An investigation on influencing parameters of comprehending the design problem as an initiation stage for the novice designers in architectural education

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Abstract

Comprehending the design problem in architectural education is a critical stage especially for the novice designers, giving them necessary first insight to start problem solving during the design process. In this paper effective parameters on comprehending the design problem are recognized and assessed. Based on analysis stage in this study, three main approaches are recognized for design problem to be explained so that facilitate comprehending it and prepare conditions for the problem solving process to begin. Brain storming, Studying similar examples and Carrying on initial short term designing sessions and sketches related to the main subject are the main approaches which can be applied parallel during explanation of the design problem.

Keywords: architectural education, creative problem-solving, design problem, comprehending design problem

1. Introduction

It has been observed that during sketching education process by architecture students, the design problem has not been comprehended well even after facing with and students feel ambiguous to comprehend design problem so it seems that design problem involvement can lead to fully comprehending problem. As Brian Lawson mentioned that thorough comprehending of the design problem without solution which explains it, is almost impossible (Lawson, 1980). Therefore in many cases various approaches are needed for a novice designer to internalize a problem. So questions are arisen concerning with approaches towards facing designers, especially novice ones, and roles of these approaches on commencing sketching process as: Whether different approaches of presenting problems and approaching the subject and design problems relates directly to internalizing design problem and commencing the process? What are the main parameters of comprehending design problem and their priorities?

In order to find answers to the questions above, and during facing and responding to the design problem by novice designers, numerous cases verify misunderstanding of students as novice designers which can be treated by approaches like commencing and asking-answering questions, mind background of a novice designer, study and research, interaction with other peer designers. These factors seem to be affective ones on comprehending design problem. Consequently it seems that better: problem to give courage to students as novice designers depends on recognition of each of the parameters. Even though a sufficient recognition of the problem doesn't necessarily lead
to better design, it seems to be essential to commence a process of designing. Therefore ample understanding of the problem is required to introduce an initiation to a novice designer. So it can be an effective way in order to encourage new designers to start their process, to find parameters and approaches towards facing the problem.

The research method in this paper is based on the study and reviewing literature on architectural education and basic theories, designers' interviews and deep observation of samples of novice designers in architectural schools. Simultaneous direct engagement with different designing groups and various schools are the best opportunities to choose the target population. So according to theoretical framework and using various visions based on design and education, the trend of facing problem for novice designers has been investigated and influential parameters have been extracted and their limits were determined.

2. Architectural education and design problem

It is hard to find a clear definition for designing so there are different attitudes toward this issue. In order to define designing thoroughly seeking common elements in various design positions seems to be essential so is comprehending the real differences between them. Moreover different approaches such as Architecture, Interior design, Industrial design etc. can lead to different definitions. However theoreticians have tried to define it generally. Jones(1970) gives what he regards to be the "ultimate" definition of design:" To initiate change in man-made things"(Lawson,1980,p.23). Such a definition is too general and abstract to be effective in this study. Lawson gives a definition such as: optimized solution for the collection of real necessities in special situation (Lawson,1980). These general definitions as Lawson discussed are too abstract but have emphasized designing process to be challenging.

In order to define designing in architectural context, the process of architectural design should be considered. Therefore in an architecture point of view, designing is a process which needs to analysis, evaluation and selection. In fact it is an attempt to find solution before making them (Lang,1987). The design thinking process can be considered as consisting of three main kinds of mental activities (Tzimar&Churchman,1984): The goal setting activity that determines the basic approach to the design question. It deals with moral values, human needs, desired states, and with the qualitative or quantitative specifications deriving from them in terms of the relevant architectural and environmental context. The problem-solving activity consists of finding or creating alternative solutions, either as whole conceptions or as partial elements of a solution(Wade,1977 cited in Tzimar&Churchman,1984). This activity depends upon imagination and requires the cognitive ability to create and express anticipatory images that are either transformations of a known reality or a new, unknown synthesis. The evaluation activity involves critical thinking, with all that this signifies. This mechanism deals with critical thinking which proposed solutions are criticized and evaluated. What is necessary here is to be able to predict proposed solutions and to assess them with a critic point of view.

