JOURNAL OF DESIGN FOR RESILIENCE IN ARCHITECTURE & PLANNING

Research Article
Online: www.drarch.org
Volume 5, Issue 1, (50-64), 2024
DOI: 10.47818/DRArch.2024.v5i1119

Can basic design be the base of urban planning education?: A case-oriented quantitative measurement model

Dalya Hazar*
Görkem Gülhan**
Bekir İnce***

Abstract

The study of design is considered as a scientific activity; however, the integration of urbanism with design thought has remained limited, which can easily be observed in the contemporary urban areas, especially in the developing countries. Thus, increasing design thinking ability and the integration of spatial planning should be a priori within urban planning and design education, and thus be practiced preventing the emergence of chaotic urban spaces. The widespread view is that basic design education increases the planning and design skills of students; therefore, it is offered during the first stage of planning education. Within the scope of the basic design courses, students experience using and transferring the formatting tools such as line, stain, texture, color, volume, light-shadow, abstraction, and perspective effectively. They learn design principles such as suitability, unity, sovereignty, contrast balance, repetition, direction, measure, range, value, motion, and hierarchy. Gestalt visual perception principles adopted by the Bauhaus school of design are often applied in basic design education. The process is completed by providing technical drawing lessons on principles and abstraction parameters. Teaching is a planned process, and objectives are determined through the cognitive-affective and psychomotor learning areas known as Bloom's Taxonomy of Learning Domains. So, is the current education paradigm accurate and measurable? Is it possible to utilize it to improve planning and design education? For this purpose, this study researches the contribution of basic design learning outcomes to the urban planning studios and the relationship between achievement levels of students in relevant courses through knowledge and attitude tests. The research model is a case study, based on the relational analysis of quantitative data, which quantitatively propounded that the relationship between two different teaching processes is linear and positive.

Keywords: basic design education, bloom's taxonomy, gestalt principles, planning education, urban planning

1. Introduction

Basic design education is given to students at the first semester of the Faculty of Architecture, for so long. Within the scope of the basic design courses, students experience using and transferring the formatting tools such as line, stain, texture, color, volume, light shadow, abstraction, and perspective effectively. They learn design principles such as suitability, unity, sovereignty, contrast balance, repetition, direction, measure, range, value, motion, and hierarchy. In subsequent basic design education, the Gestalt visual perception principles adopted by the Bauhaus school of design are often applied. The process is completed by providing technical drawing lessons on principles and abstraction parameters. Teaching is a planned process, and objectives are determined through the cognitive-affective and psychomotor learning areas known as Bloom's Taxonomy of Learning

*(Corresponding author), Assoc. Prof. Dr., İzmir Metropolitan Municipality, Türkiye, dalyahazar@gmail.com
**Assoc. Prof. Dr., Pamukkale University, Türkiye, ggulhan@pau.edu.tr
***Assist. Prof. Dr., Pamukkale University, Türkiye, bince@pau.edu.tr
Article history: Received 12 February 2024, Accepted 02 April 2024, Published 23 April 2024,

Domains. In general, basic design education covers all three areas, so the measurements related to these areas were created as a case study. Accordingly, grades of the students at the Department of Urban and Regional Planning (URP) in any Turkish University (Anonymous University) were determined as a sample study group (Figure 1-2).

Figure 1 Studio 1 - Basic design presentations (Anonymous University, 2016)

Figure 2 Visual abstractions from animals (Anonymous University, 2016)

In subsequent basic design education, Gestalt principles, abstraction parameters and technical drawing studies are covered at the end of the process to ensure the effective use of these tools in the future of abstract thinking and to have the ability to define the relationship between figure and ground. In essence, the frame of reference is important not only for defining the visual world, but also every given area. These two and three-dimensional exercises in the abstractness of the visual world can also be applied to the real world. The acquired basic design skills can be used in the

arrangement of urban spaces, and elements such as stratification, private and public spaces, structure, spine, and edge, which are all shaped within the framework of Gestalt principles (Gunay, 2007). Thus, this study asserts that the ability of abstract thinking will render students more successful, especially in design-based courses in urban planning education.

For this purpose, this study investigates the literature on design thinking and the relationship between the achievements at the courses of basic design and the success at the courses of urban design and planning studio. Accordingly, the knowledge level, affective level, and psychomotor skills of students at the Department of URP in an Anonymous University concerning the basic design studies were measured through the evaluations of the academic jury and online knowledge tests and the final grades were compared by multiple linear regression model.

This study aims to prove that "basic design" really provides vital and fundamental knowledge to URP students and thus, should be encouraged in the early stages of undergraduate education. In literature, the effect of the basic design courses on other design-based courses is frequently emphasized (Gunay, 2007; Caliskan, 2016).

Denel (1979) clarifies that the aim of design education is to "conceive, perceive, organize and communicate as wholes as opposed to fragmented and unrelated information". Accordingly, Gunay (2007) declares that the importance of basic design education in the first semester of URP departments is to teach the essentials of design through visual representation of the environment where seeing and perceiving abilities are provoked, creating the most suitable conditions to display abstract-concrete relationship. By these means, students will be able to apply the concepts of basic design to the production of the environment (Gunay, 2007).

However, it is also seen that the effects of the basic design courses on other design-based courses have not been quantitatively investigated in depth in the literature. Therefore, this study sets up an experiment aimed at measuring the influence and impact of acquired basic design knowledge upon later studios through a design test for beneficiary students in an Anonymous University.

