Chapter

Assessment of Perception of Physical Environment in the Context of Cognitive Maps and Experiences

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Abstract

Experiences in the physical environment awaken different perceptions in different people and enable the formation of an environmental image in people's minds during and after use. The campuses are also the physical environments in which students from different cultural, ethnic, and social backgrounds spend part of their lives during their education. In the formation of the environmental image, it is important that the students choose, organize, and add meaning to what they see in line with their own needs and goals. In this way, the image formed in the minds of the students limits what is seen, while emphasizing what is important according to their own mental orientation. In this context, the students are asked to draw the cognitive maps of the Meselik Campus of Eskisehir Osmangazi University. The obtained cognitive maps are examined, and the image elements used are evaluated statistically. As a result of the evaluation, it is seen that the students emphasize the reference points and the roads first. In this study, cognitive maps of first and fourth grade architectural students were evaluated separately and then compared with each other in order to determine the change of time factor in students' perception and the effect of architectural education on expression techniques.

Keywords: cognitive map, urban memory, legibility, architectural education

1. Introduction

The physical environments shaped according to the needs of the societies contribute to the formation of different environmental images in their minds by arousing different perceptions in individuals during and after use. The environmental images formed in the minds of individuals may vary depending on the physical, social, and cultural characteristics of the individuals and their experiences [1]. The reason for this variability is that individuals choose, organize, and add meaning to what they see by establishing a personal relationship with their physical environment according to their needs and goals [2]. The image formed in the individual mind limits what is seen, while at the same time it allows some to be seen more. In this context, the perception of the physical environment varies according to time, situation, and people.

Perception is the interpretation of the sensory data coming from the sensory organs of individuals through a mental process in order to become a meaningful whole [3]. While individuals remain indifferent to some of the data coming from sensory organs, others are interested and curious [4]. In this context, the perception of the physical environment also varies according to the individual's interest, curiosity, and experiences. Even different experiences of the individual over time may cause the individual's perceptions of the physical environment to differ.

Perception, which is one of the main fields of study of psychology, is mostly seen as environmental perception or spatial perception in studies related to city and architecture [5]. Spaces containing physical concrete components become meaningful with the experiences in the minds of individuals and become an abstract image. This abstract image, which emerges as a result of the perception of the individual, helps to create an image and identity of the place in the minds of individuals. The image and identity of the space formed in the minds allow individuals to define, perceive, and use the space. The increase in the experiences and the time spent in the space also contributes to the development of the image and identity in minds [6].

Perception process, symbolic, visual, emotional, and selective perception [7]; or cognitive/mental and sensory perception [8] is classified in various ways. However, these classifications are of similar content, and it is emphasized that the data obtained from the physical environment through the senses are coded, conceptualized, stored, and remembered in different ways specific to the minds of each individual in line with the needs, expectations, and value judgments of individuals. The physical environment containing concrete data is experienced with sensory perceptions and forms the cognitive perception by being shaped in the mind of the individual. The formation and development of cognitive perception is affected by the time spent by the individual in the space, the place in the mind, storage, and remembering the place in accordance with his experiences [5]. In this context, the concretely perceived space that meets the physiological, psychological, and social needs of individuals gains meaning abstractly through experiences in the individual's mind [9].

Architects and urban planners, who are the organizers of space, can influence the process of creating an image of a space-specific identity in the minds of the users, paying attention to the interaction of external stimuli while creating the environmental image. It is the form, color, or arrangement that makes the image of the space vividly identifiable and keeps it in memory for a long time. However, the form, color or arrangement used by architects and urban planners will gain meaning with the perceptions and experiences of the users and will take place in their memories. In this context, researchers used the cognitive maps included in Tolman's [10] study in order to determine the perception style of the places depending on the users' experiences. In cognitive maps, the images that occur in the minds of individuals experiencing and living in the process [11] are expressed by drawing techniques [12]. In other words, it is a way of expressing a psychological process in which individuals process, store, encode, and recall the data obtained from places as a result of their experiences.

On an urban scale, Lynch classified urban images perceived by individuals in five groups as paths, edges, districts, nodes, and landmarks as shown in **Table 1**. In his study according to these classifications, he states that individuals who experience less space describe regional elements and ways, and those who experience more describe consecutive elements and reference points. In addition, the study emphasizes that the relationship between the individual and the place is in interaction and that identity, structure, and meaning are important in the formation of the image of the place [13].

Paths	**Shared travel corridors, e.g., streetscape**
Edges	Linear and enclosing but not functioning
Districts	Large spaces with common features
Nodes	Major points where behavior is focused
Landmarks	Distinctive features used for reference

Table 1.
Categorization features of cognitive maps [14].

