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Article

Studio exercises within the intuitive and intellectual approach in basic design education

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ABSTRACT

Basic design is a totally critical and authentic course for all disciplines related to designing. When designing is considered as a process of problem solving, the main purpose of the course can be regarded as conveying the conceptual, abstract thinking approaches to students. The type of education students received earlier as well as students' habits, mental memory and visual perception are all effective in the process of solving design problem. This study discussed design process managed with both intuitive and intellectual approach while solving design problem. The study was conducted as a two-stage experimental research to analyze the methods students use while solving design problems. First, a questionnaire was administered to students to gain information about their learning styles. Secondly, studio exercises were performed within the Basic Design course. The following was the question of this study: "What sort of problem-solving attitude did people display and what were these people's learning styles? Consequently, what sort of results were achieved?" At the end of the studio exercises, a second questionnaire form was administered to determine students' approaches to design problems and the methods they used in the solving process. The second questionnaire was administered to students who were divided into two groups according to the learning style they preferred based on result of the first questionnaire. According to results; the hypothesis developed in the context of the interaction between process and method of solving the design problem and learning style and prior education was confirmed with the relevant data.

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INTRODUCTION

Jones (1992) defined the design process as a serious event that starts with the procurement of human made materials and components and ends with impacts on society. Therefore, the design discipline is applied not only in the fields related to artistic skills, but also in various disciplines ranging from natural sciences to social sciences. The Turkish educational system has two options for students who aim to be designers. The first is to take the annual exam conducted by the Student Selection and Placement Center, while the other option is to take the aptitude tests conducted by the institutions that provide

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undergraduate education in the fields of art and design. The student selection exam score where the qualitative and quantitative reasoning skills are assessed should be used to select a school for undergraduate education in Architecture, Landscape Architecture or Interior Architecture, regardless of the high schools, such as fine arts high school or another high school with math courses being dominant, attended by students. These departments accept the science-focused students who are successful on the student selection exam.

The first-year students receive design-based education in the Basic Design studio on the concept of design. Design is a major course for all design-related departments aimed at increasing visual sensitivity and raising design-related awareness. Basic Design is an unfamiliar course for students who are accustomed to studying with written texts and formulae (Günay, 2007; 93). According to Dikmen (2011), for students who start their undergraduate education following their success on the selection and placement exam, adaptation to design education is really challenging after abandoning the learning patterns that do not require questioning, that are based on rote learning, that only have one single correct answer, and that are focused on the instructor instead of the students. Atalayer (1993) stated that the visual skills of students whose verbal skills develop better than their visual skills could be improved and enriched with secondary education, which constitutes the focal point of Basic Design Education. Özkar and Steino (2012) noted that Basic Design, which is described as an abstract world with lines, surfaces, volumes, colors, and textures, includes learning by practicing, where hands are also used. Instead of the conventional methods of education, discussion through concepts and the process of asking questions with the efforts to develop ideas are more significant.

Accordingly, the purpose of this study was to determine the preferred design method of students, who were accustomed to scientific education, in the process of solving the design problem, based on their learning style, within the Basic Design course they received in the first term. Aspects related to determining the methods students used in the process of solving the design problem were accepted as follows:

- Students form the result-related composition with an intuitive approach by using their visual organization principles in a sensory context while solving the design-related problem.
- Students form their result-related composition with an analytical approach based on certain rules, propositions, and models and according to their educational habits in the process of solving the design-related problem.

In this study, after the Higher Education Institution's exam, the two-dimensional composition activity conducted within the Basic Design course with students who enrolled at the Department of Interior Architecture and Environmental Design within the Faculty of Fine Arts at the Afyon Kocatepe University was examined in the context of design methods associated with students' learning style scales. Subsequently, a questionnaire was given to students so that they could select scales regarding Kolb's (1984) learning styles' inventory. The learning styles selected by students formed the students' compositions and served as the basis for determining students' methods in the design process. At the end of the questionnaires, efforts were made to determine the relationship between the design method students preferred in perceiving and solving the design method and the learning style scales they preferred.

BASIC DESIGN EDUCATION

Design is lexically defined as "the form or thought imagined", "the first draft of an artistic work, structure or technical product", "design", "the frame specifying the route and procedures to follow in various periods of a research process," and "revealing a pre-perceived object or event through conscience later" (TDK, 2021). Moreover, Bayazıt (2004) defines design as the action of revealing and solving a problem that consists of the decisions made to fulfill goals, while Lawson describes the concept as follows: "Finding solutions to the needs within specific conditions" (2005; 7). The aim of design education is to provide a holistic perspective to students. This education provided in the disciplines of Painting, Sculpture, Ceramics, Graphics, Architecture, Interior Architecture etc. serves for the purpose of forming a common design language (Aslan, 2012). Despite the scale differences between these disciplines, Basic Design aims to help students acquire the habit of abstract and conceptual thinking, the most basic instrument of designing. Analyzing the problem, dividing the problem into parts, reaching the abstract plane through the concrete one, developing ideas, and returning to the concrete plane back become a possibility with Basic Design education.

There are a total of eighty-eight educational institutions in Türkiye that offer interior architecture education. Of these, twenty-nine are state universities and fifty-nine are foundation universities (Yökatlas, 2023). It is required to receive an adequate score on the Student Selection and Placement Exam conducted by the Higher Education Institution to receive education in the departments of interior architecture. Students are placed in their preferred educational institutions according to the scores they received on the Student Selection and Placement Exam. Consequently, there are students together in the interior architecture departments from both the high schools where students received mathematical education and the

high schools where students received fine arts education. It is aimed in the interior architecture departments that have two different student profiles together to constitute a shared design language with the Basic Design education.

