European Online Journal of Natural and Social Sciences 2018; www.european-science.com
Vol.7, No 2 pp. 501-510
ISSN 1805-3602

Comprehending the design problem in education of architectural basic design courses (Case Study: Students entering University of Guilan in years 2013 and 2014)

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Received for publication: 06 February 2018.
Accepted for publication: 27 May 2018.

Abstract

Training the architectural design depends on several variables and it is a very challenging issue. As personality formation of a designer and acquiring design depend on this issue, the primary steps in learning architectural design are very important in training the architecture students. The current research aims to provide a list of projects performed in the architectural basic design courses at university of Guilan by author with a looking at exercises provided in the architectural basic design courses at the University of MIT. Then, using the findings of the graduated students' survey on this course and using T-test, the impact of methods and exercises provided by architectural basic design courses on architectural design courses I to IV, was examined. Finally, the level of impact of the investigated methods and exercises studied was ranked using Friedman test and SPSS 16.0 software. Findings of the study can provide effective strategies in designing and facilitating the internalization of design problem by students.

Keywords: architectural basic design, architectural education, comprehending problem, design problem, softwareing comparison.

Introduction

Full comprehending of design problem is not generally possible immediately after direct presenting and introducing the design problem, and there are always uncertainties in the mind of architecture students on design issue and the problems related to it during the design process. It seems that the full understanding of the issue is possible through struggling with subject of the design problem. As Brian Lawson mentioned that thorough comprehending of the design problem without solution which explains it is almost impossible (Lawson, 1980). While better design is not possible merely by adequate knowledge on design problem, recognizing and internalizing the design problem is necessary to commencing sketching process.

For this approach, it is essential to have adequate comprehending of the design problem for designers, especially novice ones, to provide starting point for design. In this regard, finding variables and the ways to deal with the design problem can be effective in creating necessary courage in novice designer and reducing the hesitation at the beginning of the design. In the controlling the process of dealing with and responding the novice designers to design problem, some cases indicate misunderstanding of students as novice designers of that, which this problem is raised by various strategies like commencing and asking-answering questions, mind background, study and research, interaction with other peer designers as effective factors on the understanding of design problem .

Concept, as the generator of the design conjecture, implies not simply the possibilities of form but a form that is able to embody the complexity of the design issues to solve functional, technical, spatial and aesthetic problems (Chih-ming, 2004).

In definition of design process , As Swinch Kurt mentioned that Design process can also be defined as a process which involves all activities which can be performed by a designer from the beginning until locating the final solution (Kurt, 1994). This procedure is full of repeated actions which lie between a problem definition and the solution of this problem (Kurt, 2009). The iteration of the design experience in different but very interrelated and articulated situations brings confidence and a sense of control to the student's work (Edward M, 2013). Design data and communication tools must be based on common understanding. Working experience and professional background influence communication effectiveness (Lee & Chiang, 2017).

Design is the most important and characteristics field of the architectural profession (Cikis & Cil, 2009). Because of this fact design courses are the most important and central part of the architectural education occupying almost one quarter of the total educational load (Bunch, 1993).

Architectural students comprehend of design problem for the first time in the introductory design courses, and before that, they are trained in courses such as technical drawing, architectural expression, building materials, and so on, without using the imagination and serious exposure to the design problem that all includes knowledge and skills to prepare students to enter the introductory design studio courses.

Methodology

Educational experience of architectural basic design courses in two universities selected

The experiences gained in architecture education under title of conceptual, analytical and design exercises are confirmation for gradual entry of factors affecting the final product of the design. However, in this regard, before describing different dimensions of the considered educational system, it is essential to review other educational experiences in this regard so that the scope of action in each areas of form, space, and performance to be clarified comprehensively.

Educational experience for first year students in architectural basic design course at MIT University (Massachusetts Institute of Technology)

What is stated here is a list of projects presented in a course similar to basics of architectural design presented early years of architecture education and for Undergraduate students without any experience in design at MIT University (Hubbard, 2003). Table 1 illustrates the relationship between the presented projects and the components of form, space, and performance (Table 1).

- Bringing students to site and performing special analyzes on the site:

Students are asked to draw topical and purposeful crockies for specific subject analysis. One of the goals of this exercise is to establish a link between an architectural complex and the site, or in other words, it is floating boundary link of architecture in site around itself.

