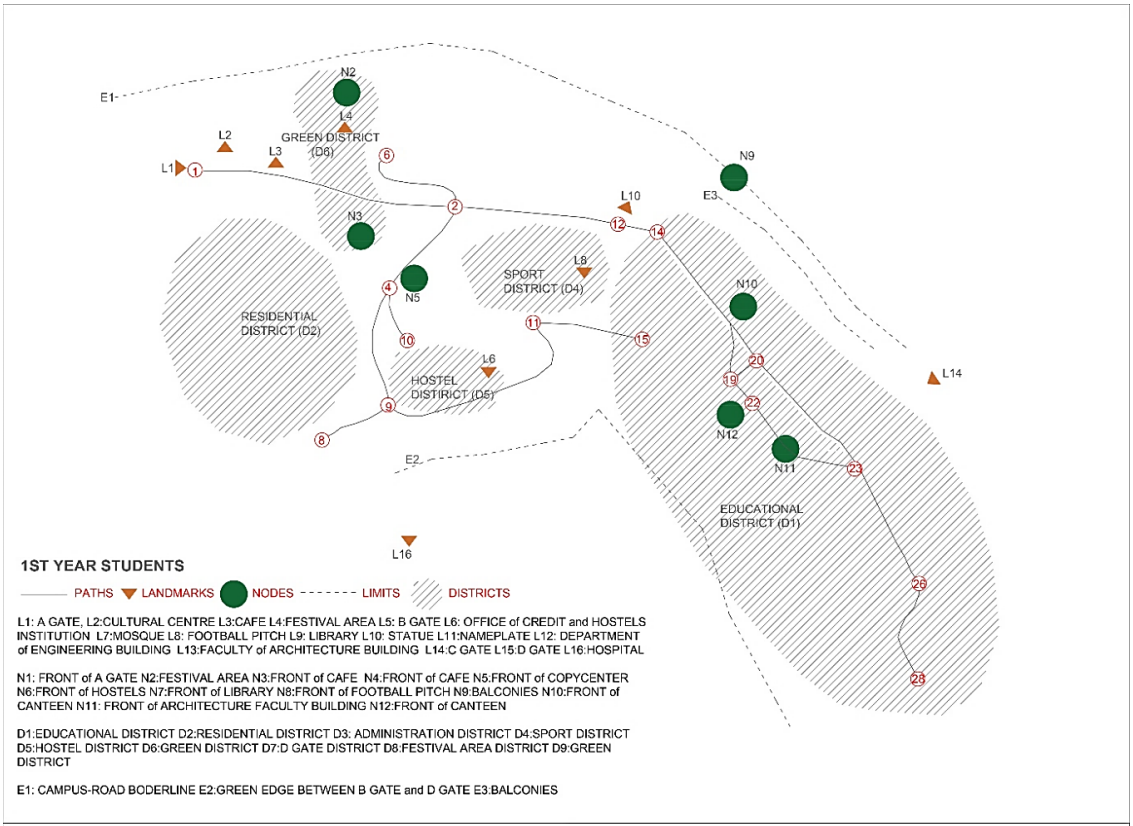
FINDINGS AND DISCUSSION

Findings

In this study, the mind maps of each class were created by taking into consideration the ranges that Lynch (1960) determined in his study "The Image of the City" as 75% and above persons, 50%-75% persons, 25%-50% persons, and 12.5%-25% persons. As a result of the analyses of roads, nodes, landmarks, regions and edges as the image elements that the majority of each class specified, it was found that:

More than 75% of the first year students specified the main road from Gate A to the next bus stop (1-26) as road element; 25%-50% of the students specified the