The German Bauhaus movement with intellectual background based on Arts&Crafts movement and stylistic background based on Art Nouveau set a balance between technology and ideology, and constituted a significant triangulation for Basic Design Education (Aslan, 2012). The first implementer of Basic Design within Bauhaus was Johannes Itten who claimed that there were no major differences between the studies presented during the enrollment despite the difference between the profiles of students who enrolled, and that students needed to receive a preparatory course for a term so that instructors could have a better idea about students' skills (Itten, 2002). Through this course, students will gain basic information about the design process, before initiating the activity of designing, and their perspective regarding the topic of design will be broadened. In the Bauhaus doctrine developed with the Gestalt perception theory, the interaction between the student-instructor as well as the educational methods are significant. Bauhaus doctrine enables students to get free and learn by practicing, and abandon stereotypes by exploring the basic features of the instruments they use (Uluoğlu, 1990; Dikmen, 2010). Many institutions in the world that provide education in design and planning give compulsory basic design education in the first year. Generally, the education in this course, which is taught with the two and three-dimensional abstract representation methods, is based on the Gestalt design principles of the Bauhaus school. Other than these, different applications are also conspicuous. The Istanbul Bilgi University implements basic design education with the computational design methods (Yalınay Çinici, 2012), whereas the Middle East Technical University in Ankara is focused on space in the direction of certain concepts and focuses on technical drawings and rules of perspective together with this (Özgüner, 1966). Some educational institutions focus on concepts, such as materials and texture and to references from the concrete world. Students make design exercises with these by knowing the materials. Students at the Bursa Orhangazi University realize their course outside with clay and sand workshops (İstanbul Teknik University, 2014). According to Boucharenc' study (2006; 2), the Basic Design course is globally considered as a one-year activity and that the instructors of this course support one-year education for this course. The common point of this education is to teach students thinking, analyzing and developing themselves and the fact that students have difficulty understanding the course. Bauhaus doctrine effectively changed architecture and relevant disciplines. According to the study by Yıldırım (2018), the common point of the Basic Design course presented with different content in different institutions is the conveyance of Bauhaus-based information to students with different methods (Boucharenc, 2006; Yıldırım, 2018).

The Basic Design Education have courses where the conceptual frame and Bauhaus-based basic design principles are briefly instructed, but there are also opposing views that these courses are actually the presentation of studies conducted in previous years to students (Erdoğdu, 2016). Çubukçu and Dündar (2007) stated that presenting visual images to students during the course did not affect creativity, while showing the student studies performed in previous years as examples might cause students to incorrectly think that the design has only one correct approach and to create similar works. Relevant studies reflect that a process where students experience objects and events without limiting their own creativity should be followed, and that it would be a better method for students to gain information about the alternative solutions of problems considering the relevant studies as examples. In Demirkan and Afacan's study (2011), created an instrument to determine the criteria on which creativity depends in a first course design studio and tested this instrument in the evaluation of 210 result products. As a result of the study, the concept of creativity is related with;

- consists of the novelty and affective characteristics of artifact that are associated with its shape,
- the elaboration characteristics that are integrated with its geometric and figure ground relations and harmony of design elements
- consists of rhythm, repetition, unity, order and number of design elements.

Although the approaches regarding the Basic Design education differ, the main purpose here is as follows:

- Helping students gain the relevant layout perception by enabling them to understand that creating two or three-dimensional compositions is fundamental and by stressing the arrangement-related principles,
- Helping students develop abstract thoughts, gain the ability to represent, and acquire appropriate design language and skills,
- Helping students re-assess their environments through abstraction and conceptualization, and
- Helping students form designs and organizations by blending, organizing and changing the concepts of figure, form, color, pattern, material, scale and space (METU 2020, METU 2015).

According to Itten (1975; 62), the composition created with abstract forms helps consider the practices and develop new instruments of representation, whereas the Bauhaus doctrine contains the square partitions with the geometrical forms such as square, triangle or circle.

Practices of Basic Design education are conducted with the analogue instruments such as cut, fold or paste. Signs, symbols and similes should not be used in such practices. Use of basic geometrical forms directs students, and students who learned how to use these forms can create parametric and fluent designs (Erdoğdu, 2016). The Basic Design Education aims to present the basic two and three-dimensional principles, and it is generally supported by the principles of Gestalt doctrine shaped with reference to Bauhaus' perception psychology. The literature has various definitions of basic design education: creativity and problem-solving skills, visual perception and language (Beşgen et al. 2015, Denel 1981, Makaklı 2015). According to Zelanski and Fisher (1996), many people know much about the discipline of design but only a few of them are familiar with visual development. Therefore, Basic Design education aims to increase visual sensitivity and raise design-related awareness.

In the first year of education, no matter what the profession, it is expected that students will transform the learning habits coming from secondary education. Within the scope of the first year of education is giving up the learning method based on memorization in place of the learning method based on research. Whereas the design education with the subjects, such as acquiring different skills and creativity becoming part of the activity, makes it mandatory to have an approach that requires a somewhat more detailed evaluation in this process of transformation (Dural, 2000). Students in the existing educational system in Türkiye are used to working with written texts and formulas. Consequently, the abstract world formed of lines, surfaces, and volumes of design education is unfamiliar to students (Günay, 2007). The basic design course, which is the first place where the Interior Architecture Department students encounter design concepts, is of tremendous importance in design education from the aspect of providing for a permanent transformation in the forms of thought and a change in the habits of students coming from the past, who were used to an educational system based on memorization.

Each person shapes information in different forms. According to Türkyılmaz (2010), the methods people prefer in receiving and processing information are different. Some people learn about certain topics, such as mathematical models and theories, more easily while some understand schemes and graphs faster. According to the Experimental Learning Theory developed by David A. Kolb, who is one of the researchers that has many studies related to learning styles, the selection of experience indicates which form of learning style is preferred in the learning process of a person. Kolb, who shaped his studies on Lewin's Experiential Learning Theory, constituted a learning styles' model by also considering the views of Jung, Piaget, and Guilford (Veznedaroğlu & Özgür, 2005). According to Kolb's Experimental Learning Theory, it is constituted of the learning forms of concrete experience, reflective observation, abstract conceptualization, and active style of life phases. Although there are various educational theories regarding particular differences among learners and the role of experiential learning, few have been applied to design education (Chickering, 1977, Dunn and Dunn, 1975). In the study of Newland et al. (1987), there are four kinds of designers in relation to learning styles, these are common sense learners, dynamic learners, contemplative learners, and zealous learners. Demirkan (2016) investigated the relationship between the learning styles preferred by interior design students and their success levels in her study. Using Felder e Soloman's Index of Learning Styles in the study, Demirkan found that there are significant relationship between learning styles and achievement levels and the ranking is reduced in the form of Sensing/Intuitive, Visual/Verbal, Active/ Reflective and Sequential/ Global. In the study Kvan and Yunyan (2004) investigated the relationship between the learning styles and design studio performance of architecture students in China. According to study, there is a statistically significant correlation between learning styles and academic performance, As a result, convergers achieving significantly lower marks in one studio while assimilators succeeded in the other. This study emphasized that architectural studio programmes can advantage students with particular learning styles.