- Grid as row of column: The column grid as a tool for making layers and space

Students are asked to define their architecture with the help of row of columns and use the rows to state the idea and create a rhythm of light and shadow. They were also asked to pay attention to layering of space by using the grid of columns.

- Seperation of space: Space layers & Space zones

At this stage, students separate space by using architectural elements. They use stair as a separator of floors. They acquire corridors and movement spaces as separator of spaces in one floor and they try to create a type of spatial and visual link among the spaces.

- Consoling method:

At this stage, students are asked to add a part to the existing building as a console or add it in the most complete in terms of visual.

Table 1- Educational goal in the basic courses of architectural design at MIT University

	Type of exercise	Emphasized component in architecture
First program : link with site	Analytic-design	Form and performance
Second program: grid as row of column	Conceptual	Form and performance
Third program: space separation	Analytic	Space
Fourth program consoling	Design	Form and performance

Educational experience of author on architectural basic design courses at University of Guilan

According to approval of Department of Architecture at the Architecture and Art Faculty of Guilan University for students entered university in the academic year of 2013-2014, a total of 8 professors approved to hold an interior minutes in the courses of basics of architectural design 1 and 2, each course in two groups, with the same heading, so that two professors were used in each class, and a skilled with experience of 20 years of teaching in the basic courses of architecture and another with teaching experience of less than 7 years were used simultaneously to guide the students.

The course of architectural basic design 1 was provided by describing the following program:

- Recognition program (current situation): Case study: atelier table design
- Problem statement and questioning: searching the subject matter discussed in existing examples in the form of environmental perception and workshop discussion on the experiences. At this stage, the students are grouped and each of them will be studied in different parts of a residential unit, including the elements constitutes each space and measuring the dimensions and size of objects and furniture in the space.
- Three design exercises to improve creative power and ability of students to answer different issues in the architecture area through understanding and experience of the effect of sizes and movements of human body dimensions on furniture and elements and architectural space, including:

a. Design and drawing with a scale of 1:50 from spaces of entrance, pre-entrance, reception, living room, and dining room

b. Designing and drawing with a scale of 1:50 from the spaces of kitchen (open and closed), breakfast eating space, semi-open space and stairs

c. Designing and drawing with a scale of 1:50 from spaces of bedrooms and bathrooms

- Familiarity with the form and design of the building form and volume and structures
- The program of composition of volumes
- Familiarity with materials and familiarity with their texture, role, gender, and color
- Selecting a building and creating its simplified maquette to achieve volumetric concept of design with gradual abstraction (an attempt to do reverse design to achieve process to achieve the volumetric concept and of the original design)

- Final project 1: Designing an architectural theme like a villa, with an emphasis on consistent elements of building and the effect t of dimensions and movement of the human body on space and on objects constituting the space, with regard to experiences of students from the mentioned exercises during the semester.

The course of architectural basic design 2 with same students and with same professors continues in another academic semester according the following program:

- Strengthening the power of building analysis through direct or indirect observation of its maps and images:

In the exercise of each building critique, students are obliged to collect information from the works and designs presented by one of the international architects from Iran or world to analyze them comprehensively. Then, they sum up and classify the analytic results and works by describing and critique the considered buildings of architecture (with visual expression). Finally, they are obliged to reveal the characteristics that indicate the architect's style. The selection of an architect is regarded as interest of the student in his works and qualitative and quantitative results obtained from studies and observations of this exercise indicate his model architect in the next exercises of class.

- Strengthening the power of visualization, imagination and thinking of student
- Familiarity with the conceptual (value) areas of architecture
- Familiarity with the design of architecture from questioning to answer course
- Final project of architectural basic design 2 ;

Designing a guest suite complex in the path of Masouleh historic township including:

- Visiting the site and similar complexes constructed in the considered area and the necessity for attendance of all students
- Designing of site, including landscaping, the layout of buildings, parking lots, the arrangement of spaces such as game spaces, alcoves, and green spaces, entrance in a land with an area of more than 3000 m², considering the climatic, local, and cultural specifications of the region and considering the properties of the land and its topography and location.
- Designing suits with an area of 45 m² for accommodation of 2 to 3 people in single and four-side-open buildings.
- Designing suits with an area of 75 m² for accommodation of 3-5-member family, and in some cases, two families in a collective form with considering the privacy
- Designing a marketplace for selling handicrafts and items needed by tourists with an approximate size of 120 m², which should be designed in the form of booths including closed and semi-open spaces for each booth (Familiarity with the concept of modulation)
- Designing teahouse with an approximate area of 120 m² (60 m² closed space and 60 m² semi-open space).