In another study supporting Lynch's work, regional type maps with sequential and spatial elements emphasizing paths and consecutive elements are highlighted in the drawing of cognitive maps [15]. Then, respectively, Moore [16], Hardwick et al. [17], Downs and Stea [11], and Herman and Siegel [18] conducted similar studies using adults and children. Afterward, Siegel and White [19] stated that the paths and reference points experienced by individuals are mostly used in cognitive maps and that the elements depicted in cognitive maps increase with experience. Herman et al. [20] also found that the number of images remaining in the mind increased with experience in cognitive maps drawn by college students in different time periods. In addition, it was seen that male students used more reference points than female students. In his study, Kuipers [21] proposes that a cognitive map consists of five different types of information: topological, metric, route definitions, fixed features, and sensory images.

In recent years, in many researches in Turkey, in order to identify individual elements of the environment of perception and memory, cognitive maps are used. Ülkeryıldız et al. [22] found that in the cognitive maps of foreign students, predominantly sequential drawings and reference points and paths were included. In this context, the data obtained differed from Lynch's description of regional elements and paths of individuals with little experience in space. Then, Topçu and Topçu [23] used cognitive maps to determine the perceptual and spatial legibility of Selcuk University Campus and to develop suggestions for improvement.

Karadağ and Turgut [24] posed questions to the students of the Faculty of Literature to determine the perception of İzmir's urban environment and tried to determine their level of satisfaction with the city. In this study, the students were asked to write the associations related to İzmir and reflect them on cognitive maps. The data obtained were digitized by statistical methods and transferred to tables and graphs. In this way, the differences and similarities in the perception of the city were tried to be determined comparatively according to the educational and cultural background and interests of the students.

Özdemir requested the first and fourth grade architecture and engineering students to draw cognitive maps of the city of Yozgat using Lynch's urban images. In the study, it was stated that the number of elements in cognitive maps increased as experience and education increased. In addition, it was seen that architecture students depicted the city by drawing more details than engineering students: fourth grade architecture students, while drawing spaces with linear and curved lines, more detailed; first grade architecture and fourth grade engineering students, scattered way of expressing the places connected by the roads. In this study, the issue that should be considered is the effect of architectural education on the cognitive maps containing more details. In spite of their four-grade education, engineering students have used expression techniques similar to those of architecture students who have not received education [6].

Öztürk examined the cognitive maps of university students who experienced the city for a short time and individuals over the age of 60 who have experienced the

city from past to present in order to determine the images of Eskisehir. In this study, individuals who experienced the city in different periods were selected in order to determine the changing city memory elements [25].

In another study conducted in Eskisehir, first grade students of architecture were asked to draw cognitive maps of their campuses by using paths, edges, nodes, districts, and landmarks to determine the level of perceivability, imageability, and legibility of settlement by the students. Then, by the evaluation of cognitive maps of the students, it is seen that landmarks are located in the memory of most of the individuals. Then, paths, districts, nodes, edges, and educational buildings are listed respectively in cognitive maps [26].

Cognitive maps have been the subject of many studies in order to determine individuals' perception of space. The cognitive maps obtained in these researches were classified and analyzed in the context of Lynch's urban images, and, thus, the perceptions of the individuals were determined. However, these findings have been made as a result of comparing the data of urban images with each other. In these studies, the data obtained from the comparison of urban images are interpreted, and it is stated that experiences affect the perception of space. In this context, in this study, first of all urban images, then each physical image is classified and analyzed in more detail. In addition to these analyses, elements other than urban image classifications in cognitive maps were statistically analyzed. These analyses were conducted to measure the effects of experiences on cognitive maps. In addition, the effects of architectural education on the perception of space were determined by classifying visual expression techniques in cognitive maps.

2. Material and method

The main material of the study is university campuses, and the sampling area is the Meselik Campus, where administrative, cultural, and social centers of Eskisehir Osmangazi University (ESOGU) are located. In this study, first and fourth grade architecture students who have taken 1 year of compulsory English preparatory education in Meselik Campus and then completed 4 years of architectural education in Bademlik Campus were selected. In this context, Meselik Campus becomes the location where students benefit from all their facilities for a year, while they use a limited number of courses, internships, various administrative works, and social facilities for the remaining 4 years.

In the study, first and fourth grade architectural students were selected as a sample in order to evaluate the contribution of architectural education and to measure the impact of the settlement process on cognitive maps. In this context, as seen in **Table 2**, 58 first grade (44 females and 14 males) and 37 fourth grade students (23 females and 14 males) in architecture are requested to draw the campus plan by using drawing techniques how the imaginary elements of the campus are located in their memories. As drawing techniques, any two- and three-dimensional representations; plans, façades, and mass works; written or numerical definitions, and colored or black and white expression techniques are permitted.

Firstly, the number of elements in the cognitive maps drawn by the students according to the imaginary elements such as paths, nodes, edges, districts, and landmarks was calculated, and then the obtained data were transferred to the charts and evaluated. As the data were evaluated, because of the numerical differences between male and female students, the percentages of proportional values between male, female, and all students were used in the tables when making comparisons. Then, in order to determine the effect of experiences on the perception of space, the image elements are also classified and compared as shown in **Figure 1**.