According to Kolb (1984), while acquiring information, people use all of the Concrete Experience, Abstract Conceptualization, Reflective Observation and Active Experimentation (Active Living) stages at different rates. During the Reflective Observation stage, students learn by watching and interpreting, but they use and transform their knowledge into a new case/product in the stage of Active Experiencing. In the Concrete Experience stage, learning is performed through intuitions and private experiences. The singularity and complication of the reality is preferred in place of theories and generalization, while an intuitive approach is prioritized over a systematical and scientific approach in the process of solving problems. In the Abstract Conceptualization stage, the rationale as well as concepts and thoughts have a more important place than emotions. Characteristics such as learning by thinking, analyzing, systematical planning and deduction are all important in this stage. Scientific approaches are important in terms of developing general rules and theories and solving a problems (Kolb,1984; Kolb, Baker and Dixon, 1985). The first-year design studio atmosphere of interior architecture education is a process where a major transformation is expected, especially for students. Students are confronted for the first time with design problems and learn to ask questions that would not define them and to seek suitable answers to this. Some of

the students who encounter this difficult process for the first time are attempting to find solutions with actions of thoughts and feelings, whereas some are attempting to find solutions with actions of following and doing. It was observed in the studies conducted that interior architecture design education, which has a different learning process from other disciplines, that students are displaying an intuitive (by feeling) or analytical (by thinking) approach and have a variable learning style with the experience they acquire in the perception, solution, and transformation to a final product (Demirbaş, 2001, Kvan & Yunyan, 2005). Kolb's four learning style models in the framework of design education (Aşkar & Akkoyunlu, 1993; Peker, 2003), even if they are used actively, only the concrete experience and abstract conceptualization phases from the learning forms by feeling or thinking, which are learning means, were evaluated (Table 1). Since the feeling and thinking learning actions were used more intensively within the scope of the basic design course in the process of solving the design problem, the reflective observation and active experience stages were not included in the study.

The concrete experience and abstract conceptualization stages, which are learning styles, were examined in the present study (Table 1).

In the design education, defining the information to be known and used for creating a design is critical. Cross (1982) emphasized that the discipline of design had its own particular information and learning methods. Accordingly, knowing much about how to create a design, rather than the concept of design itself, is more important. Two types of learning styles were examined in the present study according to Kolb's Learning Style Inventory. As noted by Chevrier et al. (Veznedaroğlu & Özgür, 2005), people's learning styles as well as their learning methods and ways are presented in Table 2.

In this study, the two types of learning styles were treated for the solution process of design problems within the scope of the basic design course according to Kolb's Learning Styles Inventory (KLSI). Within the scope of the study, it was thought that students having an established learning style, would solve the design problems with intuitive or artistic behaviors by using the experiences they acquired within the framework of "concrete experience" (learning by becoming experienced or by experimenting). In the study, at the stage of solving the design problem, in the context of providing a limited amount of time and the uses of codes learned, the Learning Styles Scale was used, placed on having attributes, such as being intuitive and providing harmony with the existing situation.

It was thought that within the scope of the study, students who had assimilated the learning style would solve the design problem with behaviors, which were analytical and systematic, by using abstract ideas and concepts, within the framework of the "abstract conceptualization" (learning by thinking) capability. In the study, at the stage of solving the design problem, in the context of there being rules and following a scientific approach, the learning styles scale was used that assimilated the attributes, such as organizing the knowledge in a good manner and extracting the inductive results.

Two scales were used as learning styles in the study, based on the assumptions from Kolb's learning style inventory. The reason for using "Accommodating" and "Assimilating" learning styles;

- Students display an intuitive (feeling) or analytical (thinking) approach while perceiving and solving the design problem and transforming it into a result product.

The characteristics and comparisons regarding the accommodating and assimilating learning styles defined according to Kolb's Learning Style Inventory are presented in Table 3.

The behaviors of the Interior Architecture Department students, who came from an educational formation based on science, displayed differences according to the learning styles in the process of solving the design problems in the first year

Table 1. The relationship between learning stages and styles and information type (Turkyılmaz, 2010)

Learning Stages	Learning Style	Information Type
Concrete Experience	Learning by Feeling	Descriptive Information
Perceiving the Information		
Abstract Conceptualization	Learning by Thinking	Descriptive Information
Perceiving the Information		

Table 2. The relationship between Kolb's learning styles, methods and ways (Veznedaroğlu & Özgür, 2005)

Learning Style	Learning Methods		Learning Ways	
Accommodating	Concrete Experience	Active Experimentation	Feeling	Doing
Assimilating	Abstract Conceptualization	Reflective Observation	Thinking	Watching

Table 3. Comparison of Accommodating and Assimilating Learning Style Characteristics

Accommodating Learning Style	Assimilating Learning Style
Acting with emotions rather than logical analyses	Valuing the logical soundness of theory rather than its practical value
Utilizing the experiences and gaining learning skills	Understanding information on a broad scale and organizing information and making it short and concise
Adaptation to conditions and flexibility	Planning, modeling, detecting the problems and developing theories
Being curious and intuitive	Being analytical, logical and systematical

of education. The findings obtained according to Demirbaş (2001) were in the direction of the different courses in the curriculum felt a need for different learning styles or in other words, students having different learning styles, became varied according to their academic performances and the contents of the course. When the data obtained were analyzed, it was observed that a great majority of the Architecture and Interior Architecture students were actively learning more than being verbal and more than learning visually and reflectively. It is stated that individuals who are in the profession of Architecture and Interior Architecture have mostly the Established and Factional learning styles according to Kolb's Experimental Learning Theory (Kolb, 1984). However, in the studies conducted on architectural education and learning styles, it was supported with evidence that students preferred different learning forms at different design phases. For example, persons who have assimilative learning styles, since they are interested in abstract ideas more than working with concrete products, are more successful in the first-year studies of architectural design education, which requires the capability of being able to perceive three dimensions in the design actions, such as depth, ratio and materials. Demirbaş (2001) considered the relationship between the learning preferences of students and the design performances they displayed by making different design studio exercises with first-year Interior Architecture Department students. When the comparative results of the design findings are studied thoroughly for the learning style determined with Kolb's Experimental Learning Theory, while students who had a certain learning style obtained advantages by the learning forms they preferred in different design style exercises, it was observed that individuals with the same learning style were at a disadvantage in different design exercises (Özdemir, 2013). Since there is a difference in the levels of success in the learning process of students, successful students reach the awareness of their own cognitive processes and know how they would learn. Accordingly, successful students can use different learning strategies that are suitable to their own learning styles (Nisbet & Shucksmith, 1986).