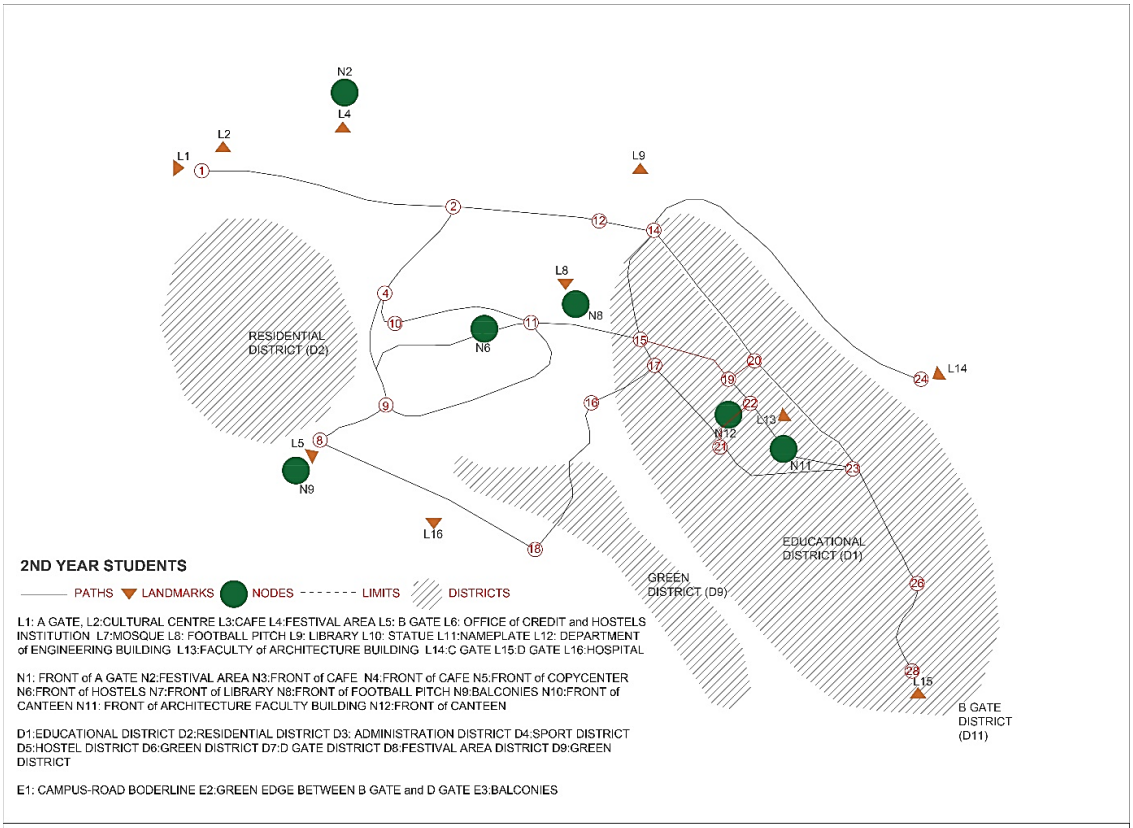
Cultural Centre (L2) and the football pitch (L8) as landmark elements; and 25%-50% of students specified the festival area (N2) as node element. 50%-75% of the students specified the sports area (D2) and the educational area (D1) as regions. 12.5%-25% of the students specified the balconies (E3), campus-road borderline (E1) and the green area between Gate B and Gate D as edge elements. The order of the image elements that the majority of the first year students specified were found to be as roads, regions, landmarks, nodes and edges (Figure 2).



1ST YEAR STUDENTS	PATHS	LANDMARKS	NODES	DISTRICTS	EDGES
75 % and above (person)	1-26	-	-	-	-
75 %- 50 % (person)	-	-	-	D2, D1	-
25 %- 50 % (person)	2-4, 19-22, 26-28 22-23, 8-9, 11-15	L2, L8	N2	D4, D6	-
12,5 %- 25 % (person)	4-9, 19-20, 4-10, 9-11, 2-6	L16, L1, L3, L14, L4, L6, L10	N12, N11, N3, N9, N10	D5	E3, E1, E2