2. Design Thinking

2.1. Design Thinking and Education in Urban and Regional Planning (URP)

Design thinking in urbanism is rooted in the urban theorist Geddes (1915) who saw the city as an evolving organic system that is planned through rational survey and analysis and takes design as an objective-driven activity, rather than an art. The Geddesian approach transformed design thinking since the 1960s and design has become a rational problem-solving activity, which is still a common approach in the contemporary planning education. Urban design as an emerging interdisciplinary field of relevant disciplines, all of which bring their own background information in design thinking and practice. Designers work through similar activities within their creative processes; yet there is still something lacking in the universal definition of urban design (Caliskan, 2016; Casakin et.al., 2016).

Design education is mostly implemented in the studios/ateliers in the Faculties of Architecture and Fine Arts. The studio can be defined as an educational setting where students work individually and/or in groups. In the studio, design activity usually becomes a problem-solving process, which is a major challenge for design education (Casakin et.al., 2016).

Several scenarios may help students to develop a useful knowledge base, improving the coordination and exchanging information through teamwork, especially in multifaceted design tasks. The results of Casakin et. al.'s study (2016) reveals that an educational approach of defining problems and analyzes solutions, mainly from a technical and functional perspective. This approach may help students gain a basic understanding of the design activity from a technical and functional perspective while scenarios are also crucial to enhance design creativity. Both methods are

necessary for design education and can promote the exploration of innovative ideas and design solutions.

According to Kvan and Jia (2005), there are several examples of studies in educational learning and design studios in the literature that show design principles that are learned in the process of education are not adequately reflected in architectural applications. Schön (1983) identifies that learning in the design studio is developed through a process defined by him as "reflection-in-action", which is a form of constructive design thinking (Waks, 1999; Kvan & Jia, 2005). Through this thinking called abductive reasoning and/or reflection-in-action, the design practice becomes a process of problem-solving, through the selection of the one best suited to establish ends. This process involves an experiment where a designer can develop tacit understandings of repetitive experiences and can make new sense of the situations of uncertainty or uniqueness (Schön, 1983).

Demirkan and Afacan (2012) identified three basic factors that should work together for the creativity in design education: (1) novelty and affective characteristics of the artifact, (2) elaboration of characteristics that are integrated with geometric and figure-ground relations and harmony of design elements, (3) rhythm, repetition, unity, order, and several design elements. In this context, the basic design elements constitute an important basis for all design-based courses, and it is important to create an interdisciplinary interaction.

In addition, Shih et al. (2006) reveals that complex cooperative or competitive behaviors can be seen in design studios. Repeated iterative peer assessment, inter-group competition and information transparency appear to be the main factors promoting collaborative learning in the design studios. It is determined that the group studies in design studios enrich collaborative learning (Shih et al., 2006). In this context, promoting interdisciplinary groups in design studios, especially in the urban design courses can reduce interdisciplinary conflicts both in educational and professional life.

This study focuses on the design education and its reflections on the Departments of URP, particularly in Turkey, most of which have basic design courses in the first semester aiming to equip planning students with design thinking. To compare the mainstream planning education; firstly, course schedules of top 10 undergraduate URP programs in the USA (The Top Schools for Urban Planners) , top 10 undergraduate URP programs in Canada, top 20 undergraduate URP programs in Europe, and a total of 35 undergraduate URP programs in Turkey are examined to identify the presence and the number of basic design courses in URP education (All Universities with Urban and Regional Planning Programs | YÖK Undergraduate Atlas).

It is seen that planning schools in USA mainly focus on more contemporary issues such as climate change, equity planning, community planning, environmental management, sustainability, and urban design in the first grade, rather than basic design. However, introduction to design and basic design courses remain in the department of architecture. When planning schools in Canada are evaluated, a similar situation is seen. There are courses about contemporary issues such as community planning and climate change, planning studio and urban design. In addition, some planning programs are offered under the architecture, fine arts, and geography departments. When the planning schools in Europe are examined, it is seen that planning education, especially in the UK, is in relation to the Geography Department, and it focuses on contemporary issues, sustainability strategies and urban design. Also, among the programs that have both architecture and urban planning, there are contents for basic design within the first semester studio of architecture (EduRank, 2021).

These planning programs usually give information about 2D-3D representations and abstractions of urban space in urban design courses (e.g., University College London (UCL), Newcastle University). Therefore, one can interpret that although Gestalt theory is not offered as a basic design course or directly as a theory in USA and Europe, it is still taught to students in various design courses, and students essentially because of its gains as a tool in planning. Therefore, it can

be inferred that basic design or Gestalt theory is still considered valid in mainstream planning education.

The pursuits of the studio instructors also differ from the laboratory studies in other scientific professions. Face-to-face communication through critiques, as well as panels and juries are required to develop projects. In other words, instructors require discussions with students to guide them to enhance their design knowledge. This process is quite different from other theoretical courses and is conducted in a similar manner (TUPOB, 2019). However, the post-pandemic era forced Universities to conduct online/hybrid courses, which inevitably affected and differentiated the design education process as a result.