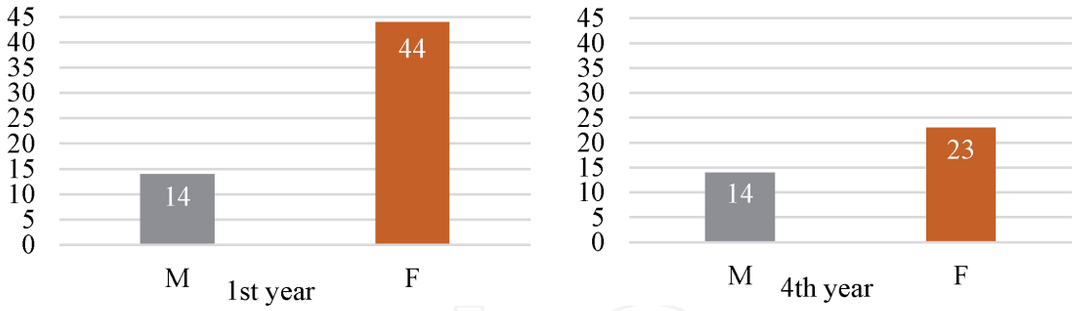

Table 2.
Numbers of first and fourth grade participants.

Finally, written and graphic expression techniques used in cognitive maps were determined, and the effects of architectural education on expression techniques and the scope of cognitive maps were investigated.

2.1 Paths

In order to make a detailed analysis of the paths in the cognitive maps, all arteries and secondary roads in the Meselik Campus are stated with different colors: three arteries (red, green, and yellow) and six secondary roads (blue, pink, cyan, purple, white, and brown) in **Figure 1**. Red and green arteries are started from the two main gateways with nodes A and B. As one of the main routes, the red path covers the entire campus from the east to west end, and the other one is the green path that starts at the north gateway routing firstly at the north-south direction and then continues with a sharp curve to the west. It also covers nine nodes (A, C, D, E, F, G, H, K, N).

All the paths drawn in the cognitive maps were counted and classified, and the data obtained were transferred to the graph shown in **Table 3**. When the data is evaluated, the cognitive maps of the first grade architecture students mostly include the main arteries stated by red and green, which are the main walking and vehicle paths of the settlement. Then, the paths stated in blue, purple, yellow, and cyan colors were drawn, respectively. The paths stated in white, brown, and pink are rarely drawn. Similar results were obtained when evaluated as male and female students.

In the cognitive maps of fourth grade architecture students, the paths indicated by red, green, blue, white, yellow, brown, pink, purple, and cyan were drawn, respectively. The representation of the paths in the fourth grade students' cognitive maps emerges at a much higher rate than the ones in the cognitive maps of the first grade students. While the paths indicated by blue, white, and brown are almost not included in the cognitive maps of the first grade students, they are in higher rates in the cognitive maps of the fourth grade students.

When the results obtained are evaluated, the paths expressed in red and green, which are the main arteries of the campus, are the paths that are remembered in the minds and processed on cognitive maps. The first reason is that these paths are the main transportation arteries, and the second reason is that the Foreign Languages department where the students are educated is located between these two paths. However, it is noteworthy that the proportion of first grade students is about half that of the fourth grades. The reason for this is that the meaning of the cognitive map for the students is limited to the structures, and therefore they are generally used as secondary components when trying to define the structures. The reason why the paths stated with blue, white, and brown are more frequently used on the cognitive maps of the fourth grade students is related to the fact that these paths were used more in the fourth year because of the connection between

Figure 1.
Paths, nodes, and landmarks of ESOGU Meselik Campus.

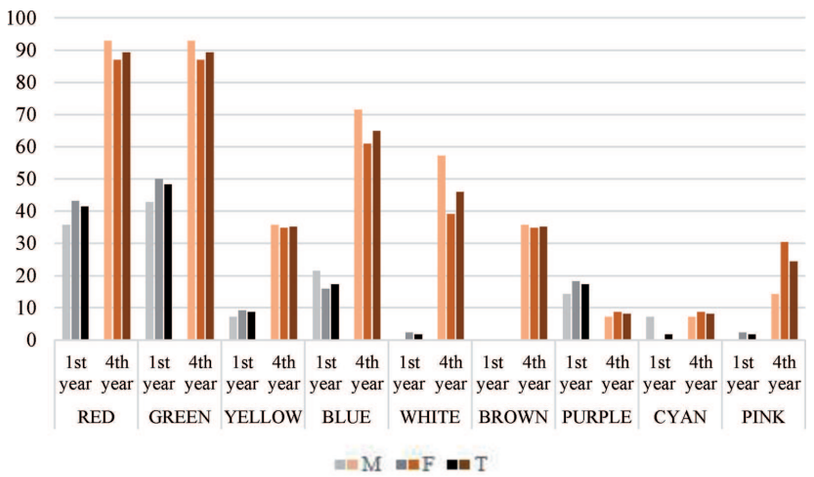

Table 3.
Path expression ratios (%) of first and fourth grade students.

the engineering faculty and the vacant land they measured during the topography internship process. As a result, the low percentages of paths in the cognitive maps of the first grades are that students have not experienced the campus so much to think holistically, think regionally and think the structures in their minds, and think the paths as the elements that connect them. The higher percentages in the fourth grade are related to the positive impact of architectural education and the fact that they have experienced every part of the campus.