Generally planning experts consider design problems as unidentified, indefinable and without hierarchy. They also account responding these problems as diverse. These questions are believed not to have absolute clear answers which need general response. So specifications of designing are illustrated as(Lang,1987): Endless stream, Never absolute and perfect, Depends on value judgments

These factors emphasize importance of seeking design problem and elements which affect it on the educational process. In the architectural education field, creating ability is the main goal of the education process. What is essentially important is to train designers and to create designing abilities. An architecture student learns how to initiate design from needs and necessities of the plan and not only meets its requirements but presents personal insight of the interpreter which means moving from question to answer.

In the other hand design process is based on creative problem-solving. Creative thinking is based on knowing and consists of finding novel responses to solve problems and find ideas to achieve design concepts in the design process. It is considerable that in the assessment of creativity in design, not only products are needed to be examined, but also processes(Salama,1995, p.8). Different models are introduced to solve a design problem and what is a common feature in them is that they are ambiguous and need to be defined properly. Eberhard(1970)
mentioned that if design problems are described as ambiguous, it is true that designers are never content with
introduced problems (Lawson, 1980). Generally five main processes are recognized as basic elements of creativity in
designing which are: first insight, preparation, incubation, illumination and verification. What is being considered in
this paper as a thorough comprehending of the problem is based on an initial stage which leads to enlightenment and
knowing.

3. Comprehending Design Problem, Analysis and study

Generally it consists of three main elements to fully understand a subject, which are person who understands it,
what is being understood or subject and finally a scientific thought which connects two first elements. In an
architectural design, problem needs to be recognized and understand but in design situation a problem is rarely clear
initially, although a lot of experienced designers believe that for beginning a creative work it is essential to have a
distinct problem. In this paper fully understand problem or comprehending the problem refers to comprehensive and
multidimensional understanding of it. In fact creative finding of the problem is one of the problems to find solutions.
General trend in this paper consists of two basic stages which aim to identify parameters and analysis them.

3.1. Target population and survey population

Target population is novice architecture students, which consist of first and second year architecture students.
This range consists of second semester to the fourth one which is significantly important to form designing
personality of a student as a designer. Survey population is chosen randomly through target population. Two main
principles of sampling are considered which means sampling consists of all members of the population and is done
naturally. In this paper survey population is 40 students which are chosen from two different architectural schools
and are studying in the third and fourth semesters. They are also asked about their long term exercises. Therefore
design methods are based on enriching design personalities of the students in two different schools.

3.2. Elementary stage/Distinguish stage

In order to identify and search parameters affecting comprehending the design problem, the elementary stage was
studied. The stage is considered to identify possible elements which are influential in understanding design problem.
In this stage main goal is to find and justify effective parameters. Therefore after studying and interviewing
designers the main framework and aspects of elements were emphasized. In fact parameters studied in this paper are
elements which are common and are referred as key parameters in architecture schools. Subsequently although
approaches toward facing problem cannot be limited to ones studied in this paper, these approaches are chosen
based on experienced designers' opinions which are the most common approaches towards problem solving in
architectural education. After studying real samples and interviewing professional designers, implicit proofs are
extracted and classified as below:

- **Obvious Parameters:**
  1. explaining teacher plan
  2. Questioning and answering and initial correction of other students with teacher
  3. Reviewing and examining samples related to design problem
  4. Analysis of samples related to design problem in studio
  5. Initial sketching session related to design problem
  6. Seeing and direct facing of real spaces of samples
  7. Slide show based on design problem
  8. Questioning and answering and Initial correction with teacher
  9. Studying previous students' samples
- **Non-obvious parameters**
  1. Being familiar with subject and having previous background
  2. Discussion and conversation around problem with other colleagues
  3. Discussion and conversation with more experienced students
  4. Discussion and conversation with more teachers

4. **Analytical stage and discussion**

   Analyses style is based on facing a novice designer with design problem by using each parameter identified in assignments through a semester. In order to do that, at the end of the semester after understanding design problem with using each parameter, questionnaires were prepared and dispensed through novice designers who have experienced design process and innovative thinking for two to four semesters. On the other hand, to control survey results, the evaluation process based on professional teachers’ is proffered.

   The design problem which was given to novice designers was also significant. We tried to choose a problem which is challenging enough (not so straight forward such as "designing a small house" that designer achieves easy sketches in his/her mind) but due to the fact that designers are not experienced, it would not be abstract and complicated (for instance "designing an airport"). Therefore the design problem in this paper has been "designing an art gallery in a specific site". It is obvious that sketch limitations such as its expansion, spaces and the location were discussed with designers.