Gunay (2007) proposes a first-year URP studio model for a Turkish university, which gives essentials of design, Gestalt principles, abstraction, and application of the basic design concepts to the spatial planning. He remarks that there is no universality of URP education in the world; however, any planning school will teach procedure, substance and gaming depending on the political conjuncture and/or the contemporary urban issues. In the model he proposed, main emphasis is put on the basic design education and Gestalt theory, which affect the three phases of the production of urban form: (1) two-dimensional subdivision of land (ground), (2) bulks of the structures, three-dimensional forms on the subdivided pieces of land (figure), and (3) architectural styles. It is known that urban planners are mostly effective in the first two phases; yet the third phase requires extra interdisciplinary urban design skills. The urban planners designing the composition of urban form in two- and three- dimensional terms should be equipped with those visual skills to form groups of structures and the sense of belonging for the totality of the environment (Gunay, 2007).

Thus, the students of URP departments should be educated to be more sensitive and creative to the urban environment, besides the rational aspects of their profession, to better communicate with the architects, landscape architects, industrial designers, and to become urban designers. At this point, the basic design learning domains of Bloom's taxonomy should be taken into consideration in URP education.

2.2. Bloom's Taxonomy (BT) and Basic Design Learning Domains

According to Bloom (1956), learning actualizes in three domains: cognitive, affective, and psychomotor. Although BT has been updated since 1956, a regulation (adaptation) in the cognitive field has recently been made by Anderson et al. (2001) leading to the Revised Bloom's Taxonomy. The basic design education includes a two-stage process based on the development of visual perception and shaping (e.g., drawing, painting). Basic design education in URP departments has also adopted BT starting with the transition of the Bologna process in Turkish Universities in recent years. Especially in the studio courses, the proficiency of the lecturer, the number of lecturers, the role of the critiques received, the physical environment, interactions and other stages affect the basic design learning domains.

Table 1 Bloom's Taxonomy (Bloom, 1956; Anderson et. al., 2001)

Cognitive Domain		Affective Domain	Psychomotor Domain
1956	2001 (Revised)		
1- Knowledge	1- Remembering	1- Receiving	1- Perceiving
2- Comprehension	2- Understanding	2- Reacting	2- Constituting
3- Application	3- Applying	3- Evaluating	3- Implementing by guidance
4- Analysis	4- Analyzing	4- Organizing	4- Mechanization
5- Synthesis	5- Evaluating	5- Value attributing	5- Complicated behavior
6- Evaluation	6- Creating	-	6- Improvisation
-	-	-	7- Creating

2.3. Proposal of a Case-Oriented Quantitative Measurement Model

The common view is that basic design education increases students' planning and design skills, so it is offered to students in the first stage of planning education. But is the mentioned education paradigm correct and/or measurable? If measurable, can it be utilized to improve planning and

design education? The knowledge and practices accumulated throughout history undoubtedly show that there is a correlation. However, quantitative measurement of the structure, framework and severity of the relationship mentioned may be an opportunity to capture the deficiencies of planning education. For this purpose, it was investigated whether the information acquired in the basic design course positively affected the further design-based courses. And finally, it was seen that the grades of the basic design courses, the basic design knowledge assessment test scores and the attitude scale for basic design course scores were correlated with the grades the students received in design-based courses. In this respect, item analysis was performed and the relationships between variables were determined using the multiple linear regression model.

3. Methodology

This study is a hypothetical examination of the teaching process in an Anonymous University, Department of URP. The hypothesis subject of the research is "The knowledge acquired from the SBP 100 - Basic Design Studio in the first semester affects achievement in all urban design-based courses taken in the subsequent learning processes". While student's achievement and attitude in basic design education constitutes the dependent variable, the success in courses focused on urban design is the independent variable. To explain the cause-and-effect relation, it is necessary to make a relational analysis between the success levels in basic design and other design-oriented courses. Accordingly, the research model can be explained as a case study based on quantitative data.

In this study, cognitive achievements, and attitude of the students from the basic design courses were identified through an online survey to be compared to their previous grades in the design-based courses. This process was managed through a three-staged model including a survey and a multiple linear regression. The flow chart of the methodology is provided in Figure 3.