Figure 2. Mental map of 1st year students

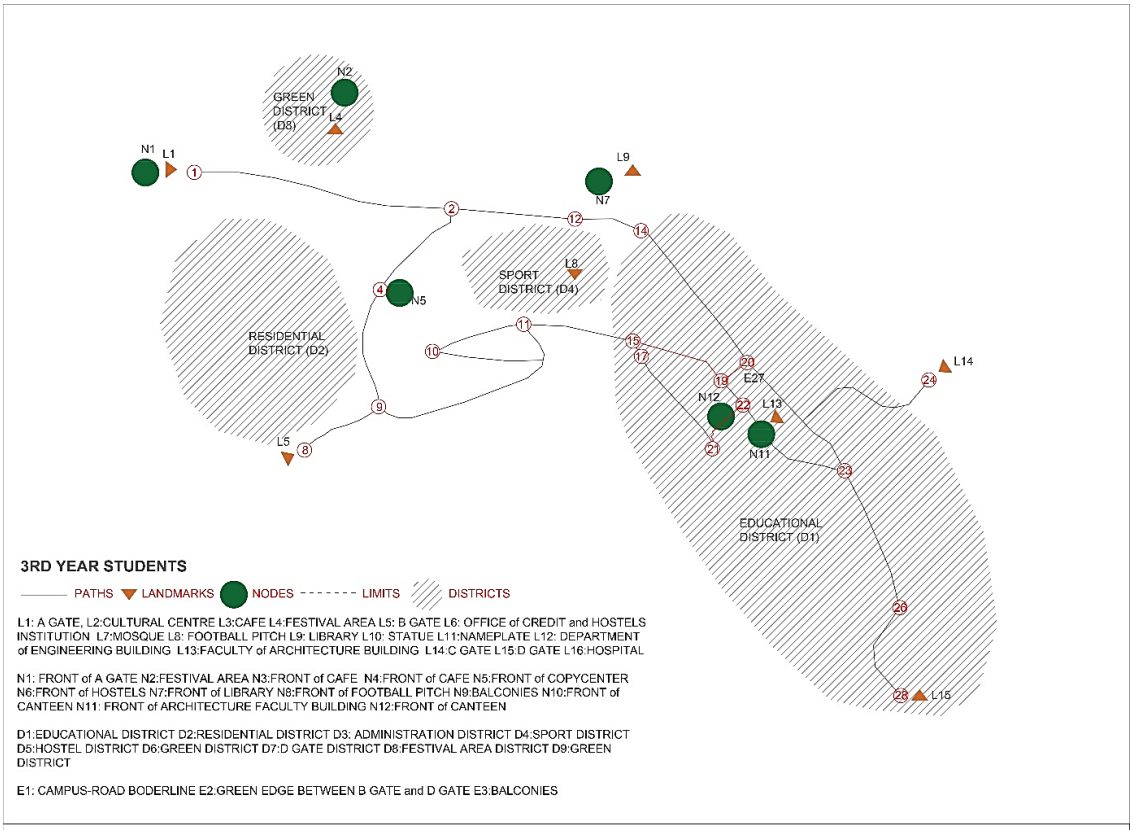
More than 75% of the second year students specified the road between Gate A and the building of Faculty of Architecture as road element (1-20); 25%-50% of students specified the university hospital (L16), Gate C (L14) and Gate A (L1) as landmark elements; and %25-%50 of students specified the festival area (N2) as node element. 25%-50% of the students specified the sports area (D2) and educational area (D1) as regions. The order of the image elements that the majority of second year students specified were found to be as roads, landmarks, regions, nodes and edges (Figure 3).



2ND YEAR STUDENTS	PATHS	LANDMARKS	NODES	DISTRICTS	EDGES
75 % and above (person)	1-20	-	-	-	-
75 %- 50 % (person)	20-23, 11-15, 16-18, 23-26, 15-19, 16-17, 8-9	-	-	-	-
25 %- 50 % (person)	9-11, 19-20, 4-9, 15-17, 2-4, 17-21, 26-27	L16, L14, L1	N2	D2, D1	-
12,5 %- 25 % (person)	14-24, 21-23,4-10, 10-11, 14-15,21-22, 22-23	L5, L8, L13, L11, L4, L15, L9	N12, N11, N6, N8	D7, D9	-