2.2 Nodes

All nodes are named in alphabetical order from A to S, in order to make a detailed analysis of the nodes in the cognitive maps as shown in **Figure 1**. As can be seen in **Table 4**, nodes listed from A to I can be seen in cognitive maps of first grade students, while all of them can be seen in cognitive maps of fourth grade students.

Nodes A and B are important intersections where all pedestrian and vehicle traffic of the campus passes. Of these, A is used more frequently by municipal busses and vehicles, while B is frequently used by pedestrians due to the presence of tram stops that provide transportation from the city to the campus. The majority of the first grade students provide transportation to the campus by tram, while the fourth

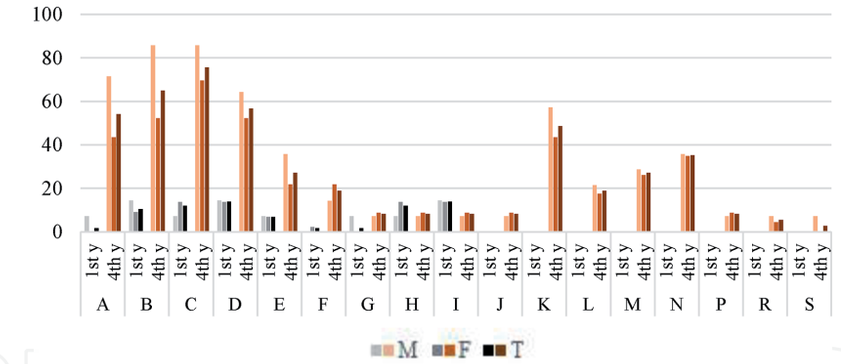

Table 4.
Node expression ratios (%) of first and fourth grade students.

grade provides transportation from Bademlik Campus to Meselik Campus by busses. That is why A node is expressed at first grade students' sheets with a little ratio and big ratio at fourth grade students' sheets.

Node C is the most important intersection of two main arteries, and node D is one of the most popular intersections of the whole campus. After entering the campus, node C and node D are the intersections where the distribution is provided and the passage is obligatory. In this context, they are largely shown in the cognitive maps of both groups, due to their locations.

Nodes G, H, and I, which are located next to the Foreign Languages building where the first grade students receive their English preparatory education, are shown in their cognitive maps depending on the frequency of use. The reason why Nodes E and F and G are shown more than Nodes G, H, and I in the cognitive maps of the fourth grade students is that the fourth grade students used the cyan path where these intersections are located more than the first grade students. While nodes from J to S were not included in the cognitive maps of the first grade students, they were highly drawn in the cognitive maps of the fourth grade students due to their excessive use during the internship period. In the cognitive maps of the fourth grade, Nodes G, H, and I were expected to be higher depending on the experience, while nodes experienced during the internship were drawn at a higher rate. In the cognitive maps of the fourth grade, Nodes G, H, and I were expected to have a higher rate due to the experience during the preparatory education process, whereas nodes experienced during the internship period were drawn at a higher rate.

2.3 Edges

The Meselik Campus is bordered by Gençlik Boulevard in the east, Ulusal Egemenlik Boulevard and the Porsuk River in the north, the Porsuk River in the west, and the forest in the south, as shown in **Figure 1**. The east, north, and west edges also separate the campus from the built environment.

In cognitive maps, first grade students expressed only the roads and walls that form the interface of the campus with the city as edges as shown in **Table 5**. On the other hand, the fourth grade students expressed the roads to a great extent as edges, then the forest, walls, city, and Porsuk River, respectively. Because of the Boulevards' public transit function, both, as the east and north-east edges, have the highest ratios at first and fourth grade students' cognitive maps. The reason why the forest and the Porsuk River, which is an important image of the city of Eskisehir, is not included in the cognitive maps of the first grade students is thought to be due to the lack of ability of students to think and draw on an urban scale, and both of them are not actively used as recreational areas in the campus.

2.4 Districts

There are four areas that carry the characteristics of a district at the campus as shown in **Table 6**. These are the rectorate square surrounded by the rectorate, library, and conference halls, the bazaar where the cafes and restaurants are located, the ceremonial square where official ceremonies are held, and the ATM square where all the cash machines of the banks (ATM) can be used.

