THE ROLE OF INTERPRETATION IN ARCHITECTURAL DESIGN THINKING

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ABSTRACT

Design Thinking is one of the most important issues in the scope of Architectural Design Studies. The results of studies on designers' thought and activity emphasize on the complexity of thinking in Architectural Design. Design Thinking includes Critical Thinking and Creative Thinking, which include the elements. Studying these elements, we can realize how designers think and thereby the quality of Architectural Design and its education will be improved. The purpose of this article is to answer this question; what is the role of the designers' individual interpretation of Architectural Design Problem in Architectural Design Process. To achieve this purpose, the viewpoints of scholars about Design Thinking, Architectural Design Process and Interpretation have been studied and finally an Interpretation-based model in Architectural Design Process, have been presented. This study indicates that Interpretation, as one of the most important elements of Critical Thinking, is a sub-process in extensive process of designing and a powerful force for creating and forming the Architectural Design solution, from beginning to end of this process.

Keywords: Design Thinking, Architectural Design Process, Critical Thinking, Interpretation.

Introduction

During the complicated process of designing all activities which a designer does, are associated with cognitive processes. Cognitive psychologists have studied Design Thinking as a subjective activity, includes two subjective processes; Creative Thinking and Critical Thinking (Sharif, 2011). Creative Thinking means to prepare and strengthen the mind to recognize and explain the problem in order to create the subjective schemata and achieve the design idea. The elements of Creative Thinking are Fluidity, Flexibility, Originality, Expansion, Complication, Curiosity, Risk, Visualization, Analysis, Composition, Organization, Construction and Creativity. Critical Thinking means to predict the implementation and evaluate and select the most appropriate solution of a problem with the purpose of processing and completing the idea as an acceptable design. The elements of Critical Thinking are Revision, Evaluation, Interpretation, Inference, Analysis, Explanation, Judgment, Decision Making and Self-Regulation (Sharif, 2009). Therefore Interpretation is verifiable as one of the elements of Critical Thinking. The purpose of this article is to find the role of designer's Interpretation of Architectural Design Problem for creating and developing the Architectural Design solution.

Critical Thinking

The literature on Critical Thinking has roots in two primary academic disciplines: philosophy and psychology. Definition of Critical Thinking emerging from the philosophical tradition includes: "purposeful, self-regulatory judgment which results in Interpretation, Analysis, Evaluation and Inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or conceptual considerations upon which that

judgment is based" (Facione, 1990, p3 from Lai, 2011,p6).

One of the definitions of Critical Thinking in psychology is: "Critical Thinking examines assumptions, detects secret values and evaluates evidences and conclusions" (Myers, 2003 from Petress, 2004). According to the viewpoint of *Richard Paul* and *Linda Elder* (2008), elements of Critical Thinking include: Point of view, Purpose, Question at issue, Information, Interpretation and Inference, Concepts, Assumptions, Implications and Consequences. In Critical Thinking all reasoning contains Inference or Interpretations by which we draw conclusions and give meaning to data (Paul & Elder, 2008). Thus it can be expressed that Interpretation is an important element organizing the Critical Thinking.

Interpretation

Interpret means to explain and represent artistically (Merriam Webster Pocket Dictionary, 1959, p181). "Interpretation is to comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria. Interpretation includes the sub-skills of categorization, decoding significance, and clarifying meaning" (Facione, 2011). Interpretation is the process of evaluation and selection that aims to achieve a corresponding structure by removing the irrelevant issues and connecting the related issues. (sharif, 2011).

Ruth Lorand's "The Logic of Interpretation" argues for understanding Interpretation as a problem-solving activity. The activity of Interpretation involves an object, an interpreter and a purpose (Machamer and Wolters, 2010). In architectural designing, Design Problem is object, designer is interpreter and conceptual model is purpose (fig 1). According to the evaluative and selective role of Interpretation and what have been presented in fig 1, Interpretation can be even continued in transformation phase, from conceptual model into design model.