MATERIALS AND METHODS

This study aimed to reveal whether there was a relationship between the result product achieved by every student who used design-related knowledge with the intuitive or analytical approach and the learning methods students preferred to understand the development of designing within the interior architecture discipline. Accordingly, the relationship between students' design processes and learning methods was examined. A field study was conducted regarding the relevant examination covering the process where the freshmen in the Department of Interior Architecture and Environmental Design at the Faculty of Fine Arts of the Afyon Kocatepe University met the concept of design for the first time and solved the design problem assigned to them. The first year is particularly important for students in interior architecture education since students are supposed to transform their learning habits after secondary education. Students encounter the problem of designing in the first year. They learn to understand and solve the design problem, ask questions that will define the problem, and seek answers for that problem. In this study, an answer was sought for the following question: "What sort of problem-solving attitude did students display, and what were their learning styles? Consequently, what sort of results were achieved?" In this study, a hypothesis was developed for the interaction between the process and method of solving the design problem, learning style, and educational background (art-based or science-based educational background):

H 1. There is a strong relationship among the method of solving a design problem, preferred learning style, and educational background.

Definition of Design Problem

The study consisted of two stages: A questionnaire was administered to students to learn about their learning styles before the initiation of the study. The purpose was to determine whether students selected "accommodating learning style" or "assimilating learning style". In the second stage of the study, a design problem was assigned to students who were then asked to solve this problem however they liked and to present the result. The freshmen who took the basic design course for the first time were asked to extract a square piece with no predetermined sizes (sizes would be determined by the students themselves) from an A3 paper and to add their names and surnames to this piece. There were two problems forming the frame of the study: **extracting** a square piece from an A3 paper and **adding**

the name and surname. Students were expected to solve the design problem during the class period and were allowed a duration of four hours. Studio coordinators were present in the studio to answer students' questions. No study was shown as a model when conveying the design problem to students.

Study Method

A 5-point Likert type questionnaire (1: negative, 5: positive) was administered to students to collect data for determining their approaches towards the design problem and the method they followed in the process of solution. The second questionnaire was administered to 111 students who were divided into two groups according to the learning style (accommodating or assimilating) they preferred based on the results of the first questionnaire. The first two items of this questionnaire were demographic questions about students' gender and educational background. The questionnaires utilized were found to be valid and reliable in the studies conducted by Özgen et al. (2019). The Statistical Package for the Social Sciences (SPSS) version 22.0 was used to analyze the data collected. Cronbach's alpha reliability tests were performed on the data, and mean values as well as standard deviation figures were also determined. The alpha values were found to be 0.83 and 0.81 for both groups. In the studies by Cronbach (1951), Kaplan and Saccuzzo (2010), and Panayides (2013), Alpha coefficients over 0.60 indicate "reliability". Based on the study by Ural and Kılıç (2005), the t test and correlation analyses were performed to compare the data. The sub-scales of the questionnaire items were given in Table 4.

Table 4. Questionnaire Scales

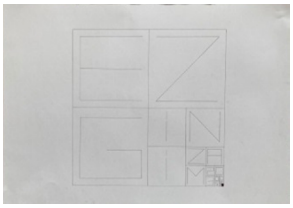
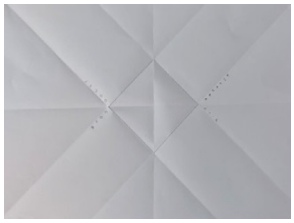
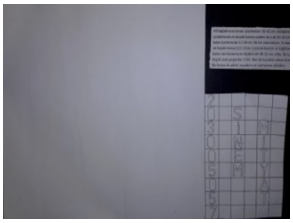
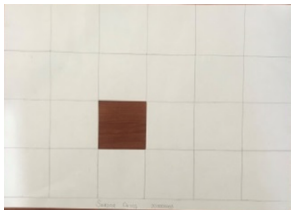
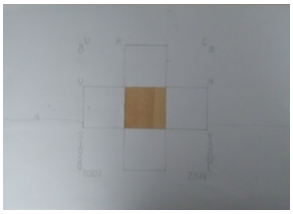
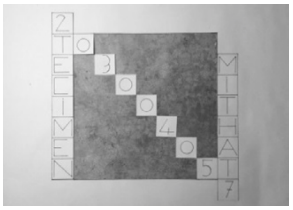
Questionnaire Scales Specified Based on Accommodating Learning Style		
Based on visual perception - intuitive		
Scales	**Acting with Emotions (AwE)**	**Utilization of Experiences (UoE)**
Statements	1. Adding-removing	1. Balance element on the surface
	2. Importance of A3 paper size	2. Visuality
	3. Size of the square	3. Integrity
Scales	**Adaptation to Conditions and Flexibility (ACF)**	**Intuitive Attitude (IA)**
Statements	1. Basic Design Principle	1. Stylistic similarity
	2. Symmetry	2. Coincidental location of square
	3. Central Orientation	3. Coincidental name and surname
Questionnaire Scales Specified Based on Assimilating Learning Style		
Based on analytical approach - intellectual		
Scales	**Logical Attitude (LA)**	**Organizing Information (OI)**
Statements	1. Adding-removing	1. Forming a rule while extracting a square
	2. Importance of A3 paper size	2. Special design to A3 size
	3. Size of the square	3. Integrity
Scales	**Planning-Modeling (PM)**	**Being Analytical (BA)**
Statements	1. Rule-based design	1. Mathematical expression
	2. Locking	2. Establishing relationship with name-surname and square
	3. Pattern	3. Accepting name-surname as a character

Table 5. Students' Demographic Data

	Education Type		**Learning Style**	
	Art-Based Education	**Science-Based Education**	**Accommodating Learning Style**	**Assimilating Learning Style**
Female	48	40	43	45
Male	10	13	13	10
Total	58	53	56	55

The design problem assigned within the Basic Design course were followed by 111 students who aimed to solve the problem with different methods. Students who preferred the accommodating or assimilating learning style displayed different approaches in the process of solving the design problem. The examples from students' studies are as follows (Table 6).

