

# AN EXPERIMENT FOR MEASURING THE EFFECT OF ARCHITECTURE EDUCATION ON SPACE PERCEPTION

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## Abstract

The concept of space, which is based on architecture and confronted as an architectural product, has various definitions in the literature. Many perspectives were improved on the concept of space that was discussed for years. Space perception is a contemporary and sophisticated theme. Aforementioned concept is classified as sensual and cognitive perception. While sensual perception is consisted of sight, hearing, smell and touch sense, cognitive perception is defined by Downs and Stea as a range of psychological transformation of obtained information by the individual and coding, storages, recollections and an analyzed case about relative places. [1]

The effect of education on space perception was evaluated within this study. Education is assumed as an important element for the generation of architecture discipline, though opposing views. Architecture education provides yield such as saving detailed perceptual levels for the individuals and differentiating space perception style. The results that architects and non-architects evaluate the constructions differently were expressed within many studies. The objective of this study is to bring into question the space perceptions of architecture students, the change about the evaluating skills of obtained information in parallel with the education.

The study was conducted through a questionnaire about the effect of education on space perception among students in the first, second, third and fourth classes. Four constructions that are an important architecture product and completed after the year of 2000, were selected for the study. The questionnaire was consisted of adjectives for measuring the visual perception at the end of the reviewing process of the literature. Besides, the students are asked for estimating the function and material of the constructions by evaluating visual imaginations. The obtained data was evaluated via statistical analysis.

The 1<sup>st</sup> and 4<sup>th</sup> class students answer more decisive and the other classes present ambivalent answers as considering the significant results. Furthermore, positive effect of education on estimating material and function is highlighted as a conclusion of the study.

*Key words: space perception, experiment, education.*

## 1. Introduction

The effect of education on creativity and perception has been discussed for years and various views were propounded by philosophers. While some of these views advocate this perception has a natal potential, the others assert that it is shaped by experiences and doctrines. The individual is expected to have a changing perception by contributing his/her design practice that possessed by various experiments, thoughts, insight and experiences to life as well as theoretic and practical knowledge during education process.

Several sources about perception were reviewed before starting to carry out this study. Primarily, the master thesis of Tokatlı İncekara named as “Physiological and Psychological Factors on Perception of Architectural Place” was examined since, it presents the concept of “perception” and the views about this concept in a detailed chronological order. [2]

Moreover, the literature has many researches on measuring the effect of architecture education on perception level of student. The master thesis of Asar “Examination of the analysis of perceptual experience in architectural space reading with the help of a method” approaches the concepts of perception, place and

experience and also, Kevin Lynch conducted a study to constitute a framework for reading architectural places by benefiting from the concepts for reading urban places in his book of “The Image of the City”. [3] The results of survey study that conducted with this framework showed that internal and external of a place are perceived as a whole.

The questionnaire form of this study was composed of the doctorate thesis of Minez named as “Investigation of the transformation of the perception of individuals throughout architectural education on the basis of visual environment evaluation techniques”. [4] This thesis generates a questionnaire about visual environment evaluation techniques by reviewing many sources in the literature and the adjectives were selected for the questionnaire.

Besides, the study of Baytin, “A Research for Determination of the Visual Effects of New Construction in İstanbul Province”, becomes a pathfinder for selecting the adjectives within the study. [5]

## **2. Purpose and Method**

The objective of this study is to investigate the issues of reading construction functions and materials among students by using obtained information of perception of the place, experience during architecture education through various parameters. In the light of this aim, a questionnaire was performed among the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> class students at KTO Karatay University Faculty of Fine Arts and Design Department of Architecture. The students were asked for commenting visual images by using adjectives that determined by various parameters in the literature. Besides, it was expected to read construction functions and materials with given two questions. Obtained data was evaluated via SPSS 24.0 through various analysis. Readings of functions and materials were evaluated frequency analysis as to the classes and variance analysis was used to test the other parameters. This study, which is an experiment about the evaluation of changing perception on visual images during architecture process, was concluded with various comments.