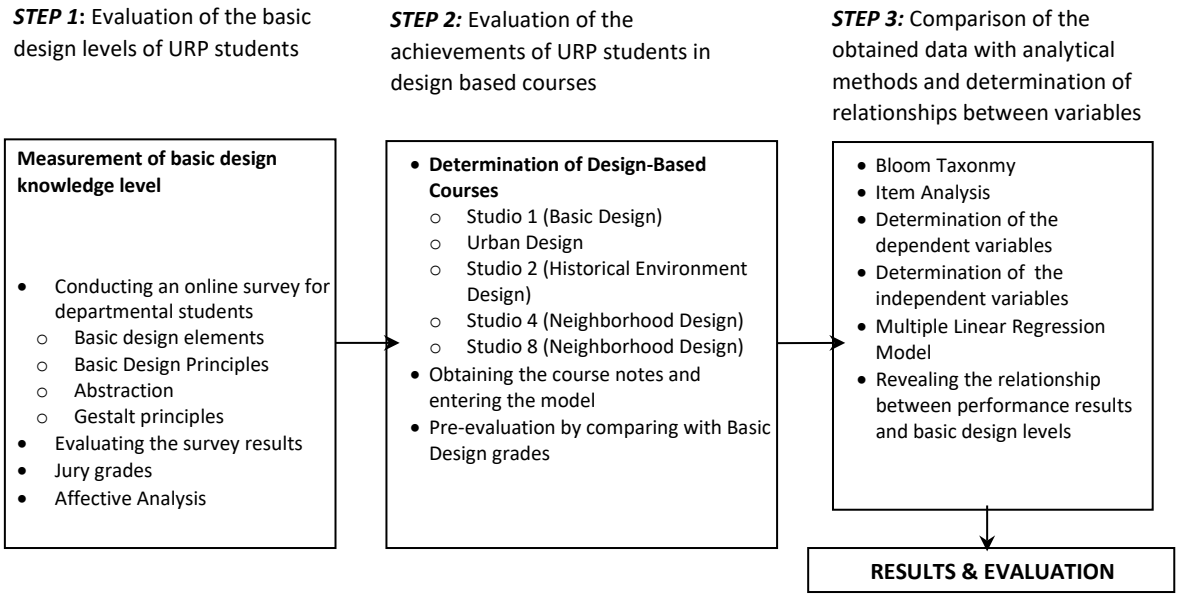


Figure 3 Flow chart of the model

In Step 1; a survey was applied to department students to measure their knowledge level of basic design. This survey was developed as a multiple-choice test and aimed to assess the students' theoretical knowledge and ability to distinguish between basic design elements, principles, abstraction, and Gestalt principles. Following this, an affective analysis was conducted to understand the basic attitudes.

In Step 2; design-based courses given at Anonymous University, Department of URP were identified. The grades of the students who participated in the survey, and who answered the questions were determined. The results obtained were entered into the model, and then were

compared with grades from the basic design course, and finally a preliminary assessment was made.

In Step 3; The Bloom's Taxonomy and Item Analysis were conducted. The dependent and independent variables and the relationship between variables were determined. Finally, the results were interpreted and evaluated.

3.1. Study Area

The study focuses on the planning and design education in an Anonymous University Department of URP. According to the definitions at the department web site, the main aim of SBP 100 - Basic Design Studio can be summarized as "creating concepts related to design, composition, and perception; spatial concepts and terms, the relationship between space and experience; and design work by means of visual, written and verbal representation techniques" (Figure 4). The basic design studio, which has approximately 70 URP students each semester, is generally conducted by two instructors from department of URP, one instructor from the department of Art Education and 1-2 instructor(s) from the department of Industrial Design and aims to provide an interdisciplinary perspective to the students.

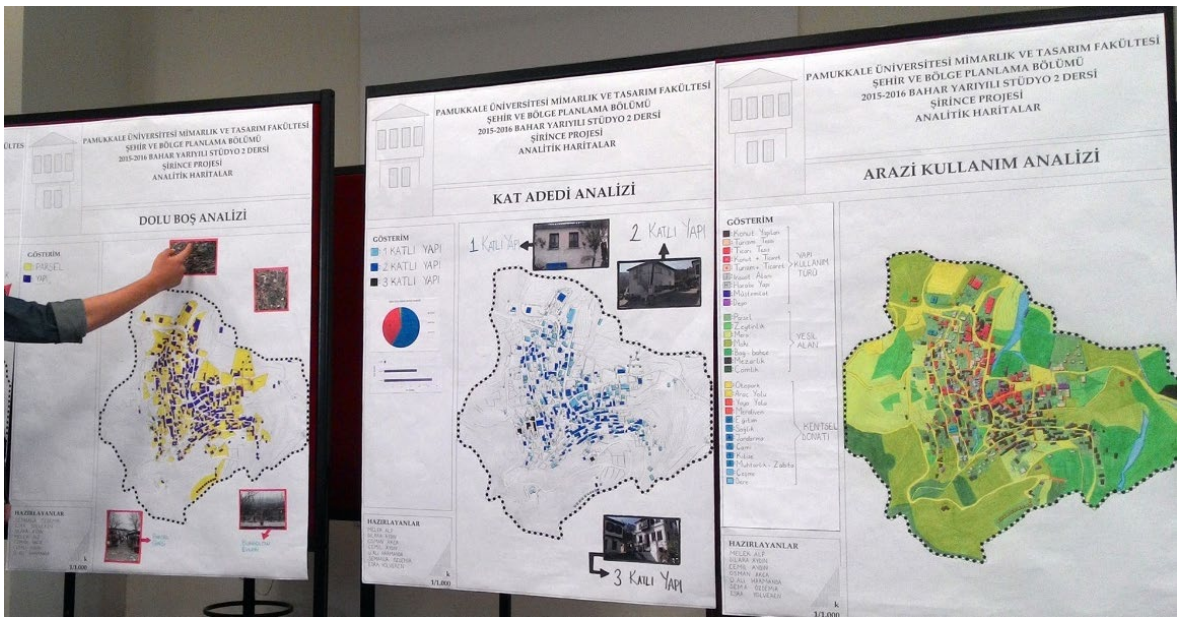


Figure 4 Studio 1 and Studio 2 presentations (Anonymous University, 2017)

It is determined that SBP 100 - Basic Design Studio directly relates to four courses in the URP Department in terms of scale and the layout plan: SBP 150 - Historical Environment Design; SBP 251 - 1/1000 scaled Implementary Development Plan; SBP 252 – Urban Design; and SBP 451 - 1/1000 scaled Implementary Development Plan (Table 2). The third-year courses are not included in the study as they are regional strategic planning-based, not design-based.