Figure 3. Mental map of 2nd year students

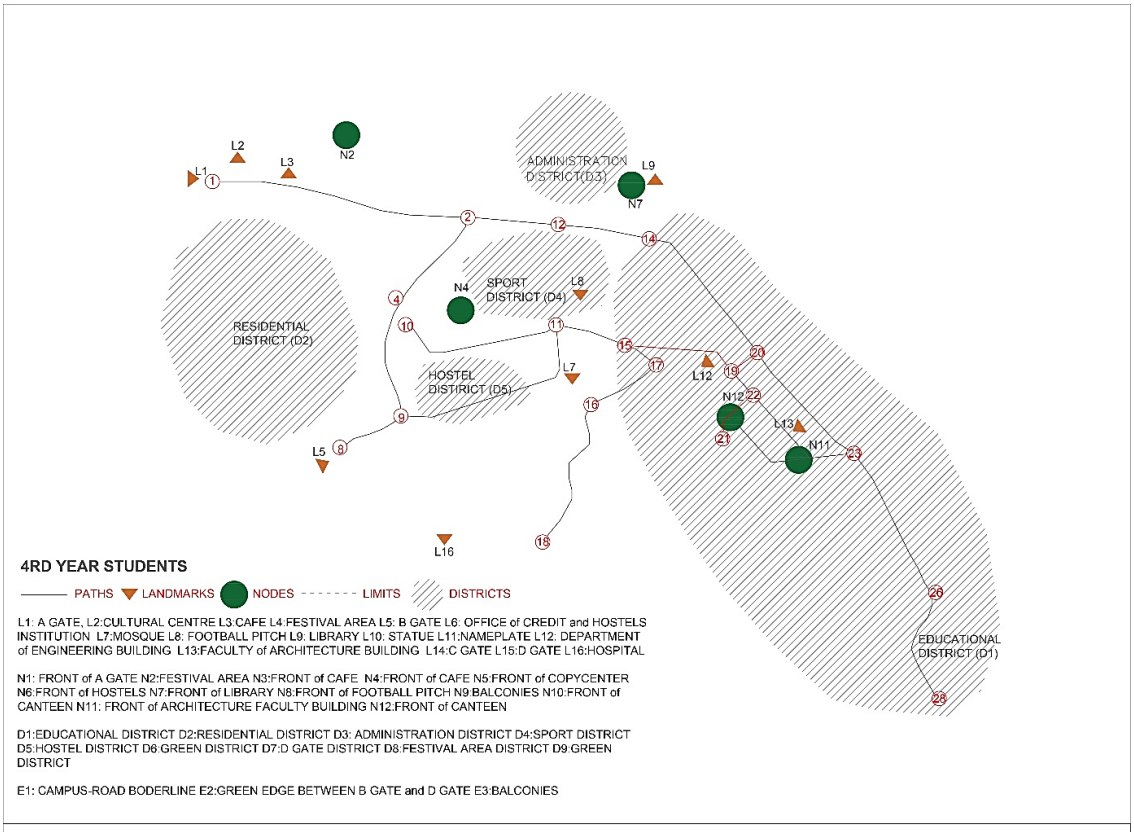
More than 75% of third year students specified road between Gate A and the building of Faculty of Architecture (1-20) as road element; and more than 75% of students specified Gate A (L1), Faculty of Architecture (L13), and Gate C (L14) as landmark elements. (N1), 50%-75% of the students specified the Festival Area (N2), Faculty of Architecture (N11) and the front of Gate A (N1) as nodes; and 50%-75% of the students specified the sports area (D2) and educational area (D1) as regions. The order of the image elements that the majority of third year students specified were found to be as roads, landmarks, regions, nodes and edges respectively (Figure 4).