When cognitive maps were evaluated in districts, Rectorate Square is stated with highest ratio both at first grade students' and fourth grade students' cognitive maps. The reason why the Rectorate Square is drawn more is that the library and the rectorate building, where the student affairs and data processing departments are located, are frequently used by students. In addition, the Rectorate Square is located next to the green path that is most commonly drawn on cognitive maps.

In the cognitive maps after the Rectorate Square, the first grades drew Bazaar Square and Ceremonial Square; the fourth grades drew Ceremonial Square, Bazaar Square, and ATM Square, respectively. The reason why the first grade students did not draw ATM Square in cognitive maps was that all the ATM were moved to the Bazaar Square 1 year before their arrival at the campus. In this context, despite the fact that it is a large area with parking and green spaces and is located on the most expressed green path in cognitive maps, ATM Square was not drawn by the first grade students. The reason for this is thought to be that they could not establish a semantic relationship in their minds about the field.

The Bazaar Square across the Department of Foreign languages, in which both groups of students were educated, ranked second in the cognitive maps of the first grade and third in the fourth grade. The Ceremonial Square is included in the cognitive maps of both groups, because it is located in node C, where the most drawn green and red paths intersect. In the fourth grade, the reason why ceremonial square is drawn more than the bazaar is that they spend less time in the Bazaar and see more Ceremonial Square in the last 3 years. In addition, when the data is evaluated, it is seen that the female students in the fourth grade remember the rectorate, ceremonial, and bazaar squares and the first grade female students remember the bazaar more than the male students.

2.5 Landmarks

Landmarks are structures that determine the identity of the urban area, have a high potential for users to remember, and help people to navigate. There are

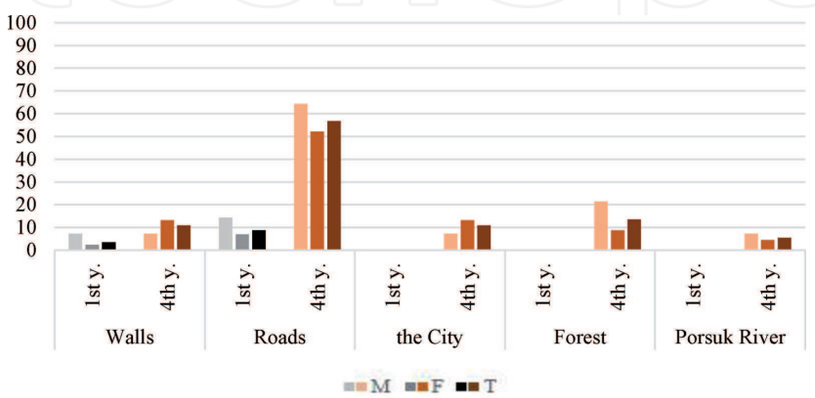

Table 5.
Edge expressions of first and fourth grade students.

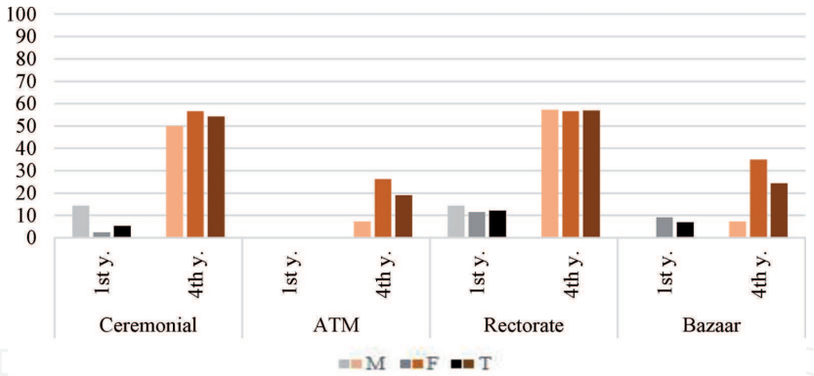

Table 6.
District expressions of first and fourth grade students.

12 buildings in the Meselik Campus that conform to the definition of landmark as shown in **Figure 1**: amphitheater, two gateways, Central Bazaar, Sports Hall, Dumlupınar Dorms, Rectorate-Library-Congress Hall Complex, hospital, and bus-tram stops located in and around the campus area.

The hospital is an important landmark for both the city and the campus as it is located at the entrance of the campus, being the highest building of the campus and being used by the city in general. In this context, the hospital ranked 94.59% in the cognitive maps of the fourth grade and ranked fourth in the cognitive maps of the first grade. The reason why the first grade students rank the hospital as the landmark in fourth place is that they have shown the most commonly used areas in the campus more on cognitive maps as seen in **Table 7**.

The complex consisting of the rectorate, library, and congress center was in second place in both groups due to the fact that it contains the functions frequently used by the students and is located above the green main artery which is highly drawn in the cognitive maps.

Another important landmark is the mosque which is highly perceptible as it is located at the entrance of the campus, differs in architecture from other buildings, and attracts attention as a place of worship. This landmark, like the hospital building, has a high rate in cognitive maps of the fourth grade and a lower rate in the first grade. However, both the hospital and the mosque were drawn more in the cognitive maps of the first grade students than the other landmarks.

