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Full Length Research Paper

The effects of training and spatial experience on the perception of the interior of buildings with a high level of complexity

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The high level of complexity that is a compulsory result of the complex plan schemes worsens the perception and usage of locations. It was attempted in this research to determine the effects of education in architecture and spatial experience on the spatial complexity and the evaluations of the perception performance in the education buildings that have a high level of complexity. The research included the Selcuk University, Faculty of Engineering and Architecture Building and the students using this building. The subjects were asked about usage of the location and their spatial perception performance. Experiments were made on their recollection levels of the locations they use. Statistical analyses and reliability tests were made on the data obtained. Consequently, it was determined that training of the students did not cause a statistically significant variety in their perception of the buildings with a high level of complexity. The buildings evaluated as complex were then evaluated as simpler through an increase in experience.

Key words: Architectural plan, indoors, level of complexity, spatial perception, experience.

INTRODUCTION

As Sommer (1969) indicated in his study, just as humans shape the environment in which they live according to their wishes and necessities, these formed environments also shape the behaviors and perceptions of humans. The external environment and generally indoors descrybed as cavities are effective on the behaviors of the humans who take a space in them.

The movement of humans in the environment is performed by blending and then evaluating the environmental alerts. This blending period is a period of gathering the surrounding data, differentiation after combining with the existing data and storing in the mind for re-use. A period that negatively affects spatial perception begins in case of a failure in this cycle for various reasons. Spatial complexity is the primary factor that effects spatial perception and that causes the problems of way finding and orientation.

O'Neill (1991a, b), has presented the inner connection density concept that corresponds to the complexity level of the architectural plan. The criterion named inner connection density (ICD) that is not subject to distance and navigation, is a dimension that is far from the nominative values. Accordingly, spaces having a high ICD rate are described as having a high level of complexity and spaces having a low ICD rate are described as having a low level of complexity. The differentiation in ICD rates also revealed a differentiation in cognitive map and wayfinding measures. It is revealed that the plan fiction described with the ICD rate influences the architectural perceptibility (Weisman, 1981).

Today, there are many buildings with a high level of complexity. In the forefront are buildings, such as hospitals, education buildings, airports, etc. that accommodate a wide variety of functions together. Most previous studies on the subject of complex construction structures were carried out on health constructions and concentrated on the detection of wayfinding performance (Peponis et al., 1990; Brown et al., 1997; Baskaya et al., 2004). The high level of complexity that is a compulsory result of the complex plan schemes worsens the perception and the usage of locations. Spatial perception and complexity

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level can be a life-sustaining and a critical matter when earthquake, fire or similar states of emergencies occur in a building in which problems about spatial perception exist in daily use.

In addition to this, there are many factors that are effective in the evaluation and spatial perception of buildings. The effects of environmental factors (heat, noise, smell, light, etc.), design factors (architectural plan, color, material, furniture layout, etc.) and social factors (age, gender, education, experience, etc.) in spatial perception and in acquiring meaning are significant (Baker, 1986). Passini (1980) indicated that triangulation points, shapes, colors, lights, configurations and graphics used in buildings are significant in the active usage of complex constructions and in the wayfinding performance increase of these buildings. Appropriate and proper use of environmental factors creates spatial efficiency and therefore makes a reference to user satisfaction.

In the study, the user's education and experience of these environmental factors were emphasized. It was aimed to determine the effects of the perception of education and experience on perception performance evaluation and complexity in buildings with a high level of complexity,

Gifford et al. (2000) have shown that architects and laypersons base their emotional assessments on almost entirely different sets of objective features, which as they suggest, help to explain why the aesthetic evaluations of both groups are virtually unrelated.

Hubbard (1996) and Downing (1992) have suggested in their work that there is a greater similarity of aesthetic evaluation among professional designers than among the lay public, with "value convergence" increasing over the course of professional education. In his study Aydintan (2001) determined that architects and engineers perceive configurations differently. Aydintan explains this as follows;

> "As architects are concerned with components, such as surface, configuration, color, side, shape, etc. in their educational process, they have gained the ability to perceive these components by abstracting their meanings and benefits. On the other hand, as engineers have no such educational process, they cannot abstract these elements while perceiving."

In addition, while differentiation is observed among groups of engineers, it is revealed that more compatible decisions are being made in groups of architects. This situation shows that differentiation will occur in reactions that will be given to environmental data. However, this research, in contrast to Aydintan's study (2001), includes the evaluation of a plan scheme of an education structure having a high level of complexity. Consequently, it is thought that there will be no statistically significant difference between departments for these types of spaces in which perception and wayfinding problems exist.

According to the general findings of the studies researching the effects of educational level on cognitive mapping; educational level, intelligence and oral discernment do not appear to be associative with the cognitive mapping ability in itself. Nevertheless, cognitive abilities, such as steric relation abilities, coordination of perspectives, rotation, abstraction and scale degradation appear to be much more significant (Imamoglu, 1980).

Besides education acquired, experience, namely the usage process of the space has also a significant effect on the perception and usage of spaces. The individual accumulation of a person includes the personal experience arising from the past. For example, differentiation can be observed between the perception of a house visited as a guest and the perception of a person living in that house. To a person living and owning that house, both family members and memories experienced in that house make this house a "home". However, it cannot have any meaning beyond a random house for an outsider. This house will be able to gain much more significance as time passes and experiences are shared. Two types of subjects that are different forms of the same object are encountered here (Albal, 1997). While it is necessary for time to elapse for composing the perceptions of a person experiencing the structure for the first time, this situation will not be the question in point for the person living there. Components that are effective when a space is perceived for the first time can lose their effectiveness as they become familiar in time.