3RD YEAR STUDENTS	PATHS	LANDMARKS	NODES	DISTRICTS	EDGES
75 % and above (person)	1-20	L1, L13, L14	-	-	-
75 %- 50 % (person)	19-22, 11-15	-	N2, N11, N1	D2, D1	-
25 %- 50 % (person)	23-26, 19-20, 8-9, 9-11, 15-19, 22-23	L5, L15, L4	N7	D8, D4	-
12,5 %- 25 % (person)	2-4, 4-9, 10-11, 17-21, 21-22, 15-17, 26-28, 20-23, 23-24	L9, L8	N12, N5	-	-

Figure 4. Mental map of 3rd year students

More than 75% of the fourth year students specified the road between Gate A and the building of the Faculty of Architecture (1-2) as road element; 25%-50% of the students specified the Cultural Center (L2), Faculty of Architecture (L13) and the Library (L9) as landmark elements. 50%-75% of the students specified the Festival Area (N2) and the front of the Cafe (N4) as node elements. 25%-50% of the students specified the sports area (D2) and educational area (D1) as regions. The order of the image elements that the majority of fourth year students specified were found to be as roads, nodes, landmarks, regions and edges, respectively (Figure 5).



4RD YEAR STUDENTS	PATHS	LANDMARKS	NODES	DISTRICTS	EDGES
75 % and above (person)	1-20	-	-	-	-
75 %- 50 % (person)	20-23, 8-9, 23-26, 2-4, 9-11, 11-15	-	N2, N4	-	-
25 %- 50 % (person)	4-9, 17-21, 26-28, 15-17, 19-22, 21-23, 10-11	L2, L13, L9	N7	D2, D1	-
12,5 %- 25 % (person)	16-18, 19-20, 22-23, 4-10, 15-19, 16-17	L1, L8, L12, L5, L7, L3, L16	N12, N11	D4, D3, D5	-

Figure 5. Mental map of 4rd year students

Discussion

Depending on the duration of the campus use of the students and the education they received, there are differences in experience between the classes. These differences affect the perception of the campus, and therefore its readability. In this context, when the readability of the campus is examined depending on the experience;

- It was found that there are differences in mind maps depending on the experience. While the clearest differences were expected to be between the first graders who just got to know the campus and the fourth graders who knew the campus best, they were seen between the first and third graders. This can be explained by the decrease in the frequency of fourth year students' use of the campus due to their syllabi.
- While the prominent landmarks for the first and second year students were specified by 25%-50% of the students, they were specified by more than 75% of the third year students. This finding supports Lynch's view that people who know the city very well attach importance to landmarks rather than regions and roads.
- Only the first year students specified the campus coastal road as edge, which is one of the general

lines of the campus. This finding supports Lynch's view that a person who has little knowledge of the city will pay attention to rough directional relations while creating a mental map of the city.

While the roads become varied for first and second graders, they are less and clearer for third and fourth graders. This finding is congruent with Appleyard's view that in the beginning people place too many details of the city in their mind maps, but that in time these details disappear and people use the habitual roads with less information (Table 1).

Table 1. Image elements of students

		1st year	2nd year	3rd year	4rd year
PATHS	75% and above	1-26	1-20	1-20	1-20
	50%-75%	-	20-23, 11-15, 16-18, 23-26, 15-19, 16-17, 8-9	19-22, 11-15	20-23, 8-9, 23-26, 2-4, 9-11, 11-15
	25%-50%	2-4, 19-22,26-28, 22-23, 8-9, 11-15	9-11, 19-20, 4-9, 15-17, 2-4, 17-21, 26-27	23-26, 19-20, 8-9, 9-11, 15-19, 22-23	4-9, 17-21, 26-28, 15-17, 19-22, 21-23, 10-11
	12.5%-25%	4-9, 19-20, 4-10, 9-11, 2-6	14-24, 21-23, 4-10, 10-11, 14-15, 21-22, 22-23	2-4, 4-9, 10-11, 17-21, 21-22, 15-17, 26-28, 20-23, 23-24	16-18, 19-20, 22-23, 4-10, 15-19, 16-17
LANDMARKS	75% and above	-	-	L1, L13, L14	-
	50%-75%	-	-	-	-
	25%-50%	L2,L8	L16, L14, L1	L5, L15, L4	L2, L13, L9
	12.5%-25%	L16, L1, L3, L14, L4, L6, L10	L5, L8, L13, L11, L4, L15, L9	L9, L8	L1, L8, L12, L5, L7, L3, L16
NODES	75% and above	-	-	-	-
	50%-75%	-	-	N2, N11, N1	N2, N4
	25%-50%	N2	N2	N7	N7
	12.5%-25%	N12, N11, N3, N9, N10	N12, N11, N6, N8	N12, N5	N12,N11
DISTRICTS	75% and above	-	-	-	-
	50%-75%	D2,D1	-	D2,D1	-
	25%-50%	D4, D6	D2, D1	D8, D4	D2, D1
	12.5%-25%	D5	D7, D9	-	D4, D3, D5
EDGES	75% and above	-	-	-	-
	50%-75%	-	-	-	-
	25%-50%	-	-	-	-
	12.5%-25%	E3, E1,E2	-	-	-