Table 2 Basic Design and Related Courses in Anonymous University URP

Semester	1st Year	2nd Year	3rd Year	4th Year
Fall	**SBP100 Basic Design**	-	-	-
Spring	SBP150 Historical Environment Design	SBP251 Planning Studio SBP252 Urban Design	-	SBP451 Planning Studio

3.2. Measurement Tools Currently Applied and Developed

Measurement and evaluation in education provide fundamental information about the level of realization of learning outcomes; therefore, they have a significant role in the identification of deficiencies and the assessment of the future course structure. The measurement and evaluation process of basic design education is carried out through an observational jury system, as is the

tradition in architecture and design education faculties, and the works subject to evaluation are commonly the visual design applications.

Undoubtedly, visual design applications of the learning process also have an informational dimension, but their affective and skill-based (psychomotor) dimensions come to the fore in student works. Learning is a holistic phenomenon that covers all these dimensions.

3.2.1. Evaluation of Skills-Based Basic Design Course Practices

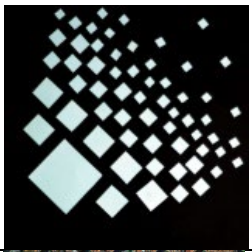
In basic design courses, the studies are evaluated by a jury, approximately 3 times throughout the semester of 14 weeks. The products are then scored based on their development process. Passing or failing is determined by the average score awarded for each student. In this study, the average score is used to represent the psychomotor learning domain of the comparative analysis.

3.2.2. Achievement Test Development for Basic Design Course

The development of a scale concerning the cognitive learning domain, or the preparation of the knowledge-achievement tests consists of many stages such as determining the content and validity and performing a reliability analysis. Accordingly, the content of the basic design education has been determined at the context-output learning level.

Firstly, a question-pool containing items about design elements, principles, Gestalt visual perception theory, form perception, abstraction and some other elements were put together by the instructors and taking into consideration the applications performed by the students. Secondly, two field experts were consulted for content validity, and 37 items in multiple choice survey form included in the trial test prevailed. According to the gradual classification of the objectives in education, known as Bloom's Taxonomy (BT) (Yurdabakan, 2012; Krathwohl, 2002), the selected items could test the levels of knowledge (recall), comprehension (understanding) and application analysis. The sampling in Table 3 was created according to BT out of the items in the test.

Table 3 Item Samples from the Basic Design Knowledge Test (BDKT)

Num.	Items	Bloom's Taxonomy
1	Which of the following is the institution that principally approached basic design education in the last century? A. De stijl B. Bauhaus School *(Correct)* C. Die Brücke D. Dada E. Der Blaue Reite	Knowledge (recall) level
2	Using contrasting colors in a composition is expressed as complementary color harmony. Accordingly, which of the following cannot be said to be true? A. They increase each other's value, they look more alive. B. They reduce each other's effects and vitality. *(Correct)* C. Green-red is a suitable example. D. One of the colors is cold and the other is warm. E. They are located directly opposite each other on the color wheel.	Understanding level
3	 Which of the following basic design principles cannot be said to apply to the arrangement (comp.) On the left? A. Unity / sovereignty B. Hierarchy C. Emphasis D. Orientation E. Symmetry (Correct) *(Image: Student Work)*	Application and analysis levels
4	 The urban texture in this visual was created by considering which design principle? A. Hierarchy B. Orientation C. Space / Occupancy D. Ratio / proportion E. Repetition *(Correct)* *(Image: Barcelona City, Royalty Free, Anonymous)*	Analysis

Item Analysis

193 graduated students responded to the BDKT scale. This number could be considered sufficient for educational research according to the scale development literature (Ozcelik, 1997). Item difficulty index assessment is given in Table 4.

Table 4 Item Difficulty Index Assessment

Item Difficulty Index (Pj)	Value / Meaning
0.00 - 0.20	Very hard
0.21 - 0.40	Hard
0.40 - 0.60	Moderate
0.61 - 0.80	Easy
0.81 - 1.00	Very easy

The discrimination index is the degree that distinguishes the answers of the upper group from the lower group according to the level of success. Item discrimination index assessment is given in Table 5.

Table 5 Item Discrimination Index Assessment

Item Discrimination Index (*rj*)	Value / Meaning
0.40 and above	Very good
0.30 - 0.39	Good
0.20 - 0.29	Can be improved
0.19 and smaller	Very weak – Must be removed

It is seen that even though the difficulty indices of 12 items were at an acceptable level, they were excluded from the scale because their discrimination indices were mostly very poor (r <0.20). Items that could be improved were reviewed. In this case, 25 items were deemed suitable for the application scale in terms of item difficulty and discrimination analysis. Based on this research, the main goal in the development of BDKT is to have relational analyses that will provide descriptive data about the sample group in question. Since the test results will not be considered as exam success, there is also no distractor analysis.

Basic Design Knowledge Test (BDKT) Reliability Analysis

Another method that can be used to prove the reliability of BDKT following item analysis is finding the Cronbach's Alpha (α) reliability coefficient. Cronbach's Alpha, which is a statistical technique, takes values between 0 and 1. The closer the value is to 1, the higher the reliability (Can, 2019). The value of α = 0.641 can be calculated in the trial scale applied to 193 graduated students. After removing items with low discrimination, the reliability coefficient (α) increased to 0.684. This shows that the developed BDKT is within a reliable range. Following this stage, BDKT can be applied to the relevant groups.

When BDKT is applied to 44 students who have taken a basic design course and are still studying in senior classes, it is deduced that the item difficulty (Pj) index has increased, that is; these students solved the test more easily than students who graduated in the past. This result is expected because they have just recently taken the course. On the other hand, the relatively low Cronbach's Alpha (α) value can be explained by the low number of participants (N) answering the test.