Another effect of the time factor on perception is related to recognition and cognition. That space acquires "recognized" and "familiar" properties depending on the time and repetition of the perception. While a random space is being perceived with instant reports, a recognized and familiar space will be perceived with the collection of past perceptual experience (Kahvecioglu, 1998).

In their studies, Dogu and Erkip (2000), could not set forth a relationship between wayfinding performance and the number of visits to the space. However, the aforementioned study was performed in a shopping center. No doubt, the usage frequency of a shopping center and the usage of an education space are different for a specific person.

Various effects of education and experience on interior spaces were emphasized in the previous studies by some researchers. Whereas, in this study, it will be determined whether or not the usage time of the space is effective through the education users (students) in the perceptual complexity of education spaces having a high level of complexity and in the evaluation of spatial performance. Accordingly, the hypotheses of the study are as follows:

H1: Whether or not a user has an education in architecture does not affect the evaluation of building complexity.

Figure 1a. The appearance of the building.

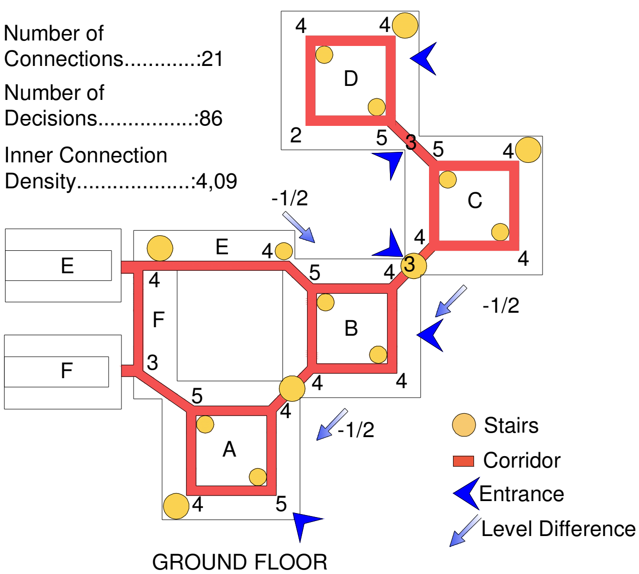

Figure 1b. The ground floor plan focusing on the internal connection of the Selcuk University, Faculty of Engineering and Architecture.

H2: Increase of the usage time of a building having a high level plan complexity (experience) enables the building to be perceived as simpler.
H3: The education of a user is not directly effective on the remembrance of the space the user applies every time.
H4: The evaluation of perceptual performance of the buildings having a high level of plan complexity is related to the characteristics of the space rather than to the architectural education of the user.

The Selcuk University, Faculty of Architecture and Engineering building was taken into the scope of the research, and a research survey was given to the students using the building for analyzing the hypotheses given above. It was aimed to determine the effects of education and experience on the perceptual performance evaluations and spatial complexity of such buildings.

RESEARCH METHOD

Limits of the research

The Selcuk University, Faculty of Engineering and Architecture was chosen as the research environment (Figure 1). It was determined in the interviews held with the users who have been using the building for a short-term for a specific purpose and the users who have been using the building constantly, that the users have serious problems about wayfinding in the building. These problems usually emerge during the duties, which have to be performed in a limited period of time. These problems can be exemplified by the fact that when a person who has not experienced the building before comes to the building for the Qualifying Examination for Students (QES), etc.), that he/she cannot find the exam classroom or exit when the exam finishes or that the new students cannot find the department/classroom.

The building was expanded with additional construction at various times and became 6 blocks and quadruple in the present-day. The 4 and 5 floor blocks have a total usage area of about 50,000 m^2. There are 13 different departments providing education in the building. All departments have classrooms, teachers' rooms, laboratories and workshops together with a conference hall, canteen, stationery store, photocopy center and administration units. Due to the special conditions at the university campus, students from other faculties also continuously use the building, which is located in a central position. The fact that there is a half floor level difference among the blocks complicates considerably the use of the building. Another significant problem is that some spaces occurred for

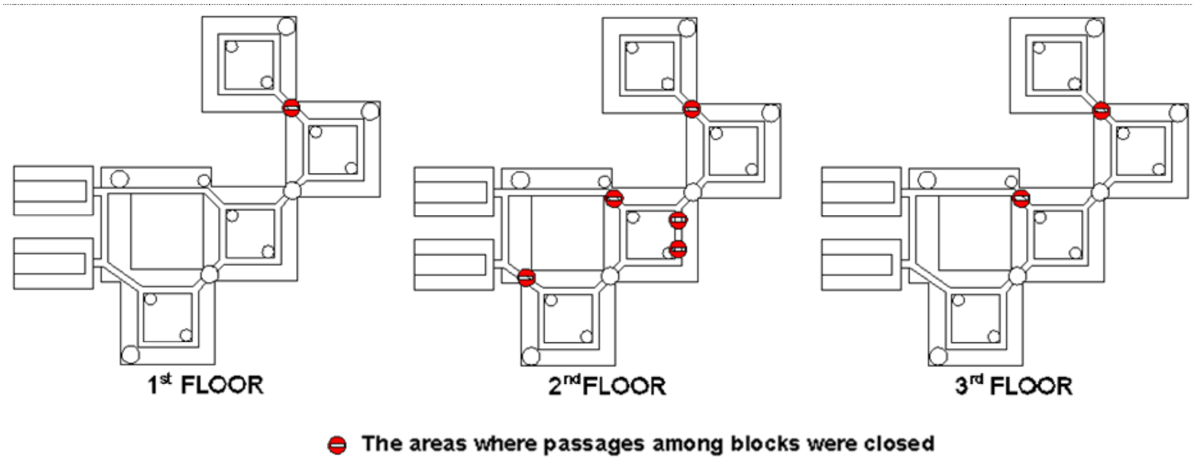

Figure 2. The areas where passages among blocks were closed.