Only the first graders specified the Office of Credit and Hostels Institution (L6) and Atatürk's Statue (L10) as landmarks, and only the second graders specified the nameplates of faculties (L11) as landmarks. This finding also supports Appleyard's view that people place details in their mind maps in the first perception of a space (Table 2).

Table 2. Landmarks of students

		1st year	2nd year	3rd year	4rd year	average
LANDMARKS	Cultural Centre (L2)	25%-50%	-	-	25%-50%	12.5%-25%
	Football Pitch (L8)	-	12.5%-25%	12.5%-25%	12.5%-25%	12.5%-25%
	Hospital (L16)	12.5%-25%	25%-50%	-	12.5%-25%	12.5%-25%
	A Gate (L1)	12.5%-25%	25%-50%	75% and above	12.5%-25%	25%-50%
	Cafe (L3)	12.5%-25%	-	-	12.5%-25%	
	C Gate (L14)	12.5%-25%	25%-50%	75% and above	-	25%-50%
	Festival Area (L4)	12.5%-25%	12.5%-25%	25%-50%	-	12.5%-25%
	Office of Credit and Hostels Institution (L6)	12.5%-25%	-	-	-	
	Atatürk's Statue (L10)	12.5%-25%	-	-	-	
	B Gate (L5)	-	12.5%-25%	25%-50%	12.5%-25%	12.5%-25%
	Faculty of Architecture Building (L13)	25%-50%	12.5%-25%	75% and above	25%-50%	25%-50%
	Nameplate of Faculties (L11)	-	12.5%-25%	-	-	
	D Gate (L15)	-	12.5%-25%	25%-50%	-	12.5%-25%
	Library (L9)	-	12.5%-25%	12.5%-25%	25%-50%	12.5%-25%
	Department of Engineering Building (L12)	-	-	-	12.5%-25%	
	Mosque (L7)	-	-	-	12.5%-25%	

Lynch (1960) gathered the urban image elements that he created with physical elements under the headings of roads, landmarks, nodes, regions and edges. The present study, too, found these elements in the mind maps of students.. Lynch ranked the city's image elements as roads, landmarks, nodes, regions and edges, respectively. The findings of the present study show that although the ranking of the image elements differs from one class to another, for all classes roads are the most prominent image element and edges are the least prominent element, which is also congruent with Lynch's ranking of the image elements. In addition, when the average of all classes is examined, one sees that it is completely congruent with Lynch's ranking (Table 3).

Table 3. Ranking of Image elements for different class

	1st year	2nd year	3rd year	4rd year	All students
Paths	51.20%	68.03%	44.39%	51.81%	55.92%
Landmarks	18.08%	14.03%	24.53%	20.56%	18.55%
Nodes	9.15%	7.82%	15.03%	14.72%	11.24%
Districts	14.16%	7.82%	11.57%	10.89%	10.51%

Discussion about identity, structure and meaning;