Table 6 Basic Design Knowledge Test (BDKT) Reliability Analysis

Stage	Number of Items	N	Cover. Difficulty (Pj)	Cover. Discrimination (rj)	Cronbach's Alpha Reliability Coefficient
1. TTBT Trial Scale	37	193	0.57	0.29	0.641
* Substance reduced	25	193	0.64	0.36	0.684
2. TTBT Application Scale	25	44	0.75	0.29	0.619

3.2.3. Attitude Scale Development for Basic Design Course

In Table 7, the factor loads, mean scores and standard deviation values of the items are shown in order from the largest to the smallest according to factor loads. The result of the factor analysis

shows that the attitude scale is a one-dimensional scale. While considering the items independently, sub-dimensions related to emotional and cognitive learning were determined in terms of meaning.

Table 7 Factor Load, Mean and Standard Deviation Values of the Selected Items for the Basic Design Course Attitude Scale

Item Number	Items	Factor Extraction	Mean	Sd
3	I like to be in basic design course.	,841	4,15	,6313
5	I never want to miss a basic design class.	,833	3,97	,7742
13	In my spare time I would like to deal with basic design.	,813	3,50	1,0055
23	The language of visual design is learned in the basic design course.	,810	4,43	,5012
2	Basic design course is one of my favorite courses.	,803	4,09	,7249
16	Basic design course prepares students for planning and design courses in upper grades.	,798	4,59	,5803
25	aesthetic value awareness develops in basic design course	,782	4,56	,5437
14	Basic design course is boring. (scored by inverting)	,782	4,17	,6767
15	I notice that my visual perception improves in the basic design course.	,776	4,67	,4740
6	I look forward to the time when I will take the basic design class.	,720	3,39	,8813
17	I realized that my abstraction skills improved in the basic design course.	,710	4,54	,5459
1	Basic design class is enjoyable.	,705	4,26	,5748
8	I follow the basic design course with interest.	,687	4,11	,7667
24	I take the basic design course because it is compulsory. scored by inverting)	,682	4,09	,7550
20	I use what I learned in the basic design course in my professional life.	,681	3,89	,8492
19	I care about criticism of my basic design course work.	,665	4,17	,5697
18	Time doesn't go by in basic design class. (scored by inverting)	,644	4,00	,8692
9	Even if it's not a basic design course. (scored by inverting)	,641	4,60	,5365
11	I willingly study the basic design course.	,609	4,11	,6742
7	it is important to learn basic design	,600	4,70	,4652

Independent Findings and Comments Obtained During the Development of the Attitude Scale

It can be said that the emotional sub-dimension in attitude is related to interest (curiosity), attention, communication, spending quality time, being able to criticize, and overall satisfaction level.

Relational / Regression Analysis Findings Between Variables

The grades of three studios and one theoretical applied course, and the score of the graduates in the applied online survey are given comparatively. The online survey was applied to 36 students that consist of almost all graduated students. The number of 36 is higher than 29 proves that it is valid in terms of “central limit theorem”. The comparison of survey scores and course grades are given in Table 8.

Table 8 Comparison of Survey Score and Course Grades

Students	**Knowledge testing score *(Y1)***	**Basic Design *Grade (Y2)***	**Attitude Scores for Basic Design *(Y3)***	**SBP 151** *Grade (X1)*	**SBP 251** *Grade (X2)*	**SBP 252** *Grade (X3)*	**SBP 451** *Grade (X4)*
1	**68**	**71**	**70**	64	57	68	60
2	**80**	**80**	**88**	88	68	69	77
3	**68**	**76**	**82**	83	55	63	70
4	**92**	**79**	**85**	78	71	75	59
5	**68**	**76**	**87**	74	68	83	64
6	**92**	**75**	**84**	65	56	63	62
7	**76**	**70**	**74**	70	71	80	61
8	**76**	**60**	**85**	75	74	93	77
9	**76**	**76**	**74**	67	63	61	65
10	**80**	**71**	**88**	73	67	72	71
11	**88**	**77**	**84**	72	85	65	67
12	**96**	**74**	**81**	83	74	83	75

13	**84**	**83**	**89**	80	73	83	65
14	**76**	**85**	**99**	74	71	85	64
15	**92**	**71**	**84**	71	60	75	66
16	**88**	**84**	**96**	77	88	74	67
17	**72**	**66**	**87**	63	62	70	62
18	**84**	**70**	**76**	64	68	65	45
19	**92**	**68**	**57**	70	68	66	56
20	**52**	**69**	**80**	62	50	76	60
21	**80**	**100**	**86**	90	90	93	85
22	**72**	**74**	**94**	62	67	63	62
23	**72**	**69**	**83**	75	67	85	65
24	**60**	**73**	**83**	90	86	91	85
25	**84**	**68**	**75**	64	65	16	46
26	**56**	**78**	**90**	66	57	85	60
27	**80**	**72**	**84**	68	72	82	42
28	**80**	**73**	**81**	62	71	76	63
29	**80**	**69**	**65**	67	48	60	53
30	**76**	**92**	**83**	73	85	85	65
31	**64**	**81**	**96**	89	68	69	74
32	**80**	**80**	**99**	65	72	70	77
33	**80**	**84**	**95**	74	87	56	77
34	**56**	**78**	**81**	71	64	73	61
35	**72**	**67**	**75**	63	53	76	70
36	**88**	**83**	**78**	73	83	88	67

Evaluation of Multiple Linear Regression Model Data

The relationship between the score obtained in the test and the grades of the students in the courses has been investigated by multiple linear regression analysis. According to the model, the knowledge testing score, Basic Design course grades and Attitude Scores for Basic Design are defined as dependent variables (Y1, Y2 and Y3), while SBP 151 course (X1), SBP 251 course grades (X2), SBP 252 course grades (X3) and SBP 451 course grades (X4) are independent variables. The linear regression model results are given in Table 9-10.