Figure 3. Examples showing the spaces where the surveys were carried out.

various reasons due to the closure of some passage spaces among the blocks (Figure 2).

When the general structure of the building is analyzed, circulation spaces are seen as three different characterizations for the connection points where the stairs are placed, the closed corridor where the rooms of faculty members are located and the open corridor that receives daylight and looks onto the inner yard. Connections to stairways are about 60 m² except for the staircase and the gallery spaces. The closed corridors are 1.7 m wide, 3.2 m high and an average of 29 m long. The open corridors are 2.7 m wide, 3.2 m high and an average of 28 m long.

The survey was carried out in three different spaces (open corridor, stair connections and closed corridor), which compose the main characteristics of the circulation spaces (Figure 3).

Participants

The experimental group consists of 61 students, 30 males and 31 females who are still using the building. A total of 51% of these students are studying at the Department of Architecture and 49% of the students are studying at the Department of Construction Engineering. A total of 56% of the subjects are in their 1st year of study and 44% of them are in their 4th year of study. An elaborate survey related to the perception and usage of the structure, which composes the limits of the research, has been given to the participants (Table 1).

Design of the questionnaire and procedure

The data for the present study was obtained in face-to-face meetings with interviewers during a two-week period in 2009. At the beginning of the study, the students were given brief information about the survey and were then asked to answer the questionnaire by looking at each experimental space (open corridor, stair connections and closed corridor). The research was conducted during the weekdays at different times of the day. It took the students approximately fifteen minutes to complete each questionnaire.

The questionnaire form consisted of three parts:

In the first part, there are questions related to wayfinding performance and usage rates of the building by the users. In the second part, there are questions aimed at determining the methods that the users apply during the recognition of the building and whether or not they know the spaces of the building that are used constantly by the students.

In the final part, there is a semantic differential scale aimed at determining the effects of circulation spaces on the perceptual performance of the users.

The students then had to evaluate the importance of each of the bipolar adjective pairs on a 1-7 semantic differential scale where 1 = happy and 7 = unhappy. A total of eleven bipolar adjective pairs – happy / unhappy, roomy / cramped, calm / restless, warm / cold, bright / dark, attractive / unattractive, pleasant / unpleasant, exciting / unexciting, active / stationary, peaceful / unpeaceful, comfortable / uncomfortable - were evaluated by the students after familiarizing

Table 1. Distribution of participants according to their gender, department and year of study.

		Department architecture		Construction engineering		Total	
		f	(%)	f	(%)	f	(%)
Gender	Male	15	24.6	15	24.6	30	49.2
	Female	16	26.2	15	24.6	31	50.8
Year	1^{st} year	19	31.1	15	24.6	34	55.7
	4^{th} year	12	19.7	15	24.6	27	44.3
Total participants		31	51	30	49	61	100

Note: M: Average value; SD: Standard Deviation; HG: Homogeneity group; ns: not significant (α is not significant to the level of 0.05). a: Variable means ranged from 1 to 7, with higher numbers representing more negative responses.

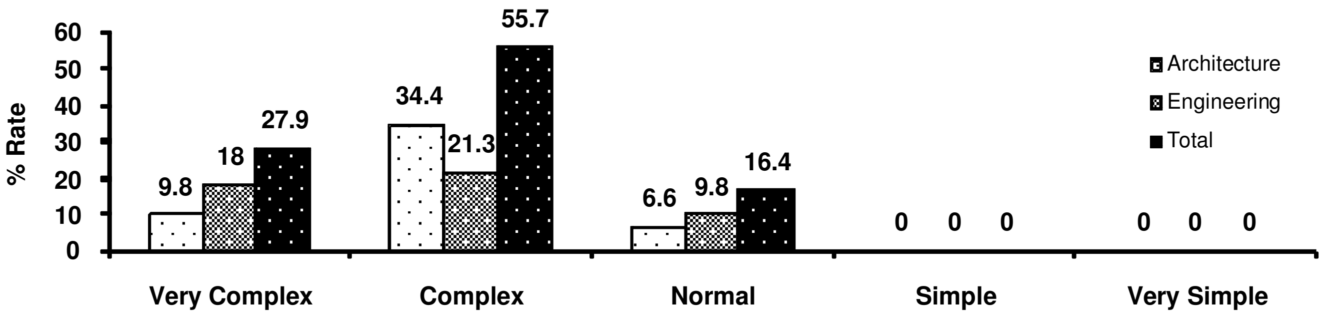

Figure 4. Plan diagram and evaluation of the complexity level. x^2: 1.972, df: 2, p = 0.373.

themselves with the items. The technique of altering the sets of items from positive to negative, as previously done by Berlyne (1974); Imamoglu (1975); Aksugur (1977); Jayasinghe et al. (1997); Stone and English (1998); Manav and Yener (1999); Fleischer (2001); Kaya and Weber (2003); Babin et al. (2003); Manav and Kucukdogu (2006); Yildirim et al. (2007); Yildirim and Akalin-Baskaya (2007) and Yildirim et al. (2008) was adopted to reduce the probability of respondents simply marking the scale on either end of the extremes. The researchers tried not to be too specific, but rather to develop a list of general attributes that would fit the research topic - the architectural environment - in compiling the initial list of items.