Results

Assessing the real needs of students in future architectural design courses

For pathological analysis of results, the activities performed in the courses of architectural basic design in Guilan province and to test the level of their effectiveness with regard to real needs of students in the courses architectural design, a questionnaire with 10% qualitative questions were developed. Accordingly, each student selects a rank from 1 to 11 in responding to each question ranging from zero to 100% with 10% increase, with regard to level of usefulness of that exercise in higher year architectural design courses. In developing different questions, numerical scale was used, but ordinal scale was used in responses to each question, so that effectiveness of students' activities to be specified with regard to type of considered projects. This questionnaire was

distributed by 36 students of architectural design I to IV students entered university in academic year of 2013-2014, who had complete knowledge on architectural design and have already completed the courses of architectural basic design with the mentioned method. It should be noted that as the professors of courses of architectural design have not been changed in the mentioned academic semesters, the quality and method of teaching were considered as controlled factors. The questions of questionnaire were asked as follows: " Which of the exercises provided in courses of introductory architectural design have been more effective and useful in the courses of architectural design ".

Table 2. Result of responses of students to effectiveness of exercises provided in courses of architectural basic design 1 and 2 on their future courses of architectural design (All tables are the author's)

% The level of usefulness of exercises	100	90	80	70	60	50	40	30	20	10	0	unanswered	sum
Recognition, analyzing, and critique of surrounding objects	0	3	8	6	7	3	3	1	2	0	0	3	36
Investigating the elements constituting each space	2	4	6	4	5	4	4	2	2	1	0	2	36
Familiarity with design of form and composition of volumes	4	5	8	9	4	3	1	1	1	0	0	0	36
Designing parts of residential unit	4	5	4	4	5	5	2	3	2	0	0	2	36
Recognition of materials	0	1	2	3	2	4	4	6	6	3	2	3	36
Constructing simplified maquette of a building	5	3	2	4	4	3	2	2	2	0	0	9	36
Final project 1: design of a villa	4	8	9	5	3	4	1	1	1	0	0	0	36
Critique of building, selecting a model architect	5	9	12	4	3	1	1	1	0	0	0	0	36
Course from question to answer in architectural design	4	2	4	5	4	4	2	2	0	1	2	6	36
Final project 2	6	3	11	6	4	3	1	1	1	0	0	0	36

The response of students is illustrated in Table 2.

1- Exercising the recognition, analysis and critique of objects in the surrounding environment.

2- The program of examining the constituent elements of each space and measuring the dimensions and furniture available in space.

3- The program of designing the various parts of a residential unit (to strengthen the creative power and the ability of students to answer various issues in the architecture area through understanding and experience of the effect of the sizes and body movements).

4- The exercises of familiarity with form and design of the form and composition of the volumes.

5- The exercise of familiarity with materials and with their texture, role, kind, and color

6- The exercise to construct a simplified maquette of a building and to achieve the volumetric concept of with gradual abstraction.

7- Project of basics 1: Designing an architecture subject such as a villa, with an emphasis on constituent elements of the building and the effect of dimensions and movement of human body on space.

8- The exercise of the critique of building, selecting the model architect and classification and analytic results of his works.

9- Familiarity with the design architecture or the course from question to answer

10- The final project of basics 2: Designing the guesthouse complex in the path of Masouleh historic township.

For significant comparison among the data obtained, a comparable number should be extracted from each row of the mentioned table (Table 2) , which includes questions of people on percentage of the importance of the projects. For this reason, in each question, the number of people selected each percentage option is multiplied in that percentage and the obtained value is divided by the number of respondent students to obtain the number which shows the real level of usefulness for each question. Finally, the sum of numbers indicates the usefulness if an exercise to all exercises and Table 3 is obtained based on this method.