Gateways are shown by both groups of students. However, as previously mentioned in the nodes, depending on the intensity of use, higher levels of hospital gateways were shown in the cognitive maps of the first grade, and new gateways were shown in the cognitive maps of the fourth grade.

Sports Hall is shown by the first-rate female and male students at a similar rate, with 57.14% by the fourth grade male students and 26.09% by the female students, which is an interesting example in terms of having the highest ratio difference between landmarks. The reason for this is that the fourth grade male students frequently use the football fields at Sports Hall.

Amphitheater and the stadium have low expression rates in both student groups between landmarks. One of the reasons for this is that the stadium is located in the farthest part of the campus and the amphitheater cannot be perceived because it is surrounded by walls. The second reason is that these places were not used by the students. In addition, male students did not show the amphitheater in the cognitive maps of the first grade students, and some of the female students did.

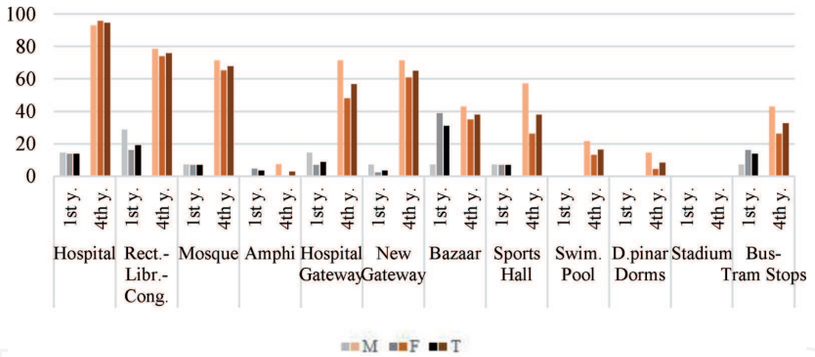

Table 7.
Landmark expressions of first and fourth grade students.

2.6 Other expressions

In the study, all components that do not meet the definition of urban image components in cognitive maps are evaluated in **Table 8** under the heading of other expressions. In this context, the rate of processing of other buildings which are not landmark but located in the campus is in the first place in the cognitive maps of the fourth grade and second in the cognitive maps of the first grade. On the other hand, life experiences rank first in the cognitive maps of the first grades and second in the fourth grades.

Life experience classification has been created, because users embody the places they use instantaneously or continuously and the good or bad memories they live in their cognitive maps. In both groups, female students processed life experiences more in cognitive maps than male students. In the cognitive maps of the fourth grade, it is thought that the reason that other buildings function more than life experiences is that they draw the area in the form of a site plan due to architectural education. Also, for the same reason, unused land and recreation and construction sites were not included in the cognitive maps of the first grade, but were included in the cognitive maps of the fourth grade.

Erasmus Registration Office, which is the liaison office for overseas education, is shown on cognitive maps of the fourth grade, not on the cognitive maps of the first grade. This is due to the fact that fourth grade students visit the building frequently in order to study abroad.

2.7 Expression techniques

In order to evaluate the effect of architectural education in the transfer of the places remembered in mind to cognitive maps by drawing, the representation techniques in cognitive maps were determined in both groups and are shown in **Table 9**. As a result of the evaluation, in the context of the expression of the field, 27.58% of the first grade students and 83.79% of the fourth grade students benefited from the black, white, or colored site plan drawings.

Both two- and three-dimensional expression techniques were used to express the structure and structure groups. The first grade students used the 2D facade drawings at a rate of 5.17%, while the fourth grade students preferred this technique at a rate of 45.95%. In this technique, first grade students did not benefit from color, while fourth grade students used colors at a high rate. This proportional difference is thought to be related to the fact that first grade participants cannot fully visualize the field in their minds and that they do not yet know the concept of the site plan.

The three-dimensional expression technique was used 75.86% in the cognitive maps of first grade students and 89.19% in fourth grade students. As in the

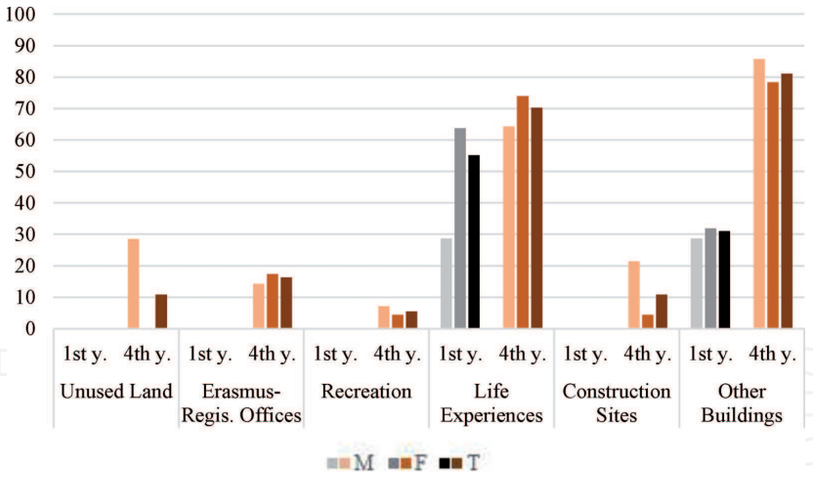

Table 8.
Other expressions of first and fourth grade students.