Statistical analysis

In this study, perception of the users about education structures and wayfinding performances are accepted to be dependent variables. There are many factors affecting the perceptions and the way finding performances of the users. Education and experience chosen from these factors are accepted to be independent variables. The data of the research was analyzed for testing the hypotheses of the study. At the end of this research, the Cronbach alpha coefficients of the dependent variables were calculated and the Pearson chi-square (x^2) test was used to determine if there were relationships between the dependent variables. Afterwards, the categorical means of the data were defined with their standard deviations and homogeneity groups. Subsequently, the One-way Analysis of Variance (ANOVA) was used for examining the effects of the differences of the characteristics of the inner spaces on the perceptual performances of students in the context of the education building. The data is given in a graph for comparing the significant means of the variances in the Analysis of Variance.

RESULTS

Evaluation of the building complexity

The plan diagram of the Selcuk University, Faculty of Engineering and Architecture building, which composes the limits of the research, has been used and the connection density (O'Neill, 1991a) for a floor of the building has been calculated. According to this, the inner connection density (ICD) value of the building is 4.09 (Figure 1). This means that the user has approximately four different way options at every decision point. This situation shows the complexity of the building.

The evaluation of the experimental subjects who participated in the research about the complexity of the building also shows that the building is perceived as complex (Figure 4). According to the results of the Pearson Chi-square test related to the evaluation of plan complexity, a statistically significant relationship could not be found at a $p < 0.05$ level between evaluation of the plan complexity and the departments (architecture and engineering). Accordingly, the complexity of the building has been evaluated as "complex" at the rate of 55.7% and "very complex" at the rate of 27.9%. Besides, there were no users who evaluated the building as "simple" or "very simple". This result is seen to support hypothesis H1. Consequently, it can be stated that the education of the experimental subjects is not effective on the evaluation

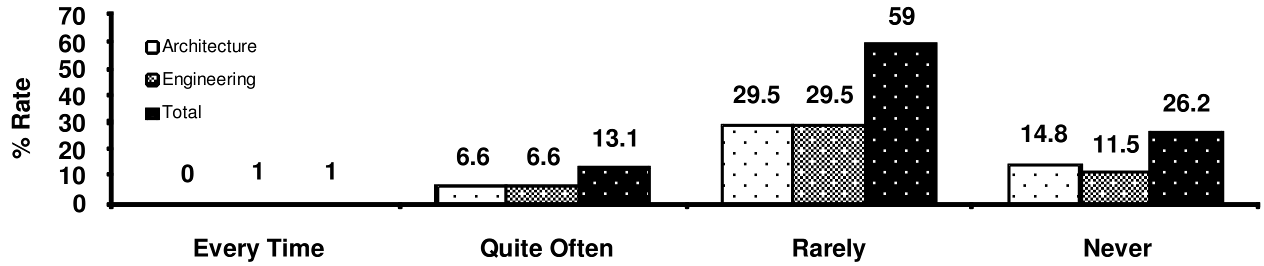

Figure 5. Frequency of the relationship of feeling lost in each department of 4th year students. x^2: 1.234, df: 3, P = 0.745.

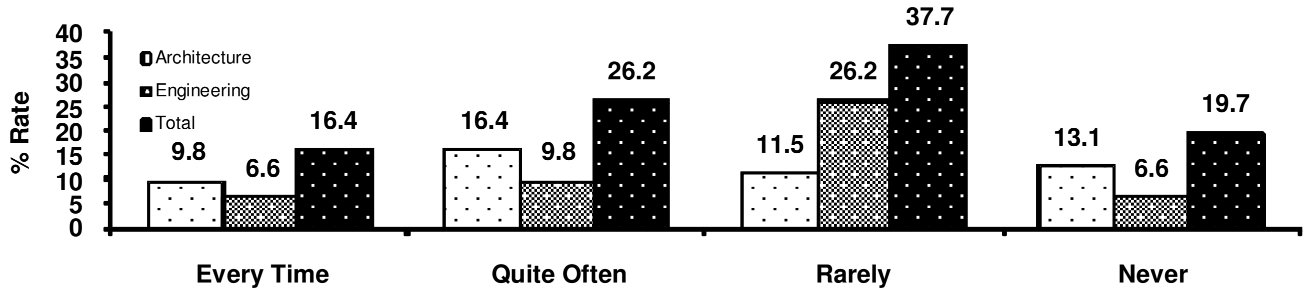

Figure 6. Feelings of being lost experienced by the subjects during their first year of study.

of the plan complexity.

The rates of feeling lost while going somewhere in the building are given in Figure 5. According to the results of the Pearson Chi-square test, there was no statistically significant relationship at the level of $p < 0.05$ between the subjects in the experiment who felt lost from the two departments. Accordingly, it was observed that most of the subjects (59%) "rarely" had the feeling of being lost".

The rates of feeling lost when going somewhere in the building by the subjects in the experiment during the first year of their usage of the building are given in Figure 6. According to the results of the Pearson Chi-square test, there was no statistically significant relationship at the level of $p < 0.05$ between the subjects in the experiments who felt lost from the two departments during the first year of their using the building.