Table 3 – Transforming the results of students' responses to comparable data

%The level of usefulness of exercises	100	90	80	70	60	50	40	30	20	10	0	Result
Recognition, analyzing, and critique of surrounding objects	0.00	0.08	0.19	0.13	0.13	0.05	0.04	0.01	0.01	0.00	0.00	0.64
Investigating the elements constituting each space	0.06	0.11	0.14	0.08	0.09	0.06	0.05	0.02	0.01	0.00	0.00	0.62
Familiarity with design of form and composition of volumes	0.11	0.13	0.18	0.18	0.07	0.04	0.01	0.01	0.01	0.00	0.00	0.74

%The level of usefulness of exercises	100	90	80	70	60	50	40	30	20	10	0	Res ult
Designing parts of residential unit	0.12	0.13	0.10	0.08	0.09	0.07	0.02	0.03	0.01	0.00	0.00	0.65
Recognition of materials	0.00	0.03	0.05	0.06	0.04	0.06	0.05	0.05	0.04	0.01	0.00	0.39
Constructing simplified maquette of a building	0.19	0.10	0.06	0.10	0.09	0.06	0.03	0.02	0.01	0.00	0.00	0.66
Final project 1: design of a villa	0.10	0.20	0.20	0.10	0.05	0.06	0.01	0.01	0.01	0.00	0.00	0.74
Critique of building, selecting a model architect	0.14	0.23	0.27	0.08	0.05	0.01	0.01	0.01	0.00	0.00	0.00	0.80
Course from question to answer in architectural design	0.13	0.06	0.11	0.12	0.08	0.07	0.03	0.02	0.00	0.00	0.00	0.62
Final project 2	0.17	0.08	0.24	0.12	0.07	0.04	0.01	0.01	0.01	0.00	0.00	0.75

Based on the Table 3, the analytical chart is presented in Figure 1:

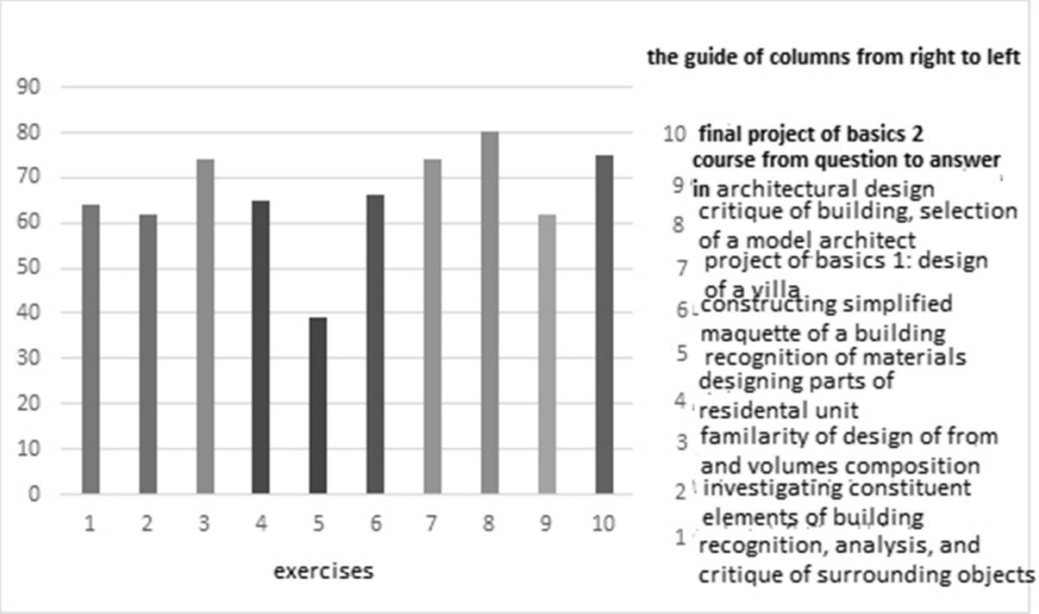

Figure 1. Diagram of the results of students' responses based on comparable data

Statistical analysis of the results obtained from students' responses

For statistical analysis of the data , T-test was used to examine if the methods and courses presented in the courses of architectural basic design courses 1 and 2 had significant effect on future courses of architectural design or not. Findings of the evaluations suggest that the program of exercise of building critique by selecting a model architect, final project of architectural basic design 2, the project of villa for architectural basic design course 1, and exercise of designing parts of a building unit exercises affected the future courses of architectural design at the confidence level of 95% and the exercise of recognizing the materials had no effect in this regard. Finally, the usefulness and effectiveness of the investigated courses and methods was ranked using Friedman test and SPSS 16.0 software. In order to determine the effectiveness and ranking of factors affecting the design of architectural design, Friedman's analysis of variance was used. In this analysis, confirmation of one of the following hypotheses was considered:

H_0 : the discussed topics have equal effectiveness from the perspective of respondents.