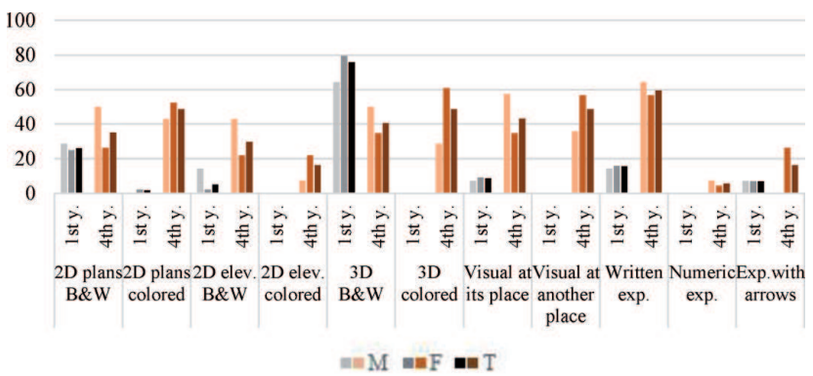

Table 9.
Expression technique ratios (%) of first and fourth grade students.

two-dimensional facade expressions, it was found that while the first grade students did not use color in this technique, 48.65% of the fourth grade students used color. Also, in all the demonstrations, female students used colors more than male students.

While only 8.62% of these two- and three-dimensional visuals are integrated and present in the site plan, this ratio is 43.24% for fourth grade participants. In addition, while the fourth grade participants positioned these visuals at a location different from where they should be in the site plan by 48.65%, the first grade participants positioned all the structures as they were in the site plan. However, this is due to the fact that first grade students draw less structures on a regional scale.

In addition, 15.52% of the first grade participants used written expressions and 6.90% of them used descriptive arrows, while 59.46% of the fourth grade participants used the manuscript. Therefore, while the 4-year space, architecture and technical education is expected to reduce writing and expression, on the contrary, due to architectural education, because of the attempt to draw cognitive maps in the form of the site plan, the writings on the drawings have been more than expected.

2.8 Imaginary elements

In this part of the study, the number of paths, nodes, edges, districts, landmarks, and other elements are determined and shown in **Table 10** proportionally.

The percentages of the total number of items found in the cognitive maps of first grades are 15.33% with paths, 14.37% with other elements, 8.91% with landmarks, and 6.03% with districts, followed by 4.36 and 2.41% with nodes and edges; in the cognitive maps of fourth grades are 44.44% with paths, 41.22% with landmarks, 38.51% with districts, and 32.43% with other elements, followed by 27.98 and 19.46% with nodes and edges, respectively.

In both groups of students, nodes and edges took the last place, respectively. The reason for this is that, as shown in **Table 5**, the city, the forest, and Porsuk River, which are defined as border elements, are not drawn in the maps. Interestingly, although paths were the most drawn elements in both groups, the rate of drawing of nodes found at the intersections of paths was very low. The reason for this is that the roads drawn are not continuous, and most of the nodes are on the roads which are not drawn. In the cognitive maps of the first grade students, other elements are in the second place, followed by landmarks and districts, because they mostly draw the region where they are educated. In the fourth grade, because they tried to draw the entire settlement, the landmarks took the second place, followed by districts and other elements.

3. Results and discussion

The results obtained from the study show that first grade students who have less experience in the campus draw in spatial style and fourth grade students draw in sequential style. In this context, it is seen that the two display techniques mentioned in previous studies take place [15]. Lynch states that as the experience of space increases over time, these two display techniques change in place in the individual [13], while Spencer and Weetman state that this situation is shaped according to the tasks of individuals [27]. In the context of these two different opinions, when the data obtained in the study are evaluated, it is seen that a result similar to both opinions is obtained. In the study, with the experience and time, the number of fields and elements shown in the cognitive maps of fourth grade students increased. However, the reason for this increase was not the elaboration of the same spaces, but the increase of the spaces experienced by the students. If only the experience and time factor were effective, in the cognitive maps of the fourth grade, the Foreign Languages department and the Bazaar should be drawn at a higher rate, while the spaces in the minds were drawn at a higher rate as a result of new tasks and experiences. In this context, both views were supported in different contexts.

In the study, in accordance with their own experiences and perspectives, the students selected some of the physical environment elements in the campus and reflected them to their cognitive maps within the framework of the fiction and order they created. In this context, as Lynch states [13], students have formed an identity of the campus by making sense of some of the physical environment they see within the framework of their own feelings, thoughts, and experiences.