## **3. Architecture Education and Perception**

The concept of “perception” is defined as “transferring nonego to self- consciousness through senses” in the dictionary. [6] Two basic concepts are identified as emotional and cognitive perception for perception of place. Emotional perception is comprised of the actions that occurred by sense organs such as sight, hearing, smell and handling and cognitive perception can be explained according to Downs and Stea as a range of psychological transformation of own obtained information such as an analysed fact about codings, storages, recallings and relativist places. [1] Is perception capability natal or are there learned skills on the basis of perception? This question was discussed many philosophers such as firstly Descartes, Kant and then Berkeley and Locke in the history of philosophy. While Rapoport advocates that recognition consists of direct and indirect experiences and pure perception occurs suddenly [7], Maslow asserts that all people have a potential natal creativity and they lose time due to education. [8] Furthermore, Montessori expresses that curiosity and creative imagination are losing values while the child’s education process. [9]

Architecture education process is a discipline that has the action of design in the central point and is formed by theoretical courses supporting the central point. A new, original, different and creative product and imagination for accessing this product and living various experiences for transformation new ideas to the action are expected from the students during this education process. [10] Design is a field that individuals obtain theoretical and practical information and transform this information into final product with own creative comment in the architecture education process. Design education has differences comparing to other disciplines and contains different cognitive stages. Individual learns by experiencing, thinking, divining and performing in these stages. [11]

The beginner students of architecture education feel themselves as in a different environment because of high

school education based on pure theoretical information. Two basic situation that are faced by the students in this environment as unfamiliarity to architectural definitions and being these definitions as quite subjective and uncertain. [4] The student is in a paradox and cannot know what should be firstly learned as expressed by Schön. It is expected from the student to perform not being in the know and he/she goes into dilemma. The student, who have experience by learning the logic of design action, multiple thinking and questioning during the education process. [12] Kahvecioğlu indicates that the performance showed about using and association of data set provides to access the optimal solutions for the problem in unlimited information space. [13]

#### 4. Survey Study




An experiment was conducted to investigate the effect of architectural education on individual perception as to visual imagination within this study. For this purpose, a questionnaire was performed among 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> class students of Department of Architecture. The sample size was determined through statistical tables. Distribution of sample size as to the classes was given in Table 1.

Table 1. The distribution of Sample Size as to Classes

First year students	Second year students	Third year students	Fourth year students	Total
41 people	39 people	50 people	34 people	164 people

Constructions in the questionnaire was selected as cultural constructions after the year of 2000 and these were taken into consideration as valuable and recognized architectural products. For this purpose, Modern Art Museum of Fort World (Architect: T. Ando) constructed in 2002, Walt Disney Concert Hall (Architect: F. Gehry) constructed in 2003, Royal Ontario Museum (Architect: D. Libeskind) constructed in 2007 and Elbphilharmonie (Architect: Herzog/Meuron) constructed in 2016 were selected for the questionnaire. Visual imaginations of these constructions were demonstrated to the students with colourless printing and were asked for reading their functions and materials. While selecting the imaginations, it was cared of associated with its environment (Table 2).

Table 2. Visual Imaginations

			
<b>Modern Art Museum of Fort Worth</b>	<b>Walt Disney Concert Hall</b>	<b>Royal Ontario Museum</b>	<b>Elbphilharmonie</b>

It is remarkable that more than half of the participants know the correct functions of Walt Disney Concert Hall and Royal Ontario Museum, as seen the results of reading of function. However, Modern Art Museum of Fort Worth was selected as an education building and Elbphilharmonie that was constructed on an old building, was assumed as a trade building (Table 3).