The role of Interpretation in Architectural Design

The first phase of Design Process consists of understanding the problem. That is knowledge acquisition. In practice this often means understanding the problem and assimilating it to a conceptual framework that is already known to the designer. A designer constructs a conceptual model of the artifact by abstracting knowledge from previous experiences and information stored in the memory. This abstraction process is aided by the use of Interpretation. These conceptual representations are being linked both with the external forms of knowledge and with the internal representations of the model (Demirkan, 1998). For solving a Design Problem, designers compare the precedents and previous samples in their minds which based on their Interpretation and personalization the design program, and provide the primary designs.

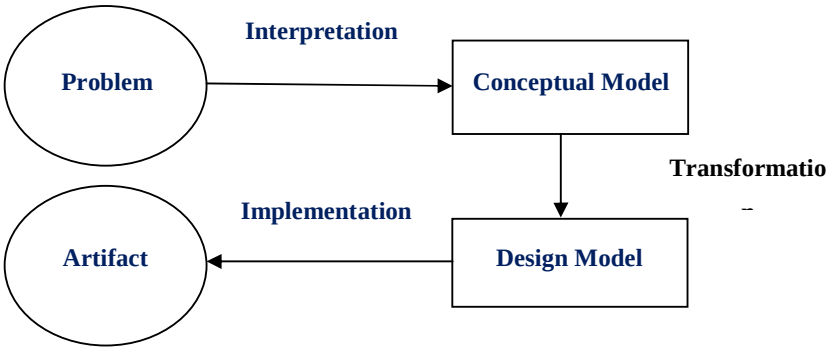

Fig 1. The Design Process (Demirkan, 1998)

"The sub-process of Interpretation emerges as the single most important force in the shaping of design solutions" (Goldschmidt, 1988). Each situation and every condition requires a new Interpretation. Interpreting a situation means taking a critical reading of it. An Interpretation is formed when design moves, which are enacted an knowledge pertaining to the ask, transform its pieces into a stable structure by achieving a unique relationship among them. One of the models of design process that Interpretation plays an important role in it describes the process in terms of four entities: definition, or design imperatives; personalized program, or Interpretation; independent inputs, or design modifiers; physical form. The definition has to do with the collection, recording and arrangement of all relevant data, or knowledge, concerning the task. An Interpretation transforms the definition in to workable relationships among different pieces of the givens, through structuring and by introducing the designer's own input. When such input is completely extraneous to the definition and its role is one of a catalyst in the creation of an Interpretation, a design modifier becomes part of the Interpretation. Physical form in various modes is present as representation of information, a means of experimentation and inquiry, and a test-tool for the confirmation or the rejection of hypotheses. Interpretation is the hinge on which the entire process is pivoted. Interpretation in designing can itself be described as a process: The central process within a wider activity of designing (ibid). The Interpretation that is most strongly suggested can be considered as the center of Interpretation space but the boundaries of Interpretation space is indecisive and ambiguous (Stacey et al, 1999). Therefore when the primary Interpretation makes the initial forms and drawings emerged, the indecisive boundaries of Interpretation and ambiguity of visual representations results to Reinterpretation and design development.

The process of Interpretation is essentially an attempt to select, transform and compose pieces of knowledge to so as to create a stable structure in which conflicts have been largely removed or resolved. A stable structure acquires a meaning beyond the additive sum of that of its parts. A designer endeavors to arrive, through the making of design moves, at a combination of pieces of knowledge with a 'good fit' relationship among them. When such a combination is achieved a stable structure (Interpretation) is created. For both the lock and the Interpretation, the key concept is that a particular relationship among elements (often hierarchical) provides a solution to a problem. The enormous quantity and complexity of pieces of knowledge in a design situation explain the fact that so many Interpretations are simultaneously possible. An Interpretation, which is a continuing process, there is never a totally 'final' combination. It can grow, be transformed, become part of a wider, more global construct. The structure that generates it aspires to achieve maximum stability (Goldschmidt, 1988).

Beyond the ability to represent semantic content, the syntax of shapes may itself be the medium to represent classes and structures of visual domain knowledge. Design Schemas are examples of such a knowledge structure in architecture in which the Schema as a pattern, or configuration, of shapes constitutes an important class of domain knowledge. *Liu* has proposed categories for recognizing possible emergent shapes based upon the ability of the designer to 'see' (interpret) the underlying structure behind the shape configuration. From a cognitive point of view, this implies a higher level of understanding of the syntactical content of drawings. In this view designers understand shapes and their relations as 'underlying structures' and are capable of interpreting design configurations at a higher, conceptual, level (Oxman, 2002).