If Figures 5 and 6 are examined carefully, then it can be said that way finding problems in the building have decreased with the increase of usage time. Accordingly, while the rates of students losing their ways "every time" were 16.4% in the first year, this rate regressed to 1% in the fourth year. This result supports hypothesis H2. From this data, it can be inferred that the space is perceived to be simpler with the increase of experience.

Recollection and identification of the space

In the second part of the survey, six photos taken from various spaces of the building and printed on A4 sized pasteboard have been shown to the subjects participating in the survey (Figure 7). Of these photos F1 - F2 represent open corridors, F3 - F4 represent stair connections and F5 - F6 represent closed corridors.

The question was asked to which block, floor and department these photos belonged and for them to state which elements they made use of when identifying these photos. Oral statements used when the photos were being identified were marked down in summary by the pollster. Spaces to which the photos belonged were used by the subjects or chosen from the previously spaces they passed.

The rates of building recognition of the subjects according to departments are given in Figure 8. According to the results of the Pearson chi-square test, there was no statistically significant relationship at the level of $p < 0.05$ between the subjects of the two departments concerning correct recognition.

When the photos are analyzed one by one, it is observed that especially F4 (total 65.6%) and F5 (total 50.8%) are more familiar compared to the others. F4 was taken with a perspective from block C through block B and it is located on the ground floor. While subjects were identifying this photo, they especially made use of the panel seen on the right side and the wall covering seen on the opposite side. The space seen in F4 is the connection point that every student in this building uses constantly. Despite this feature, the correct recognition rate of the space by the subjects remained at 65.6%.

F5 is on the 2nd floor where the Department of

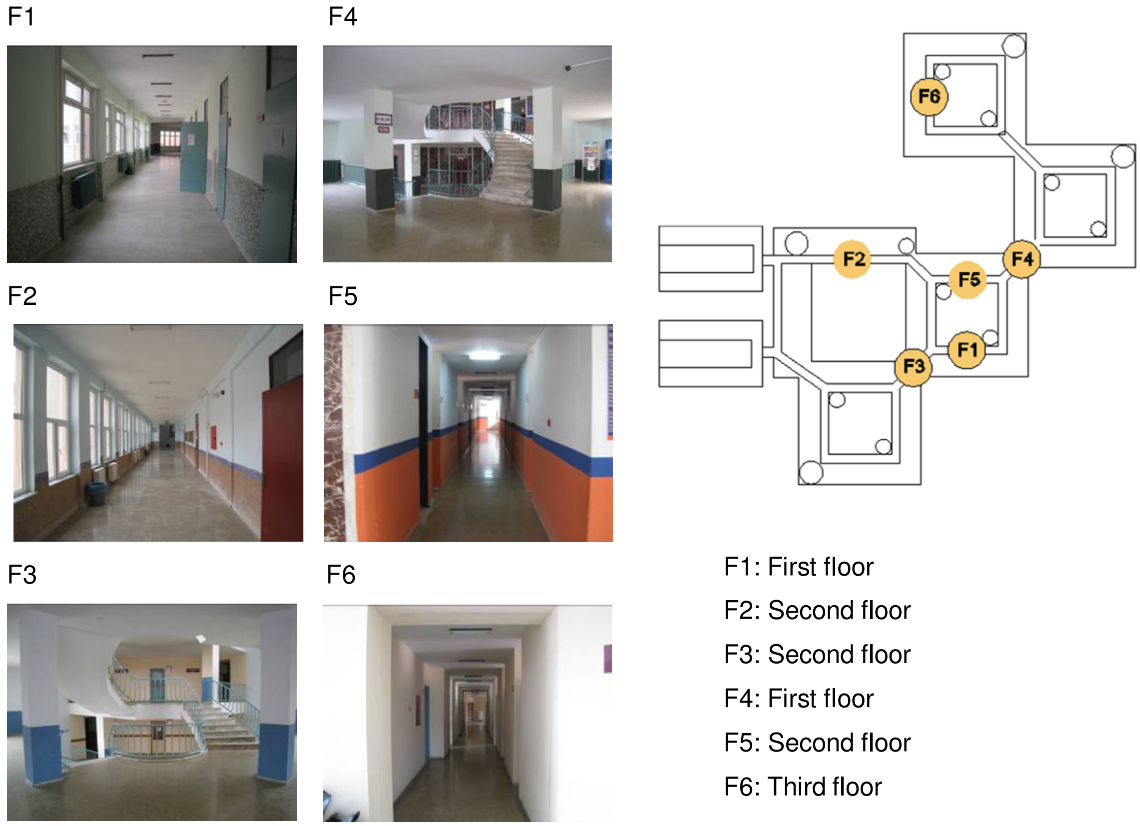

Figure 7. Photographs of the places used in the questionnaire and their locations on the plan.

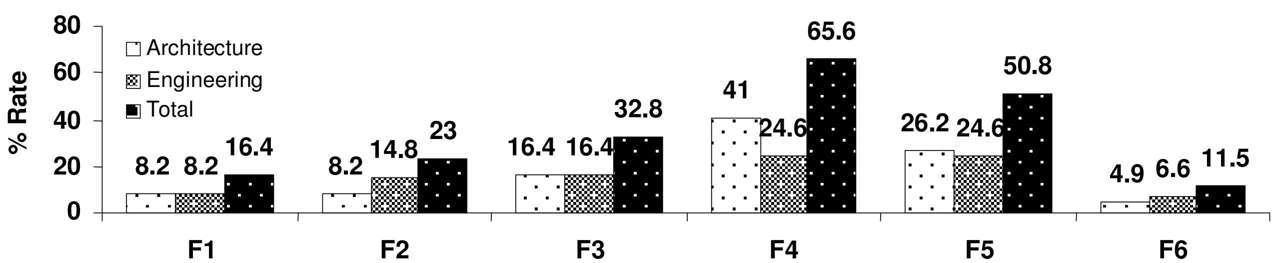

Figure 8. The relationship of photo recognition between departments. x^2: 2.558, df: 4, P = 0.634.