Table 9 Multiple Linear Regression Model Results (for Y1=Knowledge Testing)

Regression Statistics		***Variables***	***Parameters***	***Standard Error***	***t Stat***	***P-value***
Multiple *R*	0.99	**Intersection**	0.00	#NONE	#NONE	#NONE
R²	0.98	***X1***	0.68	0.32	2.15	0.04
Adjust *R²*	0.94	***X2***	0.63	0.23	2.72	0.01
Standard Error	12.95	***X3***	-0.07	0.17	-0.42	0.68
Observation	36.00	***X4***	-0.17	0.30	-0.55	0.59

Table 10 Multiple Linear Regression Model Results (for Y2=Basic Design Course)

Regression Statistics		***Variables***	***Parameters***	***Standard Error***	***t Stat***	***P-value***
Multiple *R*	0.99	**Intersection**	0.00	#NONE	#NONE	#NONE
R²	0.99	***X1***	0.54	0.18	2.93	0.006
Adjust *R²*	0.96	***X2***	0.40	0.13	2.99	0.005
Standard Error	7.55	***X3***	0.06	0.10	0.62	0.54
Observation	36.00	***X4***	0.06	0.17	0.33	0.74

Table 11 Multiple Linear Regression Model Results (for Y3= Attitude Scores for Basic Design)

Regression Statistics		*Variables*	*Parameters*	*Standard Error*	*t Stat*	*P-value*
Multiple *R*	0.99	**Intersection**	0.00	#NONE	#NONE	#NONE
R²	0.99	***X1***	0.48	0.19	2.50	0.02
Adjust *R²*	0.96	***X2***	0.44	0.14	3.17	0.00
Standard Error	7.80	***X3***	0.12	0.10	1.15	0.26
Observation	36.00	***X4***	0.08	0.18	0.43	0.67

When we evaluate the tables, it is determined that the R2 value is higher than 0.95. The R2 value of 0.98-0.99 indicates that the reliability/significance of the model is high. Furthermore, when (t) values are observed, it is revealed that X1 and X2 values are positively correlated with Y variables. In this case, it was observed that students with higher Basic Design perception, which were determined with the survey for graduate students, were successful in SBP 151 and SBP 251 courses. However, students did not achieve the same success in SBP 252 and SBP 451 courses in the following period.

The reasons why the SBP 151 course interacted positively with students with higher basic design perception could be due to the continuation of the basic design course in the same studio with the same instructors. Design expectations are strong as the course includes the Layout Survey. The SBP 251 - Studio 2 is the course where students first meet with Implementary Development Plans and at this stage, the theoretical load of the course is not heavy, but the design aspect is strong. For this reason, it makes sense that this course still has strong connections to basic design. With the increasing course loads and theoretical knowledge intensity and the development curriculum legislation getting ahead of the design, the relationship could not be detected in the other studio courses. In the SBP 252 - Urban Design, it is a possibility that the students could not spare enough time and effort for this applied course, which they took in parallel with their studio.

As time passes, it is observed that the relationship between the applied courses in the mental field and the basic design perception of the available information weakens. In the long run, especially after the fourth semester; it can be interpreted that students could not establish the relationship between basic design and planning studio due to two-dimensional plans and/or reasons such as course loads.

While establishing the multiple linear regression model, using the basic design course grades students received at the first year as the dependent variable may provide the same level of representation. However, due to the risk of ignoring the students' basic design knowledge in the senior years, the individuality of the students and other time-dependent differences, the study was used to measure the current knowledge. On the other hand, the basic design grades were arranged as dependent variables and repeated once again. Thus, by comparing the model results, it was investigated whether the grades given in the basic design studio would really represent the knowledge level and design abilities of the students.

When the results are examined (Table 11), it has been determined that the R2 value of the model is quite reliable with values above 0.99. When the significance of the T values is examined, it is seen that the 1st and 2nd values are significant, while the 3rd and 4th independent variable values are insignificant.

At this point, it was determined that "planning courses", which had significant correlation values with attitude scores, were also significant in the other two models (e.g., basic design notes and basic design questionnaire). This situation reveals that students' satisfaction, feelings, beliefs, and behaviors are also related to their success in planning courses.

In other words, success levels in design-based courses such as SBP151 (Studio 2) and SBP251 (Studio 4) are related to students' affective attitudes. It is understood that students with high affective attitudes are successful in these two courses or students with low affective attitudes are unsuccessful in these two courses.

4. Conclusion

In this study, the Anonymous University, Department of URP was examined as a case study to measure students' basic design levels and achievements in planning and urban design-based courses by dependent variables. Evaluations measure only one skill area; therefore, a knowledge-achievement test on the cognitive domain and an attitude scale on the affective domain were created. Student works were also evaluated as a psycho-motor measurement tool. These three-domain data was analyzed comparatively.