Table 6. Examples from students' studies

	Result Products			
	Student Study 1	**Student Study 2**	**Student Study 3**	**Student Study 4**
Assimilating Learning Style				
	The square that does not fit the A4 paper and that is the largest one to be drawn on an A3 paper is 22x22 cm. Implementing the fractals to 22x22 cm square, I constantly divided the square in the bottom right to four, and I cut and extracted the remaining square piece after I wrote my name-surname and number.	Folding the A3 papers, I managed to have the largest four squares that I could have. Then, I folded the papers on the corners to find the center of gravity. Auxiliary lines emerged on the paper, and a 45-degree square also appeared. I extracted the square in the middle which could only be extracted from an A3 paper. I added my name and surname in a parallel manner to 45-degree lines to lock and stabilize the square.	I considered the A3 paper as 30x42 cm; the largest square that I could extract from this paper was 30x30 cm. After drawing this square, I extracted the largest square (12x12cm) that I could extract from the remaining 30x12 cm area. The remaining area was 18x12 cm. Using the value of 2 which was the lowest common denominator, I formed a grid with 2x2 cm squares, and I added my name-surname and number within the square.	I started my activity by drawing the diagonal aspects of the A3 paper and finding the center of gravity. Using the value of 6 which was the lowest common denominator of 30 and 42, I drew a 6x6 cm square and extracted it later. I symmetrically added my name-surname and number to above and below of this square.
	Result Products			
	Student Study 5	**Student Study 6**	**Student Study 7**	**Student Study 8**
Accommodating Learning Style				
	To achieve balance in my study, I extracted a square from the middle of the A3 paper while leaving 2 cm spaces on the upper and lower sections. My name-surname and number reached 20 characters in total, and I wrote these characters symmetrically on four corners, with each corner containing five characters.	After finding the middle of the A3 paper, I marked this middle point in a manner that a corner of my square contacted this point. I formed 7x7 squares as they could be divided into 42. To achieve balance in my design, I extracted the square in the bottom left corner of the middle point. I wrote my name-surname and number on the middle of the 2-cm area below.	I drew a 18x18 square on the middle of the A3 paper using the number 18, the total character count of my name and surname. I divided this square into three pieces which are horizontally and vertically equal as I will write my name-surname and number. Extracting the square in the middle, I wrote my name-surname and number on the sides of 18x18 cm squares in a manner to ensure integrity.	I extracted a 16x16 square from the A3 paper using the number 16, the total character count of my name and surname. Then, I added my student number in a 45-degree form to the diagonal parts of the piece that I extracted.

RESULTS

The mean values of intuitive expressions forming the sub-scales of the accommodating learning style and intellectual expressions forming the sub-scales of assimilating learning style based on art and science-based education types are presented in the table below (Table 7).

According to the expressions on the accommodating learning style (intuitive expressions) in Table 7, the mean values for each dependent variable differed based on students' education types (art-based education or science-based education). The dependent variable of "Intuitive Attitude" received the highest (positive) value from students who had an art-based educational background, while it received the lowest (negative) value from students with a science-based educational background. According to the values of all dependent variables, all values received for art-based education were higher than those received for science-based education.

According to the expressions on the assimilating learning style (intellectual expressions) in Table 7, the mean values for each dependent variable differed based on students' education types (art-based education or science-based education). The dependent variable of "logical attitude" received the highest (positive) score from students with a science-based education. The dependent variable of "being analytical" received the lowest (negative) score from students with an art-based education. According to the values of all dependent variables, all values received for science-based education were higher than those received for art-based education.

According to the results of the questionnaire administered to the groups that were formed of the accommodating and assimilating learning styles based on students' preferences, a significant relationship was found between the preferred styles and variables (Table 8).

According to Tavşancıl (2006), the classifications in correlation analyses are generally as follows (0.00 – 0.30) weak, (0.31 – 0.49) moderate, (0.50 – 0.69) strong, and (0.70 – 1.00) very strong. Accordingly, there was a moderate and positive relationship between the independent variables on the scales of accommodating learning style and acting with emotions, and independent variables on the intuitive attitude scale. A strong and positive relationship was found between the independent variables on the scale of accommodating learning style and experimental learning, while a weak and positive relationship was found between the independent variables on the scale of adaptation to conditions and flexibility. According to these values, there was a moderate and positive relationship between the independent variables on the scales of assimilating learning style and planning-modeling, being analytical, and organizing information.

Table 7. Mean Values

Accommodating Learning Style Scales	**Art-Based Education**	**Science-Based Education**
Intuitive Expressions	**Mean Values**	**Mean Values**
Acting with Emotions	3.37	2.96
Utilization of Experiences	3.52	2.64
Adaptation to Conditions and Flexibility	3.46	3.01
Intuitive Attitude	4.02	2.16
Assimilating Learning Style Scales	**Art-Based Education**	**Science-Based Education**
Intellectual Expressions	**Mean Values**	**Mean Values**
Logical Attitude	2.76	4.06
Organizing Information	2.67	3.84
Planning-Modeling	2.08	3.44
Being Analytical	2.04	3.62

Table 8. Results of Correlation Analysis

	AwE-Mean		**UoE-Mean**		**ACF-Mean**		**IA-Mean**	
	r	**p**	**r**	**p**	**r**	**p**	**r**	**p**
Accommodating Learning Style	0.434	0.01**	0.549	0.00**	0.289	0.31**	0.434	0.02**
	LA-Mean		**OI-Mean**		**PM-Mean**		**BA-Mean**	
	r	**p**	**r**	**p**	**r**	**p**	**r**	**p**
Assimilating Learning Style	0.575	0.000**	0.390	0.003*	0.496	0.000**	0.466**	0.000**

* Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level (2-tailed).

Moreover, a strong and positive relationship was found between the independent variables on the scales of assimilating learning style and logical attitude.

Whether the relationships among the independent variables on the scales of art-based education and science-based education with education type were significant was assessed using the t-test analysis (Table 9).