   In this assessment table 1 and table 2 illustrate results of obvious and non-obvious parameters. According to table 1 and graph number 1, the novice designers have been asked about the effect of each parameter. Through comparing results it can be concluded that understanding design problem is significant with different parameters which can affect it. It is obvious that in addition to teachers’ explanation and initial correction which consists of questions and answers in order to illustrate the subject, there are other obvious parameters that can affect understanding design problem directly. Table 1 shows that parameters number 3, 4 and 5 which are reviewing and examining samples related to design problem, analysis of samples related to design problem in studio, initial sketching session related to design problem are important factors in understanding design problem. It can be concluded from analyzing parameter number 2 that the role of asking and answering questions between students is significantly important in understanding design problem.

   Table 2 and graph number 2 study non-obvious parameters in comprehending design problem. It can be concluded that not only obvious parameters have remarkable effects on comprehending design problem but non-obvious ones do. One of the remarkable parameters in this study is discussion and conversation of a novice designer with his peers about design process which can be an important factor in clarifying ambiguity of the problem. This is also verified by students who believe in counter-interactions. Moreover, tables and graphs show that there are other effective elements such as hidden agenda in design education which can be significantly crucial. Other studies parameters are “having previous background, using other students' experience and other teachers' advice” which are discussed in referred table.

   On the other hand parameters analyses are explored on teachers' point of view. Six experienced teachers were asked to prioritize obvious and non-obvious parameters. At the same time novice designers prioritize two classes of parameters and comparison between graphs 3 and 4 and also graphs 5 and 6 can lead to remarkable results. Studying the graphs shows that parameters 1, 4 and 8 were emphasized by both students and teachers. While parameter number 9 which is studying previous students' works is emphasized by teachers, it hasn't been considered as an important factor in student's point of views.
Table 1. Evaluation of the effect of obvious parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Degree of effect</th>
<th>Very High</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>percentage</td>
<td>percentage</td>
<td>percentage</td>
<td>percentage</td>
<td>total</td>
</tr>
<tr>
<td>1</td>
<td>explaining teacher plan</td>
<td>56%</td>
<td>25%</td>
<td>19%</td>
<td>0%</td>
</tr>
<tr>
<td>2</td>
<td>Questioning and answering and initial correction of other students with teacher</td>
<td>44%</td>
<td>28%</td>
<td>16%</td>
<td>12%</td>
</tr>
<tr>
<td>3</td>
<td>Reviewing and examining samples related to design problem</td>
<td>36%</td>
<td>32%</td>
<td>16%</td>
<td>16%</td>
</tr>
<tr>
<td>4</td>
<td>Analysis of samples related to design problem in studio</td>
<td>56%</td>
<td>28%</td>
<td>16%</td>
<td>0%</td>
</tr>
<tr>
<td>5</td>
<td>Initial sketching session related to design problem</td>
<td>44%</td>
<td>36%</td>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td>6</td>
<td>Seeing and direct facing of real spaces of samples</td>
<td>12%</td>
<td>16%</td>
<td>48%</td>
<td>24%</td>
</tr>
<tr>
<td>7</td>
<td>Slide show based on design problem</td>
<td>14%</td>
<td>22%</td>
<td>52%</td>
<td>12%</td>
</tr>
<tr>
<td>8</td>
<td>Questioning and answering and Initial correction with teacher</td>
<td>80%</td>
<td>12%</td>
<td>8%</td>
<td>0%</td>
</tr>
<tr>
<td>9</td>
<td>Studying previous students' samples</td>
<td>12%</td>
<td>26%</td>
<td>34%</td>
<td>28%</td>
</tr>
</tbody>
</table>