Construction Engineering is located and the rooms of some faculty members in the Department of Architecture are also in that corridor. The most significant reference of the subjects recognizing this space correctly is the colors of the walls. The least recognized photo is F6 (11.5%). Data that can be used for the recognition of this photo at block C on the 1st floor is very limited. It was determined that the subjects trying to identify this photo paid attention to the door signs and the panel seen at the end of the corridor. The floor covering in particular was very effective for identifying F2.

The rates of building recognition of the subjects according to year are given in Figure 9. According to the results of the Pearson Chi-square test, a statistically significant relationship at the level of $p < 0.05$ was found concerning correct recognition between years of usage. Accordingly, the 4th year students have better correct recognition rates of the spaces in comparison with the 1st year students, as actually the building usage time of the students is being considered.

Additionally, material and color covering of the floor are considered to be the most important identifiers when examining the answers that the subjects gave in the second part of the survey. In addition, other environmental data (panel, door label, lighting fixtures, signboards, etc.) can also be considered to be effective. Statements such

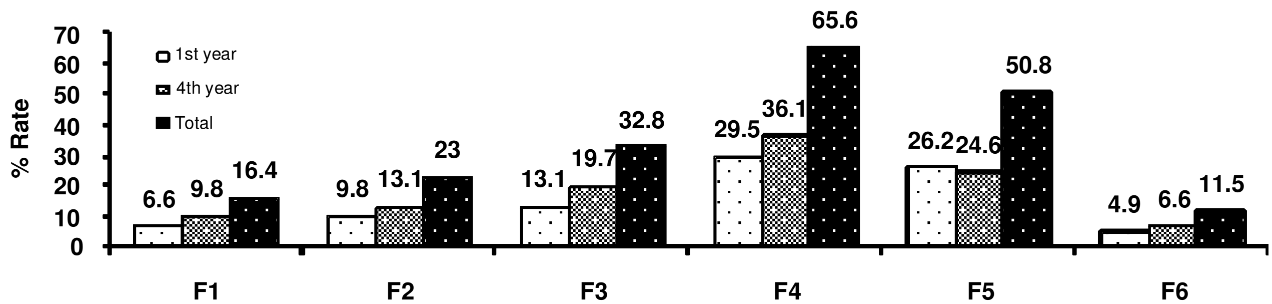

Figure 9. The relationship between photo recognition and usage time. x^2: 10.683, df: 4, P = 0.030.

Table 2. Results of the mean, standard deviation and homogeneity values of the dependent variables.

Semantic differential scale	Open corridor			Stair connection			Closed corridor			ANOVA results
	M	SD	HG	M	SD	HG	M	SD	HG	
Happy / unhappy	4.27[a]	1.20	A	4.29	0.99	A	4.86	1.25	A	P = 0.181[ns]
Roomy / cramped	3.68	1.04	A	3.71	1.49	A	4.86	1.61	B	P = 0.010
Calm / restless	3.86	1.25	A	4.82	1.31	B	5.00	1.27	B	P = 0.07
Warm / cold	3.77	1.34	A	4.47	1.74	A-B	5.05	1.21	B	P = 0.016
Bright / dark	3.05	0.95	A	3.47	1.81	A	4.82	1.59	B	P = 0.001
Attractive / unattractive	3.91	1.19	A	4.88	1.27	B	5.18	1.37	B	P = 0.005
Pleasant / unpleasant	3.95	1.17	A	4.71	1.40	A-B	5.23	1.11	B	P = 0.004
Exciting / unexciting	4.14	1.55	A	5.06	1.14	A-B	5.50	1.19	B	P = 0.004
Active / stationary	3.12	2.06	A	3.36	1.36	A	4.45	2.02	A	P = 0.050
Peaceful / unpeaceful	4.32	1.39	A	5.00	1.28	A	5.00	0.93	A	P = 0.116[ns]
Comfortable / uncomfortable	4.36	1.43	A	4.86	1.25	A	4.94	1.35	A	P = 0.330[ns]

as "I recognized it by the color of the wall", "This floor covering is found in the new blocks", "There is a panel at the end of the corridor", "This is the way I always pass through", "I have a course here in a classroom", "It is certain that it is not the Architecture Department", "I recognized it by the color of the door" were used during the recognition of the photos. While subjects were generally identifying the photos, they tried to decide by looking at the furthest points of the photo and especially at the end of the corridor. Besides, while they were identifying the photos, when they stated that they were not sure, they would make an estimate. This result supports hypothesis H3 expressed previously. This result shows that it can be inferred that the recollection of the space is much more related to the general characteristics of the space rather than the education received.

Evaluation of the perceptual performance

The reliability of the semantic differential items, including the perceptual evaluations of the students on three spaces of the education building, was tested using the Cronbach's test. The Cronbach alpha coefficient estimates of internal consistency for the scale, including the average scores for the ten bipolar semantic differential items, was 0.79. The coefficient of all items was above 0.70, representing good reliability according to some researchers (Bagozzi and Yi, 1988; McKinley et al., 1997; Bosma et al., 1997; Jayasinghe et al., 1997; Grewal et al., 1998; Kim and Yin, 2001; Pektas and Erkip, 2006). Therefore, the scale was considered to be reliable.