To indicate the role of Interpretation in Architectural Design and its ability to create a stable structure *Goldschmidt* (1988) has studied on architecture students. The results of this study consist of three phases for interpreting the issue in an Architectural Design: 1- Starting Point or Global Interpretation, 2- Play, 3- Discovery.

Starting Point; Global Interpretation

Goldschmidt's study indicates that the designers obviously think about an issue in different ways. They utilize the verbal Interpretations while creating their conceptual models. The design activity of designers are greatly based on their individual Interpretations and their past experiences and whatever a designer is more skilled and his Interpretation is stronger he will be more resistant against the deformations. In this situation the designer personalizes the program and sometimes make changes the needs to protect his idea (Goldschmidt, 1988). There is a strong relation between verbal and visual Interpretations (Oxman, 2002). External images in Starting Point of design represent a Global Interpretation. Primitive designs have an important role for activating the Design Thinking and from the beginning of design process, transform the definition of Design Problem to a conceptual structure or model by designer's individual inputs.

Play

The word 'Play' is often used in discussion of architecture and designing. 'Play' is related to design activities, discovery and so Interpretation. 'Design Worlds', virtual in nature within which design activities take place, and such virtual worlds tend to be surrogate in the case of design by children. For children design is indeed Play, while adults 'Play' when designing, in the sense that 'reality' as represented in their knowledge about the task at hand does not off-hand provide design ideas or Interpretations; to construct Interpretations the designer must break away from that preordained reality and replace it with a relative reality, or world, which sustains his or her attempts to construe the task. Play, in this sense signifies 'Search'. In the general process of Interpretation in designing, playing means the conducting of 'loose' experiments, whose purpose is to elicit hypotheses that are sensible enough to make it possible to switch to 'tighter' or controlled experiments, in order to confirm or disconfirm the hypotheses. Play-Search experiments in designing always take place in the visual domain and their success depends on the designer's ability to perceive, represent, transform and manipulate physical form. These experiments refer to as an Interpretation (Goldschmidt, 1988). Although *Finke*'s experiments indicates that sometimes a form is first generated via imagery which does not have a specific Interpretation and that the meaning and relevance of the form is discovered subsequently. (Purcell and Gero, 1998)

Piaget discerns three principal categories of Play; Exercise Play, Symbolic Play and Games with Rules. There is also a fourth category which serves as a transition between Symbolic Play and non-playful activities or "Serious" adaptations. Out of Symbolic Play there develop games of construction, which are initially imbued with play symbolism, but tend later to constitute genuine adaptations (mechanical construction, etc) or solutions to problems and intelligent creations. The fourth category indicates the role of Play in design (Goldschmidt, 1988). The visual products of plays or play-search experiments, have either been created from a Global Interpretation or after creation have been interpreted and become meaningful.

Discovery

Many Interpretations result from interests not embedded in task definitions and some come to bear on a process at an advanced stage. But usually there are not the concepts and requirements of a new design in designer's mind analogically. The designers

who experiment with their material intensively enough encounter unexpected new situations that lead them to see issues and problems in new ways. When this happens the potential for making discoveries becomes wide open. When a designer is not able to fulfill his Interpretation as a discovery he retreats rapidly toward the safer Interpretation. it can be called 'Realization'. The boundary between Realization and Discovery can be really thin and fragile. (Goldschmidt, 1988) In the beginning of design the designers create the preliminary visual images. The Discoveries produce a drawing episode with the protocols appearing to indicate that the drawing is based on the image in the 'Mind's Eye' that resulted from the Reinterpretation of the original image. (Purcell and Gero, 1998) The process of visual search called emergence, can indeed be a source for Discovery. The domain content of visual images, or visual prototypes, constitutes a significant class of visual knowledge of the designer. The existence of such prototypes explains an integral part of the designer's ability to 'think with images' in the process of the emergence of form. (Oxman, 2002) The designers judge critically about the visual prototypes which have created, and interpret them again. Sometimes Reinterpretation can results to the extension of initial Interpretation or creates a new Interpretation of the definition of design problem.