According to results of the independent t test:

A significant relationship was found between *the visuality expression on the scale of utilization of experiences (UoE2)* that belonged to the intuitive attitude defining the accommodating learning style, and students' *education type (abe-sbe)*. A significant relationship was found between *the basic design expression on the scale of adaptation to conditions and flexibility (ACF2)* that belonged to the intuitive approach defining the accommodating learning styles, and students' *education type (abe-sbe)*. A significant relationship was found between *the expressions of stylistic similarity and coincidental locations of name and surname on the intuitive attitude scale (IA1, IA3)* that belonged to the intuitive attitude defining the accommodating learning style, and students' *education type (abe-sbe)*. A significant relationship was found between *the expression of creating composition according to A3 paper size on the scale of organizing information (OI2)* that belonged to the intellectual approach defining the assimilating learning style, and students' *education type (abe-sbe)*. A significant relationship was found between *the mathematical expression on the scale of being analytical (BA1)* that belonged to the intellectual attitude defining the assimilating learning style, and students' *education type (abe-sbe)*.

DISCUSSION

Since the first step for design researchers is to examine the design processes (Uluoğlu, 2000), students were asked to perform a studio exercise to experience students' stages of solving design problem during "Basic Design" education. With Çetinkaya's (2011) statement, "perceiving the design problem, and understanding the cause-effect relationship is a significant step in solving the design problem", the design problem was clearly conveyed to the students of Interior Architecture. As expressed by Seylan (2004), no examples were shown to students who were asked to present specific studies based on their imagination. Students solved the design problem they perceived with the methods they knew or learned. The issues to be solved within the design problem are based on the roots of science, but as stated by Seylan (2004), intuitive approaches were emphasized as much as the scientific solutions in the process of solving the design problem. The systematical design methods developed according to various designers (Alexander, 1964; Archer, 1965; Asimov, 1962; Jones, 1980) were used to perceive how students considered solving the design problem as well as created designs. The learning styles students preferred prior to solving the design problem were divided into two groups as intuitive and intellectual. As noted by Uluoğlu (2000), according to the design process of students who preferred the intuitive approach, the process was not explainable or clear, even if the inputs and outputs were visible. Bayazıt (1994) stated that the design processes of students who preferred the intellectual approach were systematical with the explainable steps in mind, and these students' intellectual inputs as well as outputs and advancements were all clear. While starting to solve the design problem, the students who preferred either the accommodating or assimilating learning styles and who were divided into two groups, questioned the problem in mind and established, interpreted, and practiced relationships as stated by Tepecik and Toktaş (2014). The student group that preferred the accommodating learning style (with the intuitive approach) used creativity, visual perception, and stylistic similarity based on their educational backgrounds. The other student group that preferred the assimilating learning style (with the intellectual approach) used their knowledge and skills based on their educational statuses. The H1 hypothesis that

Table 9. Results of t test

	UoE2			ACF1		
	t	**df**	**p**	**t**	**df**	**p**
Art-Based Education	-2.156	23.292	0.042	-2.041	23.472	0.043
	IA1			**IA3**		
	t	**df**	**p**	**t**	**df**	**p**
	2.033	24.775	0.053	2.043	24.420	0.052
	OI2			**BA1**		
	t	**df**	**p**	**t**	**df**	**p**
Science-Based Education	2.991	36.019	0.050	2.551	53	0.014

p is significant at the 0.05 level.

was developed for the interactions among the process and method of solving the design problem, learning style, and students' educational background (art-based or science-based), "*A strong relationship is present between students' preferred learning style and their educational background (art-based or science-based)*" was supported by the data. As a result of the analyses:

Of the 56 students who preferred the accommodating learning style, 84% (47) had an art-based educational background, while 16% (9) received a science-based education. This result supports the hypothesis. Of the 55 students who preferred the assimilating learning style, 80% (44) had a science-based educational background, while 20% (11) received an art-based education. This result also supports the hypothesis. The other hypothesis (H2) "*There is a strong relationship among the method of solving a design problem, preferred learning style, and educational background*." was supported by the data. As a result of the analyses:

1. According to the expressions on the accommodating learning style (intuitive expressions), mean values for each dependent variable differed based on students' education types (art-based education or science-based education). According to the values of all dependent variables, all values received for the art-based education were higher than those received for the science-based education. Accordingly, students with art-based educational backgrounds used the intuitive approaches more extensively, utilized the concepts they learned, and displayed a more flexible approach in the process of solving design problems. While assessing students' studies, the digital data on the expressions that helped analyze the approaches students displayed while solving the design problem were given below:

Accommodating Learning Style	**Number of Students**	
	Art-Based Education	**Science-Based Education**
Using at least one basic design principle	42	1
Using symmetry	32	3
Having central orientation	29	2
Paying attention to visuality	50	4
Creating a stylistic similarity	34	0
Paying attention to the element of balance	28	6
Solving the design problem coincidentally	41	3

2. According to the expressions on the assimilating learning style (intellectual expressions), mean values for each dependent variable differed based on students' education types (art-based education or science-based education). According to the values of all dependent variables, all values received for the science-based education were higher than those received for the art-based education. Accordingly, students with science-based educational backgrounds used the intellectual approaches more extensively, had analytical thoughts, and displayed an approach that organized information in the process of solving design problems. While assessing students' studies, the digital data on the expressions that helped analyze the approaches students displayed while solving the design problem were given below:

Assimilating Learning Style	**Number of Students**	
	Art-Based Education	**Science-Based Education**
Forming rules	0	43
Paying attention to A3 size	8	37
Including mathematical expressions	1	38
Thinking about the problem systematically	5	44
Forming a relationship between name-surname and square	2	32
Performing an addition or subtraction	7	40
Locking the composition	0	7

3. According to the results of the questionnaire administered to the groups that were formed for the accommodating and assimilating learning styles based on students' preferences, a significant relationship was found between the preferred styles and variables. The data indicated that students managed the process of solving the design problem for the learning style they preferred.