Table 3. Frequency Analysis for the Function

		First year students	Second year students	Third year students	Fourth year students
<b>Modern Art Museum of Fort Worth</b>	<b>Education building</b>	%24,4	%12,8	<b>%48</b>	<b>%52,9</b>
	<b>Trade building</b>	%19,5	%12,8	%8	%14,7
	<b>Culture building</b>	%14,6	<b>%41</b>	%24	%14,7
	<b>Religious building</b>	%0	%0	%0	%0
	<b>Housing building</b>	<b>%39</b>	%20,5	%14	%14,7
	<b>Health building</b>	%0	%7,7	%6	%0
<b>Walt Disney Concert Hall</b>	<b>Education building</b>	%0	%5,3	%0	%3
	<b>Trade building</b>	%45,9	%31,6	%14,3	%15,2
	<b>Culture building</b>	<b>%54,1</b>	<b>%63,2</b>	<b>%85,7</b>	<b>%72,7</b>
	<b>Religious building</b>	%0	%0	%0	%0
	<b>Housing building</b>	%0	%0	%0	%3
	<b>Health building</b>	%0	%0	%0	%6,1
<b>Royal Ontario Museum</b>	<b>Education building</b>	%2,7	%0	%0	%12,1
	<b>Trade building</b>	%8,1	%2,6	%10,4	%9,1
	<b>Culture building</b>	<b>%54,1</b>	<b>%60,5</b>	<b>%64,6</b>	<b>%51,5</b>
	<b>Religious building</b>	%32,4	%34,2	%22,9	%27,3
	<b>Housing building</b>	%0	%0	%2,1	%0
	<b>Health building</b>	%2,7	%2,6	%0	%0
<b>Elbphilharmonie</b>	<b>Education building</b>	%12,5	%2,6	%0	%2,9
	<b>Trade building</b>	<b>%50</b>	<b>%61,5</b>	<b>%64</b>	<b>%61,8</b>
	<b>Culture building</b>	%17,5	%33,3	%24	%29,4
	<b>Religious building</b>	%0	%0	%2,4	%0
	<b>Housing building</b>	%10	%0	%4	%2,9

<b>Health building</b>	%10	%2,6	%6	%2,9
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71.8% of the 1<sup>st</sup> class, 81.6 % of the 2<sup>nd</sup> class, 93.9 % of the 3<sup>rd</sup> class and 84.4 % of the 4<sup>th</sup> class students answer for the material of Modern Art Museum of Fort Worth as glass; 70.3 % of the 1<sup>st</sup> class, 67.6 % of the 2<sup>nd</sup> class, 83.3% of the 3<sup>rd</sup> class and 81.3% of the 4<sup>th</sup> class students answer for the material of Walt Disney Concert Hall as metal; 51.4% of the 1<sup>st</sup> class, 48.6% of the 2<sup>nd</sup> class students answer for the material of Royal Ontario Museum as glass and 54.3% of the 3<sup>rd</sup> class and 43.8% of the 4<sup>th</sup> class answer as metal. 51.3% of the 1<sup>st</sup> class students answer as concrete and, 38.5% of the 2<sup>nd</sup> class, 46% of the 3<sup>rd</sup> class and 52.9% of the 4<sup>th</sup> class students answer as glass for Elbphilharmonie as considering the reading of material. These results explain that the 1<sup>st</sup> class students are inadequate by knowing material comparing to the 4<sup>th</sup> class students.

Various researches conducted by using visual environment evaluation technique were examined after reviewing studies on function and material in the literature. At the end of this review process, 5 factor groups and 15 adjectives (dynamic- interesting- impressive- high- spacious- huge- symmetrical- modern- old- complex- organized- well sized- compatible- distinct- ordinary) belonging to these groups were determined.[3],[4], [5] the questionnaire was rated with 5- point Likert (1- quite few, 2- few, 3- neutral, 4- much, 5- very much).

Variance analysis was used to test the difference between groups, since a statistically significant difference between the groups would help the research. [14]

Variance analysis were performed for four constructions separately and significant difference between classes was analysed. Analysis of Modern Art Museum of Fort Worth and the adjectives that have significant differences are exhibited in Table 4. The adjective of symmetrical has significant differences as the results of performed analysis. The 1<sup>st</sup> class students found this construction the most symmetrical comparing to the other classes and then the 4<sup>th</sup> class students follow this line.

