

Toward a Psychological Design Process for Interior Architecture

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Abstract. The aim of interior architecture is to achieve functional improvement, aesthetic enrichment, and psychological enhancement. The design process starts on a rational level that deals with function, while considerations of the emotional response come later. The compromise between function and aesthetic is a conflicting issue. In order to give priority to aesthetics to achieve creative forms and symbols, this study sets out to build a psychological design process for interior architecture. This process explores the paths and stages in the design process and describes contributed design decisions. To tackle the research problem, 50 architectural students contributed to the design process in five phases. A qualitative approach and descriptive method was adopted, and a hypothetical model of the four stages of the design process was built. These processes were: analysis, synthesis, modification and feedback. The analysis process depended upon fragmentation into three layers. The first layer was characterized by rationality and dealt with functional criteria and a bottom-up method. The second and third layers were characterized by psychology and dealt with aesthetic criteria and a top-down method. The synthesis stage used the superimposition of layers. The design process relied on two simultaneous aims: (1) the psychological aim as the key generative concept, and (2) the formal metaphor of artistic or natural references as the big idea. The conclusion indicates that the current design process represents an appropriate selection of design tools that shift attention toward subjective values.

Introduction

One of the essential roles of architecture is to provide built environments that sustain the occupants' psychological well-being. This role is made even more important because, in modern society, more than 70% of a person's lifespan is spent indoors (Kim, 1998). Interior architecture is defined as a contemporary profession that combines art, architecture, and interior design, and as a profession it is interested in developing a third dimension to increase architectural experience, achieve context, and required importance. It is also interested in color, light and furniture, and it attempts to unify the design between the architecture and its interior on the one hand, and the architecture and interior design on the other. The previous definition seems to move toward a more subjective, creative and psychological domain which is the most challenging issue (Kurtich and Eakin, 1993). Interior design aims to achieve functional improvement, aesthetic enrichment, and psychological enhancement.

The design requires a rational thought based on knowledge and understanding gained through experience and research. Also playing an equal role is intuition and imagination, which add to the creative dimension of a rational design process (Ching, 1987). A primary criterion for judging the success of an interior design project is whether it functions. Two approaches were considered from the study of aesthetics in architecture: the metaphysical approach, which deals with the process of creativity from a philosophical point of view, and the psychological approach, which includes the study of perception, cognition, and attitude formation (Lang, 1987). The belief that environmental aesthetics can affect people's feelings was supported (Stamps, 1989). The design process is involved in the creation of an interior, while a set of design principles is usually attributed to aesthetics. The designers' creations reveal an implicit belief in the capacity of the physical components in an internal environment to influence users' psychological responses. In addition, professional accounts of

architectural and interior design frequently refer to the experience of the user, the feelings or moods the design creates and the meaning carried by such environments (Strong, 1998). Complexity theory has evolved as a new discipline that provides a broad scientific perspective and offers the challenge as well as the chance to reconsider common design approaches, and to invent new strategies based on the new paradigms generated (Herr, 2002). Without using emotions, there is simply no way to decide on the appropriate geometry, shape of a building and path, or the relationship between two structures. How can a place be loved without emotions? Clearly, we react to built form emotionally (Salingaros, 2003). Many studies describe the challenges of architectural design, specifically within the design process. The architectural design has two objectives which do not always harmonize well: function and aesthetic. The domain of creative architectural design poses special challenges for the modeling of the processes involved (Bertel *et al.*, 2004). Furthermore, there was concern over both the way in which designers tackle the process of design, and the insights that can be gained from a psychological approach to this question. A great deal of research into the process of design decision-making, creativity in design, and problem-solving in design as an individual, as well as group activity, were discussed and advocated (Wilpert, 2007).

Other literature has drawn attention to conflicting issues between the methodological approaches of design processes, or those identified as synthesis-analysis and conjecture-analysis. In the first 'scientific' approach of synthesis-analysis, architectural cognition is based on the analysis of facts. This comes from the belief that the processes of design are open to systematic examination, rational interpretation, and quantifiable evidence. The second approach of 'conjecture' and 'pre-structuring' comes from the belief that in order to design we pre-construct a hypothesis or a concept that we then test on real grounds. So within the 'conjecture' model, conceptualization occurs through continuous interaction with reality. The designer first conceives an architectural idea in his mind and then s/he tests it by representing it. Continuous interaction exists between the conception and the materialization of the idea that allows for the modification and improvement of the proposed solution. As a result, the new model seems to fit the design process better as it is more interactive and flexible, accepting the unpredictability and implicitness of design. But this account still remains within the realm of a 'scientific' explanation, where one has to conceive in order to design. It seems that the previous two models depart from the problem of space to a