In order for a physical object to create a strong image, it must be distinguishable from other elements, have spatial relations, and have a meaning for the observer; in other words, as Lynch described it, a strong image element must have the qualities of character, structure and meaning. In order to create a strong image, the physical object must be distinguishable from other elements, have spatial relationships and be meaningful to the user; in other words, as Lynch defined it, a strong image element should have the qualities of character/identity, structure and meaning. When the strong image elements highlighted by all students in the research are examined in terms of character/identity, structure and meaning, it has bee seen as following:

Only the road element was perceived by more than 75% and above of all classes. The road between the Gate A and the building of the Faculty of Architecture (1-20) was perceived clearly by all students. This road is consistent with the topography and it is the widest road on the campus. It is bifurcated only once in form and this bifurcation separates the educationalareas from other areas. Its starting point and endpoint is clearly readable and its boundaries with the building facades and green areas are clear and form a continuity with them. It is the main transportation axis and the only mass transportation route. It houses different functions such as catering, education, administration, and sports, and therefore it is heavily used by people on the campus. Because of all these reasons, it is unique and is different. Therefore it has an **character**. Besides, this road is the axis between Gate A, the main entrance of the campus, and the Faculty of Architecture and is **meaningful** from the Faculty of Architecture.

While more than 75% of the third graders specified landmarks, maximum 25%-50% of other graders specified them (Table 4). Therefore, differences were found between the most frequently stated landmarks among the classes. Hence, there is not any common landmark that was specified by the majority of all classes. This can be explained by the lack of a very effective image element on the campus (Table 4).

Table 4. Prominent landmarks for different class

		1st year	2nd year	3rd year	4rd year	average
LANDMARKS	Cultural Centre (L2)	25%-50%	-	-	25%-50%	12.5%-25%
	Football Pitch (L8)	25%-50%	12.5%-25%	12.5%-25%	12.5%-25%	12.5%-25%
	Hospital (L16)	12.5%-25%	25%-50%	-	12.5%-25%	12.5%-25%
	A Gate (L1)	12.5%-25%	25%-50%	75% and above	12.5%-25%	25%-50%
	C Gate (L14)	12.5%-25%	25%-50%	75% and above	-	25%-50%
	Faculty of Architec-ture Building (L13)	25%-50%	12.5%-25%	75% and above	25%-50%	25%-50%
	Library (L9)	-	12.5%-25%	12.5%-25%	25%-50%	12.5%-25%

But when examined structurally, it was observed that most of the landmarks in the mind maps of all classes are located on the main transportation axis. In addition, the number of landmarks increased at the campus entrances, at the immediate surroundings of the entrances and at the intersection points where

movement changes. This finding supports Lynch's view that attention increases at the entrances and intersections. The prominent landmarks specified by the students in all classes are the Gate A (L1) and Faculty of Architecture (L13). These elements are meaningful due to being the department where students study and the entrance gate to the campus.

- The festival area is a prominent node for all classes. In addition to this area, the most effective nodes for the 3rd graders were the front of the Department of Architecture and Gate A, and the front of the cafeteria for the 4th graders.

The festival area is meaningful in terms of use due to the fact that it meets the recreational needs of the students. It is the only space on the campus that offers students a variety of activities such as playing games, playing music, performing and watching. Furtheremore, it can be seen from the main axis of the campus and is dominant in terms of its size. Therefore, it is **meaningful**, **structural** and **has a character/identity**. On the other hand, the front of the Department of Architecture is meaningful as a node because it is the place where students study and which is used intensively (Table 5).

Table 5. Prominent nodes for different class

		1st year	2nd year	3rd year	4rd year	average
NODES	Front of A Gate (N1)	50%-75%	-	50%-75%	-	12.5%-25%
	Festival Area (N2)	25%-50%	25%-50%	50%-75%	50%-75%	50%-75%
	Front of Cafe (N3)	12.5%-25%	-	-	-	-
	Front of Cafe (N4)	-	-	-	50%-75%	12.5%-25%
	Front of Copycenter (N5)	-	-	12.5%-25%	-	-
	Front of Hostels (N6)	-	12.5%-25%	-	-	-
	Front of Library(N7)	-	-	25%-50%	25%-50%	12.5%-25%
	Front of Football Pitch (N8)	-	12.5%-25%	-	-	-
	Balconies (N9)	12.5%-25%	-	-	-	-
	Front of Canteen (N10)	12.5%-25%	-	-	-	-
	Front of Architecture Faculty Building (N11)	12.5%-25%	12.5%-25%	50%-75%	12.5%-25%	25%-50%
	Front of Canteen (N12)	12.5%-25%	12.5%-25%	12.5%-25%	12.5%-25%	12.5%-25%