Table 4. Variance Analysis results of Modern Art Museum of Fort Worth

	<b>First year students</b>	<b>Second year students</b>	<b>Third year students</b>	<b>Fourth year students</b>	<b>P</b>	<b>T</b>
<b>Symmetrical</b>	3,39	2,94	2,52	3,14	0,011	3,844

Analysis of Walt Disney Concert Hall and the adjectives that have significant differences are exhibited in Table 5. The adjective of spacious has significant differences as the results of performed analysis. The 4<sup>th</sup> class students found this construction as quite few spacious.

Table 5. Variance Analysis results of Walt Disney Concert Hall

	<b>First year students</b>	<b>Second year students</b>	<b>Third year students</b>	<b>Fourth year students</b>	<b>P</b>	<b>T</b>
<b>Spacious</b>	2,67	3,20	3,50	2,29	0,03	4,82

Analysis of Royal Ontario Museum and the adjectives that have significant differences are exhibited in Table 6. The adjectives of interesting, impressive, modern and complex have significant differences as the results of performed analysis.

Table 6. Variance Analysis results of Royal Ontario Museum

	<b>First year students</b>	<b>Second year students</b>	<b>Third year students</b>	<b>Fourth year students</b>	<b>P</b>	<b>t</b>
<b>Interesting</b>	4,45	4,10	4,36	3,80	0,047	2,71
<b>Impressive</b>	4,10	3,36	3,35	4,34	0,044	2,60
<b>Modern</b>	4,07	3,94	3,87	4,45	0,049	2,20
<b>Complex</b>	4,15	3,52	3,65	3,88	0,027	3,13

Analysis of Elbphilharmonie and the adjectives that have significant differences are exhibited in Table 7. The adjectives of impressive, spacious, old, organized, well- sized and compatible have significant differences as the results of performed analysis. A regular decreasing ratio of the answers as impressive, spacious, organized, well- sized and ordinary was demonstrated from the 1<sup>st</sup> to 4<sup>th</sup> class for this construction. The answer of neutral was beginning from the 1<sup>st</sup> class and towards the 3<sup>rd</sup> class and the students became more decisive in the 4<sup>th</sup> class.

Table 7. Variance Analysis results of Elbphilharmonie

	<b>First year students</b>	<b>Second year students</b>	<b>Third year students</b>	<b>Fourth year students</b>	<b>P</b>	<b>t</b>
<b>Impressive</b>	3,48	3,25	2,80	3,03	0,021	3,34
<b>Spacious</b>	3,41	2,79	2,46	2,64	0,01	5,74
<b>Old</b>	1,56	2,05	2,00	1,50	0,032	3,015
<b>Organization</b>	3,43	2,66	2,88	2,44	0,03	4,89
<b>Well-sized</b>	3,60	3,25	3,00	4,02	0,048	2,70
<b>Compatible</b>	3,63	2,94	2,70	3,82	0,004	4,66

## 5. Evaluation and Conclusion

The most of the participants estimated Walt Disney Concert Hall and Royal Ontario Museum as cultural constructions correctly as the results of analysis of four constructions' functions and materials within this study that aimed to investigate the changing perception of the students on space perception during architecture education. The reading of right material knowledge was increasing towards the 4<sup>th</sup> class.

The results of 15 adjectives that were selected for measuring the effects of visual imaginations on students are showed various significances. Decision- making in the discipline of architecture is not an easy task due to knowledge, possibilities, complexity and discrepancies. [4] Desire to try different things that occurred by possibilities and complexity created by this desire can rise different psychological situations in this process.

Especially uneducated about architecture of the 1<sup>st</sup> class students and the 4<sup>th</sup> class students that are about to complete their architecture education as a candidate of architect express their ideas more decisive comparing to the other groups as seen in the significant results. The 1<sup>st</sup> class students that are the beginner of architecture education answer bravely. More knowledge creates more ambivalence, but then the students become more decisive towards the last class of the education process.

This study is limited with four construction groups that were used within the study, which is aimed to evaluate the effects of education on perception level. This study is expected to be pathfinder for further and more extensive studies.

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