Reinterpretation; Representation and Design Thinking

Shape Representations, whether of a physical object or an abstract concept, are always open to Interpretation. The process of shape Interpretation and Reinterpretation is a base for interacting with drawing in design (Oxman, 2002). Sketching therefore is linked to the formation of images that provide a Starting Point related to a possible physical form and a way of developing that form. In those disciplines concerned with the design of objects or artifacts, there has been a long tradition of using drawings and other pictorial forms as part of the Design Process (Purcell & Gero, 1998). According to Oxman (2002), Design Thinking is activated through these external Representations in visual reasoning. Also the visual illustrations have protected the Interpretation and so they make the reasoning. Initial sketches are interpretable. Designers exploit the potential for differing Interpretations of their own sketches to stimulate their own idea generation (Stacey et al, 1999). Reinterpretations of sketches have the consequences; either during or following sketching, new knowledge becomes part of the problem solving process. This new knowledge significantly involves both new perceptual and abstract or conceptual knowledge. The role that sketches play in Reinterpretation; That is in the emergence of new ways of seeing the perceptual (drawn) Representation of a potential design. (Purcell & Gero, 1998) Sketches are the space for emerging the Interpretations and happening the Reinterpretations and a facility for conceptual and exploratory processes.

Externalization of Design Thinking; Reflection in Action

Frequently referred to as 'Reflection in Action', these models emphasize the interaction of the designer with the problem Representation and characterize design as a process of Reception (Perception), Reflection (Interpretation), and Reaction (Transformation) (Oxman, 2008). The sequential and cyclical processes are supported by visual Representations, and Design Thinking operates through externalized Representations in visual reasoning. In one well-known rendition of this relationship, according to *Schon*, designing proceeds in a sequence of 'seeing-moving-seeing' cycles. The 'seeing-moving-seeing' model has been widely accepted and has been supported by extensive studies of the externalization of Design Thinking in drawing and sketching (Fig 2). 'Reflection in Action' is an

Interpretation of this model initiated by Reflection and feedback from the external Representations, which initiate an action. (Fig 3) (Oxman, 2002) These models emphasize on the effect of perception of visual Representations on Design Thinking and the creation of Interpretations during the Design Process.

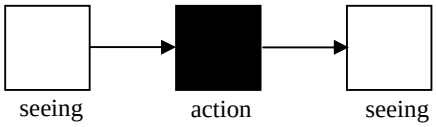

Fig. 2- Reflection in action (Oxman, 2002)

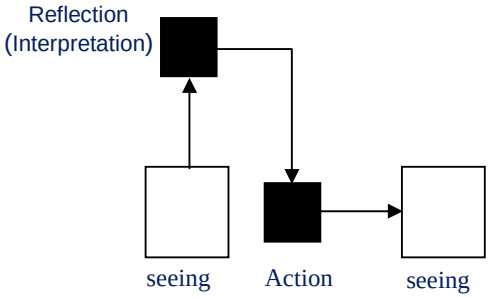

Fig. 3- Sequential model (Oxman, 2002)

Conclusion

The processes of Interpretation and Reinterpretation will be continued through the vast process of design, from Design Problem to final design. Figure 4, represents a simple Interpretation-based model from the beginning of Design Process. In this model, designer's thinking about the Design Problem, first goes through the one of two paths; 1 or 2. In the path 1, Design Problem is interpreted and a conceptual model created by the Plays related to Interpretation. In the path 2, when the Design Problem is explained, irregular Plays will be begun without the relation with a special Interpretation and primary drawings will be created. These drawings will be interpreted, then their meaning, discovered and formed to a conceptual model. Afterward one of the two paths; 3 or 4 will be gone through. In the path 3, the designer's primary Interpretation is strong and thoroughly related to Design Problem. Therefore Interpretation will be confirmed and extended to achieve the final model. The designer's potential of discovery is very significant for confirming and developing the conceptual model. In the path 4, the visual Representations will be reinterpreted. In this situation, ambiguous boundaries of Interpretation cause to new Interpretations are emerged. Or because of non-related Interpretation to Design Problem, design modifiers, as a part of Interpretation, make the conceptual model changed. Finally Interpretation process results to create the final model of design.

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