In studies conducted on cognitive maps, it is seen that individuals' drawings are classified and evaluated according to urban images. In this study, all kinds of elements such as drawing, writing, sign, and symbol, which are not considered as urban images in the cognitive maps of the students, were also evaluated. The data obtained as a result of the evaluation are classified under the other expression category. The issue that draws attention in this category is that students express their experiences and memories by writing them on cognitive maps, although they are not requested from the students. The other remarkable issue is that many buildings that do not have landmark characteristics in the cognitive maps of the students have more place than landmarks. In this context, it is thought that students

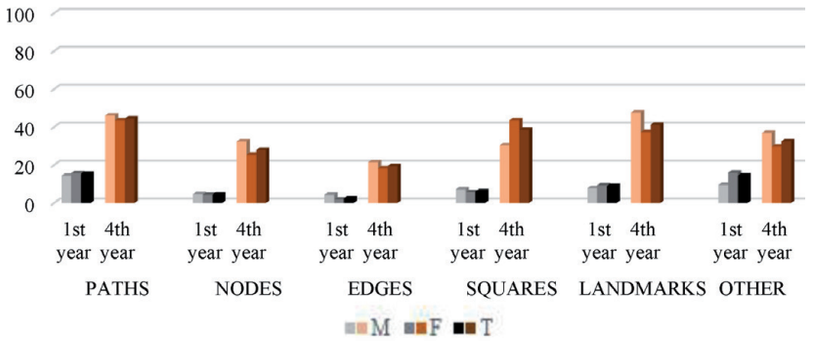

Table 10.
Percentage distributions according to imaginary elements.

describe many structures as landmarks in their minds by associating them with their experiences.

In the study, if the assessment was made only in the context of urban images, it could be said that paths and landmarks were more involved in the students' minds. However, when each element in the cognitive maps is evaluated, the proportion of the places in which students load meaning according to their own lives is almost equivalent to landmarks. In addition, it is seen that the students draw the paths that they walk or see in the form of a route and transfer the structures that interest or load meaning on this route to their drawings.

Landmarks on their routes or experienced are more often in the drawings, whereas landmarks they have never seen and experienced are less common. In this context, it can be assumed that the results obtained from the studies conducted with cognitive maps aimed at determining the urban identity may vary with the sample group used. For example, it can be said that the perception of the city and the identity of the city will differ in the minds of a group of tourists coming to the city with tour companies and a group of tourists visiting the city with their own means. Tourists who travel with the tour company guide experience the paths and landmarks in the company's travel program, while the other group of tourists will have a perception of the city in accordance with their own route and sightseeing. In addition, the formation of the urban identity that will take place in the minds of the individuals traveling with the guide will be shaped according to the route drawn by the guide. However, even in this case, each individual will perceive what he or she sees, hears, and lives and will create a different urban identity in his or her mind. However, even the city identity formed in this case will be shaped by the guide. A similar situation can be observed for this study. When the sample group is selected from different groups such as students from different departments, administrative or academic staff, urban people, the perception of the campus, and the perception of identity in minds will change because, as stated in the study, the urban images in the cognitive maps show changes in line with the experiences. Even if the same study is repeated with the same sample group years later, the results may differ depending on the new experiences.

In this study, the effect of architectural education on the formation of cognitive maps is also investigated. In this context, in line with the data obtained, it is seen that students' drawing skills and architectural perspectives are effective in the formation and elaboration of cognitive maps. In this context, the ability of individuals to draw and use visual techniques can affect the results obtained from cognitive maps. In the context of female and male students, it can be said that girls use more colors and try to add meaning to spaces with written expressions. However, there was no significant difference in the overall study.

4. Conclusions

Cognitive maps provide the ability to determine the perception of the physical environment in which individuals live according to their experiences. The emergence of this perception is influenced by what the individual lives, sees, hears, and reads. However, it will not be sufficient for studies to determine the urban identity on an urban scale. Because, as Twersky pointed out in his work, the "cognitive map" metaphor does not reflect the complexity and richness of environmental knowledge [28]. In order to reach a scientific conclusion in the context of urban identity in the cognitive maps, it is necessary to increase the number of individuals used in the subjects such as age, gender, and education. In addition, data obtained from cognitive maps should be supported by questionnaires. However, even the results obtained from such a study using cognitive maps may change over time.

In the study, it is seen that experience is more important than time factor in the formation of perception of physical environment. If only urban images were compared, the fact that fourth grade students drew more elements and details in their cognitive maps could be related to the time factor. However, when each urban image is evaluated in detail, it is seen that this interpretation is wrong because, in a small urban area such as a campus, students who spent both 1 and 4 years showed the physical environment they experienced in their cognitive maps. In this context, it is seen that the experience factor is more important than the time factor in the increase of the data obtained in cognitive maps.

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