H_1 : the discussed topics do not have equal effectiveness from the perspective of respondents

Findings of the Friedman test are as follows: The value of x^2 to confirm one of the mentioned hypotheses is 100/085 with a degree of Tolerance of 9 and a significance level of 0.000. As the significance level is less than the level of first type error at the level of 0.05, the hypothesis states that factors and discussed topics have equal effectiveness is rejected with 95% confidence, so they do not have equal effectiveness.

The analysis of Chart 1 indicates that the exercise of building critique and designing based on selecting model architect ranked first in terms of application in courses of architectural design from the perspective of students. The aim of this exercise was to enhance the ability of students in understanding the design issue with modeling from prominent international architects. The exercises of designing guest suit complex in the path of Masouleh historic township ranked second. The reason of it might be combination of form, space and performance, and the direct effect of this exercise as a package including the extract of various exercises of lessens of basics 1 and 2 on the courses of architect design of students. The exercises of familiarity with form and the composition of the volumes and abstract design of a villa ranked third. The exercise of designing the form and the composition of volumes was carried out to enhance the knowledge of students in understanding the concept of uniformity of form and space in the architectural building, while the exercise of abstract design of a villa was performed to enhance the students' mental capacity in simplifying the form and conceptual design process. The ranks from fourth to sixth belonged to exercises of constructing a simplified maquette of a building, designing different parts of a residential unit, and the exercise of recognition, analyzing, and critique of surrounding objects, respectively. In the exercise of constructing a simplified maquette of a building, the perception of the students of the form increased and their sense of artistic and aesthetic perception was challenged. In the exercise of designing various parts of a residential unit, students gained knowledge on the exclusive residential spaces as the most tangible spaces where they have lived, and the exercises of understanding the issue of designing appropriate house were performed to train the concept of proportions and furniture consistent with performance of each space and the factors affecting it. The exercise of recognition, analysis, and critique of the surrounding objects was performed to gain knowledge on the stages of the studies before designing with precise engineering approaches. Both exercises of investigating the constituent elements of each space and the course from question to answer in architect design ranked seventh, and finally, the exercise of recognition of materials to gain knowledge on the quality of the various materials ranked eighth. A look at the students' selections, it was revealed that the exercises performed with the explicit goal of training the form and volumetric

composition to students were placed in the first priorities. Other exercises ranked next with considerable difference have one shared subject and it is indirect referring to the subject of form, space, and performance. In other words, these exercises are components that are effective in qualitative improvement and can include subjects such as proportions, colors, materials and theoretical issues, which placed in end of list of priority of exercises due to less applicability in future courses of architectural design.

Conclusion

The conducted studies reflect the following results:

- Comprehending the problem of design is a gradual process and is not achieved at a specific period, but it is achieved in a time interval by stimulating the student to ask question and give an answer, and mental involvement for internalizing the design issue. However, as students are novice and their subjectivity and as they have no mental background, the simultaneous raising of the issue along with the study and critique of sample designs related to gain adequate understanding of the design issue seem to be an effective strategy.
- The analytical findings of the study reveal that the presented exercises can be classified into four groups. The first rank belongs to the exercise of building critique and designing based on the model architect selection and its reason is that this exercise has been performed to enhance the ability of students in understanding the design issue with modeling the prominent international architects. The form ranked next and its reason is that the first-year students pay more attention to objective and tangible manifestations of architecture and acquiring the ways to deal with form and body and volumetric compositions. The third rank belongs to exercises performed with the aim of training the design tools. These exercises were considered as side effect in the design issue and they obtained less core. Finally, with a great distance, the materials project ranked fourth, indicating the low importance of paying attention to recognition of materials in the courses of architectural design.
- Holding the sketch sessions simultaneous with program description and the statement of problem is another important approach that applying it in creating adequate understanding of design issue based on the previous studies are emphasized.

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