4. A significant relationship was found between *the visuality expression on the scale of utilization of experiences (UoE2)* that belonged to the intuitive attitude defining the accommodating learning style, and students' *education type (abe-sbe)*. A significant relationship was found between *the basic design expression on the scale of adaptation to conditions and flexibility (ACF2)* that belonged to the intuitive approach defining the accommodating learning style, and students' *education type (abe-sbe)*. A significant relationship was found between *the expressions of stylistic similarity and coincidental locations of name and surname in*

the intuitive attitude scale (IA1, IA3) that belonged to the intuitive attitude defining the accommodating learning style, and students' *education type (abe-sbe)*. A significant relationship was found between *the expression of creating composition according to A3 paper size on the scale of organizing information (OI2)* that belonged to the intellectual approach defining the assimilating learning style, and students' *education type (abe-sbe)*. A significant relationship was found between *the mathematical expression on the scale of being analytical (BA1)* that belonged to the intellectual attitude defining the assimilating learning style, and students' *education type (abe-sbe)*.

CONCLUSION

Modern design studios are environments that contain much more than pedagogical, sociological, ideological, and epistemological concepts and traditional classes (Demirbaş & Demirkan, 2003). Accordingly, it was observed that students used many conceptual backgrounds during their studio exercises. According to Hendrix (2017), who stated that the scope of studios, which always paid attention to conceptual approaches, and which conveyed these approaches to others, expanded with the terms from disciplines such as mathematics, literature, and cinema, and according to Hisarlıgil (2012), students utilized certain disciplines, such as mathematics and art, based on their educational backgrounds, while solving design problems. Kvan and Yunyan (2004) stated that students' different environments and educational backgrounds were effective in improving their conceptual relationships. The methods students used while solving design problem were related to their educational backgrounds, and they adopted their backgrounds into the new educational environments. It is a fact that studio exercises, which are a part of Basic Design, make contributions to the solution of problems and help students explore themselves with practical and theoretical methods. Evyapan's (2010) phrase, "developing certain basic conceptions instead of learning them" in basic design purposes was specifically emphasized with the Basic Design studio exercise. Consequently, this study may serve as the basis for different disciplines in the field of design, such as architecture, landscape architecture, urban, and regional planning.

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REFERENCES

Alexander, C. (1964). Notes On The Synthesis Of Form. Harvard University Press.

Archer, B. L. (1965). Systematic Methods For Designers. Council of Industrial Design.

Artun, A. (2009). Geometric modernity: Art at the Bauhaus International and Turkey. A. Artun & E. Çavuşoplu (Eds.), In Bauhaus: Design Of Modernization, (p.183-199). Istanbul: İletişim Press.

Asimov, M. (1962). Introduction To Design. Prentice Hall.

Aslan, Ş. (2012). An ApproximationTowardsthe Sense Criteria in Basic Design Education. Phd Thesis, Hacettepe University, Ankara.

Aşkar, P., & Akkoyunlu, B. (1993). Kolb öğrenme stili envanteri (Kolb learning style inventory). Eğitim ve Bilim, 17(87), 37–47 (in Turkish).

Atalayer, F. (1994). Creative Vision. Journal of Anatolian and Art, 2, 1-17.

Bayazıt, N. (1994). IntroductionTo Design Methods İn İndustrial Products And Architecture. Literatur Publishing.

Bayazıt, N. (2004). Exploring Design: Forty Years Of Design Research. Istanbul Technical University Journal/ a architecture, planning, design, 3(1): 3-15.

Beşgen, A., Kuloğlu, N.& Fathalizadehalemdari, S. (2015). Teaching/learning strategies through art: Art and basic design education. Procedia Social and Behavioral Sciences, 182, 428–432. https ://doi. org/10.1016/j. sbspr o.2015.04.813.

Boucharenc, C.G. (2006). Research on Basic Design Education: An International Survey. International Journal of Tehnologyand Design Education, 16, 1-30.

Chickering, A. (1977), Experience and learning: an introduction to experiential learning, Change Magazine Press, New Rochelle, NY.

Cronbach, L.J. (1951), Coefficient alpha and the internal structure of tests, Psychometrika, 16 (3), 297-334.

Cross, N. (1982). DesignerlyWays Of Knowing. Design Studies, 3 (4), 221-227.

Çetinkaya, Ç. (2011). Analysis Of Design And Concept And İts İmpact On Basic Design Education. Master Thesis, Hacettepe University. Ankara.

Çubukçu, E. & Dündar, Ş.G. (2007). Can Creativity BeTaught? An Empirical Study on Benefits of Visual Analogy in Basic Design Education. Istanbul Technical University Journal/ a architecture, planning, design, 4(2), 67-80.

Demirbaş, O. O. & Demirkan, H. (2003). Focus On Architectural Design Process Through Learning Styles. Design Studies, 24(5), 437–456.

Demirbaş, Ö. O. (2001). The relation of learning styles and performance scores of the students in interior architecture education. Doctoral dissertation. Bilkent University, Institute of Social Sciences, Department

of Interior Architecture and Environmental Design, Ankara.

Demirkan, H. & Afacan, Y. (2011), Assessing creativity in design education: Analysis of creativity factors in the first-year design studio Design Studies, 33, 262-278.

Demirkan, H. (2016), An inquiry into the learning-style and knowledge-building preferences of interior architecture students, Design Studies, 44, 28-51.

Denel, B. (1981). Basic Design And Creative Thinking. Ankara: METU Architecture Faculty Press.

Dikmen, Ç.B. (2011). The Importance Of Studio Work In Architectural Education: Basic Education Studios. e-Journal of New World Sciences Academy, 6 (4),1510-1520.

Dunn, R. & Dunn, K. (1975), Educator's self-teaching guide to individualizing instructional programs, Parker Pub. Co.,West Nyack, NY.

Dural, T. A. (2000). Dönüş(tür)me sürecinde temel tasarım eğitimi (Basic design education in the process of transformation). Mimarlık, 293 38(3), 62–66 (in Turkish).

Erdoğdu, Sarıoğlu, G., P. (2016). Basic Design Training: An Example Of A Lesson Plan, Planning, 26(1), 7-19.

Evyapan, A. (2010). Developing Visual Thinking In Urban Planning Education. M. Ersoy (Der.), In the development of the training program of the Department of urban and Regional Planning of Metu since its establishment (p. 619- 628). Ankara: METU Architecture Faculty Press.

Günay, B. (2007). Gestalt theory and city planning education. METU Journal of Faculty of Architecture, 24(1), 93–113.