In the next part, the statistical relationships between the perceptual evaluations of the students on the differences in the characteristics of the inner spaces of the education building were analyzed. The results of the research questionnaire are given Table 2 as the mean, standard deviation and the homogeneity values for each of the items of the dependent variables. The differences in the characteristics of the inner spaces of the education building seem to have positive/negative effects on the perceptual performances of students when the means and the homogeneity values in Table 2 are considered. The differences between the perceptions of students on three different inner spaces (open corridor, stair connections and closed corridor) were tested by using the one-way ANOVA. According to the ANOVA results given in Table 2, the differences between the dependent variables "roomy / cramped" (F = 4.959, df = 2, p = 0.010), "calm /

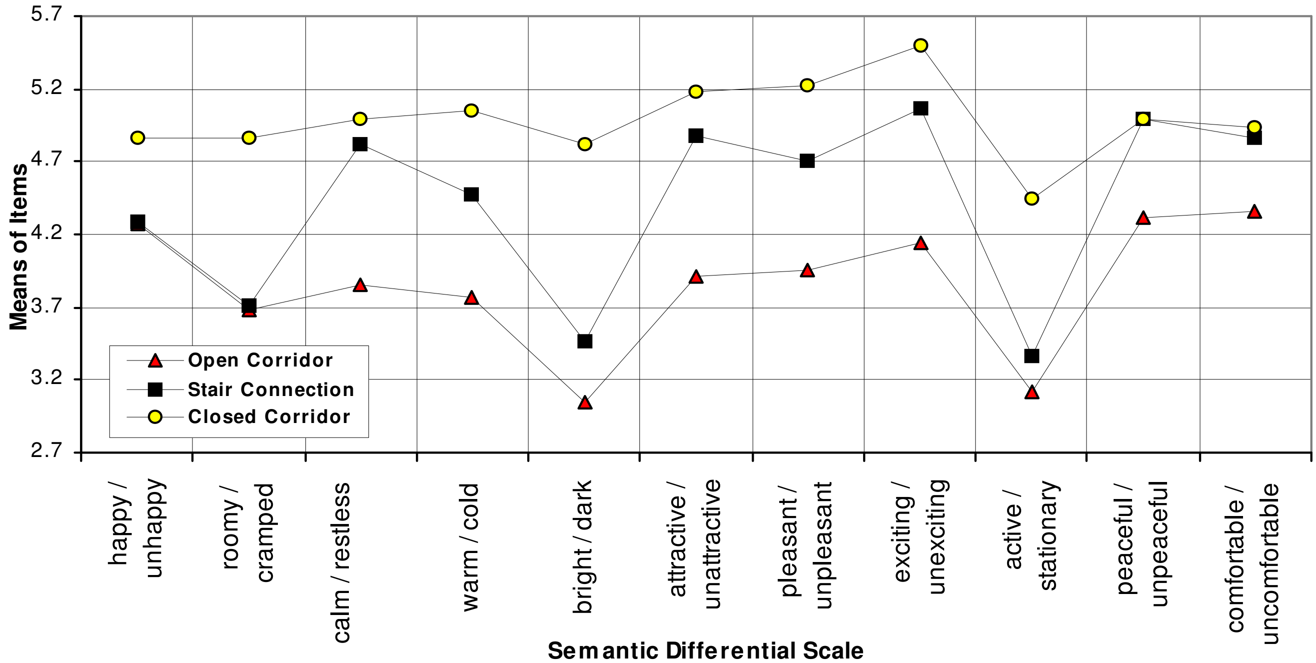

Figure 10. Effects of three different inner spaces on the dependent variables. Note: Variable means ranged from 1 to 7, with higher numbers representing more negative responses.

restless" (F = 8.043, df = 2, p = 0.07), "warm / cold" (F = 8.932, df = 2, p = 0.016), "bright / dark" (F = 18.588, df = 2, p = 0.001), "attractive / unattractive" (F = 9.605, df = 2, p = 0.005), "pleasant / unpleasant" (F = 8.990, df = 2, p = 0.004), "exciting/ unexiting" (F = 10.582, df = 2, p = 0.004) and "active / stationary" (F = 10.386, df = 2, p = 0.050), were found to be statistically significant at the level of p < 0.05 for all of the semantic differential items. Accordingly, each of three different inner spaces has an important effect on the perceptual performance of the students.

Graphical expressions of the data have been given in Figure 10 for comprehending better the differences among the perceptual evaluations of spaces. Accordingly, it is seen that students perceive the closed corridors negatively and generally perceive the open corridors positively compared to the other spaces.

Furthermore, the ANOVA test was performed for examining whether or not the differences between the departments where the subjects study and the space perceptions of the subjects are statistically significant. Accordingly, there is a statistically significant difference found between the departments where the subjects study and their spatial perceptions for the adjective pairs "peaceful / unpeaceful" (F = 10.451, df = 1, p = 0.008) and "comfortable / uncomfortable" (F = 15.050, df = 1, p = 0.003) at the level of p < 0.05. However, a statistically significant difference between the departments where the subjects study and their spatial perceptual evaluation for the adjective pairs "happy / unhappy" (F = 1.482, df = 1, p = 0.305), "roomy / cramped" (F = 0.391, df = 1, p=0.677), "calm / restless" (F = 0.326, df = 1, p = 0.667), "warm / cold" (F = 7.632, df = 1, p = 0.065), "bright / dark" (F = 3.305, df = 1, p = 0.272), "attractive / unattractive" (F = 2.505, df = 1, p = 0.254), "pleasant / unpleasant" (F = 4,952, df = 1, p = 0.092), "exciting / unexciting" (F = 7.311, df = 1, p = 0.057) and "active / stationary" (F = 8.911, df = 1, p = 0.114) at the level of p < 0.05 could not be confirmed. This result supports hypothesis H4. It can be inferred with this result that the evaluation of perceptual performance of the space is much more related to the general characteristics of the space rather than the education received.