It is observed that there is a strong relation between adequate design thinking and achievement in URP education. The courses that have a strong bond with basic design education are SBP 151 and SBP 251. However, the bond weakens when it comes to SBP 252 and SBP 451. This situation may be explained with reference to time. In the long run, students tend to forget their basic design perception due to focusing on the theoretical and curricular parts of the education. Yet, this is not valid for SBP 251 as this course is directly linked to basic design perceptions. Thus, the irrelevance between the scores and course grades might be explained by the intensive course load of the students and the parallel studio courses, as well as the different technical requirements, norms and standards in the urban planning and design process.

The model established in the study measures the connection of students' basic design levels and abilities with applied design-based courses in the future. The investigation has focused on how the benefits of the students' success in the design process have changed depending on the time that has passed, in addition to what results they have created and in which fields.

The results of the tests made for the graduates of URP have determined how effective the students who still dominate the basic design processes are in design-based studio courses. Furthermore, based on the results obtained, the courses in which basic design techniques, principles and practices should be improved were determined. As an outcome of investigating the effects of basic design knowledge on applied studio courses, measures should be implemented to strengthen the link between basic design and planning, which otherwise weakens within the mental fields of the students over time. Students' perspectives and interpretation techniques should be kept strong by focusing on the applications related to basic design principles and abstraction techniques in applied studio courses. Furthermore, it is necessary to review the contents of courses, such as urban design to strengthen their connection with basic design practices and to increase homework or in-class applications that will allow students to relate with the design principles and abstraction techniques.

When the model results were compared, it was seen that the significance of independent variables were both the same, where the test results were accepted as the dependent variable and basic design grades were accepted as the dependent variable. It was observed that the model validity results, and the significance levels of the independent variables were also close. This has shown that the basic design studio grades represent the students' level of knowledge, the design education they receive is important for their success in future design-based courses, and this comparison can only be made using the basic design studio grades.

It is understood that the beliefs, thoughts, attitudes, opinions, and views generated by the students regarding the necessity, importance and impact of the basic design course are not completely related to the success levels in all the design-based courses. This result is thought to be related to the fact that the students who participated in the affective survey are graduates today, and therefore, their views and perspectives on basic design may have probably changed. Today, students are more likely to believe in the requirements of basic design courses as graduate city planners. It is highly probable that the affective attitudes of the students during the period they took the courses have changed.

Interdisciplinary studies at the basic design level in planning education can be seen as an école continuity (Gunay, 2007) since the architecture education started before planning education in Turkey and many planning departments were formed by separating from the architecture

departments. It is thought that basic design education increases the understanding of different scales and success in the third dimension and urban design scale; yet this situation may also result in the lack of emphasis on some contemporary concepts of planning in the current planning education.

However, it can also be said that when planning is separated from design education, it turns into a profession more focused on strategy formulation, and thus becomes distant from other disciplines that produce urban space such as architecture and landscape architecture. In this context, it is necessary to focus on the design education of planning students to carry out interdisciplinary studies, especially at the scale of urban design.

The application of the model in URP departments will identify the spots where the relationship with basic design is not maintained in the design-based courses and can guide to establish a more effective system. This model may provide a better understanding of the content of the studios. Improving the content of the studio courses will be an important basis for decision makers.

However, the COVID-19 pandemic has forced the universities towards online/hybrid courses, which inevitably affected the applied design education that certainly needs face-to-face training. Yet, there can be various advantages of online education as well, such as interaction with other planning schools and/or collective online juries.

In future studies, it is considered that the implementation of this measurement tool to other planning schools for further comparative analysis is necessary to improve the quality of planning education. In addition, several measurement methods such as panels, colloquiums, surveys, and questionnaires can be applied to students during their education and encouragement to off-school education forms such as UCTEA Chamber of City Planners' student commissions, summer student camps and online classes (e.g., Urbanism School on YouTube) can be proposed for better results.

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Resume

Assoc. Prof. Dr. Dalya Hazar received her Ph.D. (2018) in City and Regional Planning Department from İzmir Institute of Technology, specializing in rural planning. Between 2019-2022, she worked as a faculty member at Pamukkale University, Faculty of Architecture and Design, Department of Urban and Regional Planning. She is currently working as an urban planner at İzmir Metropolitan Municipality, İzmir Planning Agency (İZPA), while continuing her studies in urban planning, urban design, urban morphology, rural planning, commons, gender, and local sustainable development.

Assoc. Prof. Dr. Görkem Gülhan received his Ph.D. (2014) in Civil Engineering Department from Pamukkale University, specializing in transport planning. His research interests focus on transport master plans, accessibility, and transport planning. Apart from transport, he is interested in urban design, urban sociology, numerical methods in planning. He has publications in many national and international indexes. He is currently working as an associate professor at Pamukkale University, Faculty of Architecture and Design, Department of Urban and Regional Planning.

Assist. Prof. Dr. Bekir İnce received his Ph.D (2007) in Art Education Department from Dokuz Eylül University. He has multidisciplinary studies in the context of art education, art criticism teaching, and design culture. He is a member of Denizli Photography Association. He has been conducting photography studies and giving seminars and conferences for many years. Recently, digital platforms, new media and video techniques are among the topics he has been interested in. His photographs took part in many national and international competitive, selective, and invited exhibitions. He is currently working as an assistant professor at Pamukkale University, Faculty of Education, Department of Education and Fine Arts.