Table 2. Evaluation of the effect of non-obvious parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Degree of effect</th>
<th>Very High</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>percentage</td>
<td>percentage</td>
<td>percentage</td>
<td>percentage</td>
<td>total</td>
</tr>
<tr>
<td>1</td>
<td>Being familiar with subject and having previous background</td>
<td>12%</td>
<td>16%</td>
<td>72%</td>
<td>0%</td>
</tr>
<tr>
<td>2</td>
<td>Discussion and conversation around problem with other colleagues</td>
<td>48%</td>
<td>32%</td>
<td>16%</td>
<td>4%</td>
</tr>
<tr>
<td>3</td>
<td>Discussion and conversation with more experienced students</td>
<td>4%</td>
<td>32%</td>
<td>36%</td>
<td>28%</td>
</tr>
<tr>
<td>4</td>
<td>Discussion and conversation with more teachers</td>
<td>4%</td>
<td>13%</td>
<td>32%</td>
<td>51%</td>
</tr>
</tbody>
</table>

Graphs 1 and 2 are extracted from initial graphs with four levels so that better conclusion can be drawn. According these two graphs parameters 6, 7 and 9 from obvious ones and 1, 3 and 4 from non-obvious ones are considered as non effective parameters. However general observations and predictions seemed to be different. These results can lead to implications of educational system in architecture. As the paper is not aimed to justify these implications, we just try to pay attention to them to find clues for future studies.
When we study non-obvious parameters in graph 2 and compare graphs 5 and 6, other delicate results are derived. According to graph 2 students considered parameter 2 which is discussion and conversation with colleagues and peer students as efficient and other parameters inefficient. On the other hand when studying graphs 5 and 6 it can be concluded that teachers' prioritized parameter 3 - discussion and conversation with more experienced students- and comparing these two contradicting results seems to be challenging. There are explicit results such as lack of proper communication between different levels of students. Teachers always emphasize on active and dynamic interaction between different levels of students in architecture design studios and these results can accentuate finding new approaches towards interactive dynamic of the students in different levels.

5. Verification of results

In order to examine and assess results, another group of students have been studied as novice designers through a semester whose results analyzed and used. In this study target population consists of 14 novice designers who were studying in the fourth semester. In this study the referred main approaches based on effective parameters towards facing design problem have been applied. So according to previous stages results, efficient and significant parameters have been emphasized. Therefore during first semesters these approaches gradually have been utilized to supplement internalizing process of a design problem and fully comprehending it:

- Explaining teacher plan and brainstorming
- Enrichment of questioning and answering and Initial correction with teacher
- Analysis of samples related to design problem in studio
- Initial sketching session related to design problem

It can be explained that these approaches are not continuous and should be applied parallel. The novice designers' assessment during first eight weeks has been done in two stages: self assessment by the learner and teacher's assessment. These assessment results based on graph 7 show that approaches claimed in this paper based on effective parameters can be significant in comprehending design problem.
Graph 6. Adequate comprehending design problem and internalizing progress in the first eight weeks of the semester (author)

Graph 6 shows that through utilizing design approaches mentioned in this paper, the majority of target population end up better comprehending the design problem. More precise study of the graph emphasizes that internalizing trend is frequent. It also shows that the design problem cannot be comprehended immediately after facing it though by utilizing mentioned approaches based on obvious and non-obvious parameters fully comprehension of the design problem can be achieved.

6. Conclusion

It can be concluded that there are delicate important parameters in architectural education as well as questions and ambiguities which have been considered. According to this paper these conclusions can be drown:

- Fully comprehending design is a general matter and cannot be obtained in specific stages, but through time period and interaction of various parameters can.

- It is a multifaceted problem to comprehend a design problem properly. In fact presenting design problem does not lead to comprehend it, while other various parameters should be considered. Therefore this study identifies efficient parameters which two kinds of them-obvious and non-obvious ones- have been considered.

- According to study it can be recognized that there are three main important approaches toward facing design problem which can be useful for novice designers to comprehend thoroughly as:
  - Encouraging students to ask and answer questions to be engaged in order to internalize problem which can be used as brainstorming in the first session.
  - Simultaneous introducing the problem with study and review connected plans in order to fully comprehend the problem is another useful approach which is proposed. Although this approach may seem challenging when the teachers prioritize neutrality of designer's mind, the results show that this approach is a very effective way to facilitate problem comprehending.
  - Organizing sketch sessions along with design problem explanation and introducing the problem is another significant approach whose usage in thorough comprehending the problem has been approved.

What is important is that these approaches do not contradict each other and parallel utilizing them can be helpful to fully comprehend the design problem, internalizing it and reduce initial pause for a novice designer. Other implications of this paper can lead to study and assess current architectural educational system.

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