DISCUSSION AND CONCLUSION

The results regarding the evaluation of the building complexity, the situation of recalling the space, the features of long-term recollection and perceptual performance evaluations according to the education received and the students' experience by those using the Selcuk University, Department of Engineering and Architecture building taken into the scope of the research are given below.

The Inner Connection Density for one floor of the Engineering and Architecture building composing the limits of the research (O'Neill, 1991a) is 4.09. This means that the user has approximately four different way options at every decision point. O'Neill (1991a) in his study where the inner connection densities of spaces are 2.40, 2.45 and 2.54, states that mistakes would increase and the space's legibleness would decrease in the tasks performed. In this test, it was set forth that the spaces for which the density is 2.54 are perceived as much more complex. In our study, both the ICD measurements of the building (4.09) and the complexity evaluations of the subjects show that the Selcuk University, Faculty of Engineering and Architecture building can be evaluated as much more complex.

According to the data obtained, most of the users evaluated the building as complex or very complex. In addition, there was no statistically significant relationship between evaluation of the plan complexity and departments. This situation especially set forth that there was no statistically significant difference between the students who received education in architecture and the students who did not receive education in architecture for the complexity evaluation in the buildings having a high level of complexity.

In various reports (Brown and Gifford, 2001; Stamp and Nasar, 1997; Aydıntan, 2001), it has been stated that in experimental studies performed with the subjects receiving education in architecture and with the subjects apart from this field that education received in architecture and design are effective in the perception process.

On the other hand, studies related to the aesthetic preferences and psychological perceptions of architects and non-architects have also been made. In the study by Akalin et al. (2009) regarding the evaluation of "prefervency, complexity and impressiveness" of architecture and engineering students, they proved that education is effective on perceptual evaluation and that it causes a statistically significant difference.

Gifford et al. (2002) have investigated the differences between architects and laypersons, with participants assessing the global aesthetic quality and six key cognitive properties of 42 large contemporary buildings and then independently scoring 59 physical features of each building. According to this study, architects and laypersons base their pleasure ratings on entirely different sets of physical cues. Interestingly, for architects, pleasure was significantly related to the presence in facades of more metal cladding, fewer arches and more railings. Architects were more pleased by buildings that had more rounded edges and corners, and more triangular elements.

Hershberger (1969) provided early empirical evidence that architects and non-architects perceive physical settings in fundamentally different ways. He compared the semantic differential ratings of buildings by three groups (architects, pre-architects, and laypersons) and found that the architects differed significantly from the other two groups.

Similarly, Groat (1994) used a sorting task to determine categories that architects and laypersons use to interpret buildings. According to her findings, laypeople tended to sort buildings on the basis of preference and type, whereas architects used categories such as design quality, form, style, and historical significance. Architects could clearly distinguish between modern and post-modern designs, whereas the lay group could not.

However, the studies given as examples above are about aesthetic evaluations, preferences and psychological perceptions. This study, on the other hand, was related to the perceptions of complexity in the buildings having a high level of complexity. Consequently, the fact that there was no statistically significant difference between the education received and the perception of complexity was considered to be an expected result.

When analyzed, the data concerning the feeling of being lost when going somewhere in the building showed no statistical connection between the departments. However, it was observed that the rates of those who get lost in the building "every time" were related to the time of experiencing the building. Besides, it was determined that as experience in the building increases even more, then the feeling of being lost decreases even more and that with the increase of experience, space would be perceived to be simpler.

A study in the United Kingdom by Wilson (1996) has shown the dramatic changes in visual preferences of architectural students at different stages of study. According to Norberg-Schulz (1965), when we first experience an example of a particular formal structure, it stands alone and lacks meaning as a formal structure. As we learn the same or similar formal structures, we recognize them internally in terms of similarities and dissimilarities. The learned case reflects the individual's internal representation of the building and meanings associated with that representation and building.

When the results of the experiment performed regarding the subjects' identifications of the photos belonging to the building were observed, it was seen that the departments and the years of study showed no statistically significant relationship for recognizing the space. When the spaces that were generally much more remembered are taken into consideration, it was seen that space characteristics, such as color, shape, triangulation point, etc. came into the forefront. It could be inferred with this result that the recall of the inner space was much more related to the general characteris-tics of the space rather than the education received.

According to another result, the differences between the perceptions of students on three different inner spaces (open corridor, stair connections and closed corridor) were found to be statistically significant at the level of $p < 0.05$. It was seen that the inner space receiving daylight and looking onto the inner yard (open corridor) was construed and perceived more positively compared to the inner space having the rooms of the faculty members (closed corridor) and the inner space having the stairs (connection point) in the scope of the semantic differential scale.

We would like to emphasize that a statistically significant relationship could not be found between the perceptions of complexity of the education structures having an architectural plan with a high level of complexity when comparing the students of construction engineering with the students of architecture. Accordingly, it was set forth that buildings having orientation and wayfinding problems and especially having a high level of complexity constitute a significant problem for all the users, whether or not they received education in archi-tecture.

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