- The residential area and the educational area have been the areas that were most commonly specified by all classes. These areas were clearly specified by 50%-70% of the first and third graders, and 25%-50% of the second and fourth graders. The residential area and educational area are separated at the bifurcation point of the main axis of the campus and their edges are strengthened by the roads. This feature enabled the areas to be separated easily and, therefore, to gain a character (Table 6).

Table 6. Prominent districts for different class

		1st year	2nd year	3rd year	4rd year	average
DISTRICTS	Educational District D1)	50%-75%	25%-50%	50%-75%	25%-50%	25%-50%
	Residential District (D2)	50%-75%	25%-50%	50%-75%	25%-50%	25%-50%
	Administration District (D3)	-	-	-	12.5%-25%	-
	Sport District (D4)	25%-50%	-	25%-50%	12.5%-25%	12.5%-25%
	Hostel District (D5)	12.5%-25%	-	-	12.5%-25%	-
	Green District (D6)	25%-50%		-	-	-
	D Gate District (D7)	12.5%-25%	-	-	-	-
	Festival Area District (D8)	-	-	25%-50%	-	12.5%-25%
	Green District (D9)	-	12.5%-25%	-	-	-

In mind maps, it was found that the strong image elements that are highlighted by everyone regardless of the perceiver are the qualities of character, structure and meaning. These qualities alone are sufficient for the element to be effective, and when used together, they further increase the imageability (Table 7).

Table 7. Prominent edges for different class

Strong image elements		identity	structure	meaning	aveage
Path	The road between Gate A and the building of Faculty of Architecture	*	*	*	75% and above
Landmark	The building of Faculty of Architecture		*	*	25%-50%
	A Gate	*		*	25%-50%
Node	Festival Area	*	*	*	50%-75%
District	Residential District	*			25%-50%
	Educational District	*		*	25%-50%
Edge	-				-

CONCLUSIONS

Campus settlements are like cities due to the variety of functions and spaces they contain. The Kanuni campus of KaradenizTechnical University has a readable feature. Therefore, users can move around the campus without getting lost and feel safe.

As in the mind maps of cities, there are spaces in the Kanuni Campus where people gather, use as reference points in finding directions, move, group them in terms of common features and limit the areas. In other words, the elements of road, landmark, node, area and edge that Lynch treats in the city as image elements are also found on campus maps.

The image elements on a campus are designed to support each other and they are readable. In other words, landmark elements are supported by roads, and areas are supported by edges. It was found that the most effective element of the campus is the road, and the weakest element is the edge. In general, this finding coincides with Lynch's ranking of image elements.

The sample of this study consists of students from the Faculty of Architecture. They take their education in the same faculty, they have similar needs, and they use the same spaces. However, the study found that the mind maps of students show discrepancies depending on their experience on the campus.

It was found that the details in the mind maps of students decreased over time, and students who perceived the campus newly highlighted the outer edges and general characteristics of the campus. Especially in weak image elements, the differences that occur with (the length of) experience (on the campus) are seen more clearly.

Although there are differences in students' mind maps of the campus in terms of experience, there is no difference in the image elements highlighted by all students. When we examine these elements, we see that they have the qualities of character, structure and meaning specified by Lynch. In fact, these qualities are together in some elements, and therefore, the image element has an even stronger imageability.

The readability of a campus is an important design problem in campus design. While doing this, the designer should organize the image elements that create a strong image effect in everyone and, therefore, have the qualities of character, structure and meaning together in a way that supports each other.

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