Hendriks, L. (2017). Design Evolution And The Mathematical Design Studio [Conference session]. 10th International Workshop of the Design Theory SIG of the Design Society (pp. 1–20), Amsterdam, The Netherlands.

Hisarlıgil, B. B. (2012). Franz Kafka İn The Design Studio: A Hermeneutic-Phenomenological Approach To Architectural Design Education. The International Journal of Art and Design Education, 31(2), 256–264.

Itten, J. (2002). Design and Form: The Basic Course at the Bauhaus and Later. John Wiley& Son, Inc. New York.

İstanbul Technical University. (2014). Mimarlık okulları 1. sınıf stüdyosu buluşması, 19 Aralık 2014 (Architecture schools 1st year studio meeting, 19 December 2014). Unpublished booklet of abstracts) (in Turkish).

Jones, J. C. (1980). Design Methods: Seeds Of Human Futures (Vol 2). John Wiley.

Jones, J.C. (1992). Design methods. (2nd ed.). New York: Van NostrandReinhold.

Kaplan, R. M. & Saccuzzo, D. P. (2010). Psychological Testing: Principles, Applications, & Issues. Belmont, CA: Wadsworth, Cengage learning.

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Englewood-Cliffs: NJ. PrenticeHall, p.22.

Kolb, D.A., Baker, R. & Dixon, N. (1985). Personal Learning Guide: Self study booklet. Boston: MA: McBer.

Kvan, T. & Yunyan, J. (2004). Students' Learning Styles And Their Correlation With Performance İn Architectural Design Studio. Design Studies, 26(1), 19–34.

Lawson, B. (2005). How Designers Think. Demystifying the Design Process, Taylor & Francis Group. p.182-183.

Makaklı, E. S. & Özker, S. (2015). Basic Design in Architectural Education in Turkey. In Paper presented at the ERPA International Congresses on Education, Athens, Greece. http://dx.doi.org/10.1051/shsconf/20162 60105 3.

Middle East Technical University Architecture and City and Regional Planning. (2020). http://archweb.metu.edu.tr/programs/undergraduate-programs/bachelor-in-arhitecture/arch101, Accessed Date: 15.10.2020.

Middle East Technical University, Faculty of Architecture. (2015). CRP101 Planning Studio I. https://catalog.metu.edu.tr/course.php?course_code=1210101, Accessed Date: 14.01.2015.

Newland, P., Powell, J. A. & Creed, C. (1987), Understanding architectural designers' selective information handling, Design Studies, 8(1), 2-16.

Nisbet, J., & Shucksmith, J. (1986). Learning strategies. London: Routledge and Kegan Paul.

Özdemir, E. E. (2013). Mimarlık eğitiminde tasarım sürecinin geliştirilmesi yönünde bir yöntem arayışı (Exploration of a method on architectural education through design process). Doctoral dissertation. Gazi Üniversitesi, Fen Bilimler Enstitüsü, Mimarlık Anabilim Dalı, Ankara (in Turkish, abstract in English).

Özgen, D., Afacan, Y. & Sürer, E. (2019). Usability of Virtual Reality For Basic Design Education: A Comparative Study With Paper Based Design. International Journal of Technology and Design Education, https://doi.org/10.1007/s10798-019-09554-0.

Özgüner, O. (1966). ODTÜ mimarlık fakültesinde basic design uygulamaları (Basic design applications at the Middle East Technical University {METU} architecture faculty). Mimarlık, 8, 6 (in Turkish).

Özkar, M. & Steino, N. (2012). Shaping design teaching: Exploring form as an agent in design reasoning and pedagogy. M. Özkar& N. Steino (Eds.), Shaping design teaching: Explorations into the teaching of form in (ss 9-24). Aalborg: Aalborg UniversityPress.

Panayides, P. (2013), Coefficient alpha: interpret with caution, Europe's Journal of Psychology. 9 (4), 687-696.

Peker, M., (2003). Kolb öğrenme stilleri modeli (Kolb learning styles model). Milli Eğitim Dergisi, 157. (Online): http://yayim.meb.gov.tr/yayimlar/157/peker.htm (in Turkish).

Seylan, A. (2004). Basic Design. İstanbul: Yem Press.

Tavşancıl E. (2010). Measurement of attitudes and data analysis with SPSS, Ankara: Nobel Press.

TDK. (2021). Meaning of Design. https://sozluk.gov.tr/. Accessed Date: 01.03.2021.

Tepecik, A. & Toktaş, P. (2014). Basic Design Education In Fine Arts Faculties, Ankara: Gece Press.

Türkyılmaz, C.Ç. (2010). Examination Of The Transformation Of Knowledge In The Early Design Phase In Architectural Design Education And A Model Proposal. Phd Thesis, Yıldız Technical University, İstanbul.

Uluoğlu B. (1990). Architectural Design Education: Studio Criticism In The Context Of Design Knowledge. Phd Thesis, İstanbul Technical University, İstanbul.

Uluoğlu, B. (2000). Design Knowledge Communicated in Studio Critiques. Design Studies, 21(1), 33–58.

Ural A. & Kılıç İ. (2005). Scientific research process and data analysis with SPSS, Ankara: Detay Press.

Veznedaroğlu, R.L. & Özgür, O.A. (2005). Learning styles: definitions, models and functions. İlköğretim-Online, 4(2), 1-16. Url: http://ilkogretim-online.org.tr.

Yalınay-Çinici, Ş. (2012). Computation çevirisi ve anlaması kolay olmayan-dil, düşünce ve mimarlık (Computation translation and language that is not easy to understand, thoughts and architecture). Dosya 29 hesaplamalı tasarım (File 29 computational design). Mimarlar Ankara Odası Şubesi, Ankara, 12-18 (in Turkish).

Yıldırım, İ. (2018). Content Analysis Of Basic Design Education In Interior Architecture Departments From A Theoretical And Practical Point Of View. Master Thesis, Hacettepe University, Ankara.

Yökatlas. (2023). İç mimarlık ve çevre tasarımı program bulunan tüm üniversiteler (All universities with an interior architecture and environmental design program). https://yokatlas.yok.gov.tr/lisans-bolum.php?b=10096. Access date: 8 February 2023 (in Turkish).

Zelanski, P. & Fisher, M. P. (1996). Design Principles And Problems. Belmont: Thomson Wadsworth