solution (Marda, 1996). The concept of integrated design processes found in the current literature is still based on an understanding of the design process as synthesis-analysis (Trebilcock, 2009). Design tasks do not have one single solution which needs to be determined. However, all the previously mentioned studies in the field of architecture suffer from a relatively serious weakness. This is that they have not given adequate attention to the design processes that might be influenced by psychological qualities in interior architecture, or given priority to achieve the aesthetic by creative forms and symbols that are metaphorically drawn from art and nature. In order to fulfill these requirements, it is useful to adopt a combination of a potentially wide variety of different methods, models, techniques, and cross-cutting intertwined design decisions. Accordingly, this study seeks to make progress via building a framework for a psychological design process of interior architecture. This process explores the paths and stages of design and describes the contributed design decisions.

Theoretical Background

In this section, a number of issues are addressed, including psychologically affective qualities, the design process, creativity and the design process, design process models, and design methods and mechanisms.

Psychological and affective qualities

Perceiving the environment involves observing its physical characteristics and assimilating environmental information. The influence of the physical environment over affective responses has been emphasized by many researchers. A great deal of the literature focuses on examinations of the emotional responses and aesthetic qualities of the environment. The increased complexity in the environment leads to greater interest, while higher levels of order decrease responses (Nasar, 1994). In addition to the fact that peoples' interest increases with arousal, there is also the idea that preference increases with arousal up to a moderate level and then falls (Berlyne, 1989). The issue of aesthetics within the designed environment has divided researchers and designers. The split is a result of the social scientists advocating 'social function' and the designers promoting 'aesthetic goals'. The two sides may be reconciled by focusing on peoples' evaluations of the environment and their feelings towards it (Stamps, 1989). Four basic dimensions of the environment affecting environmental evaluation were discovered: namely, 'complexity' (consisting of a large number of

parts); 'novelty' (a new experience to the perceiver); 'surprisingness' (containing unanticipated elements), and 'incongruity' (being out of keeping). The initial work is that the environment and individual personality combines to influence emotional response (Mehrabian and Russell, 1974). However, a model of affective evaluations based on two independent bimodal dimensions of emotions, pleasantness and arousal have been promoted (Russell *et al.*, 1981). This model was refined and named 'A spatial representation of descriptors of the affective quality of environments'. The model shows the affective responses to combinations of pleasantness and arousal. For example, these are: a high degree of arousal and pleasantness results in an 'exciting' affective state, whilst a high degree of pleasantness with low arousal leads to a 'relaxing' feeling. The two axes produce four quadrants, in which many affective states may be placed. Therefore, a high degree of pleasantness combined with neutral arousal may be considered 'comfortable', and this might be located on the pleasantness axis. This arrangement of the different combinations of pleasantness and arousal leads to a circular ordering of the emotions (Russell, 1988). It appears that these two psychological dimensions allow some insight into the world of affective evaluations. Figure 1 shows the model of the 'affective qualities of the environment'.

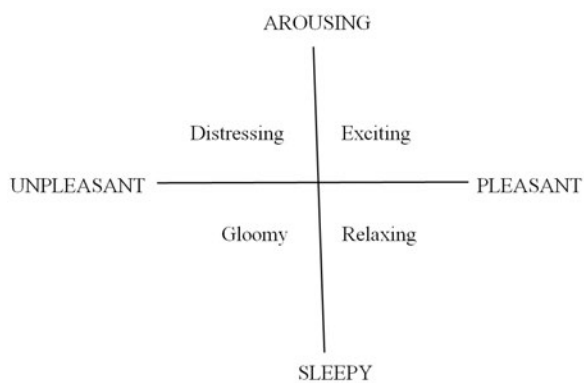


Fig. 1. Model of the affective qualities of the environment (Russell, 1988: p. 122).

The types of atmosphere in interiors were highlighted (Strong, 1998). These are:

- Calm: A relaxing, peaceful environment in which to rest.
- Lively: An invigorating, exciting environment.
- Welcoming: An environment which is inviting and approachable.
- Private: The environment promotes a sense of privacy.

- Cheerful: A happy, fun environment.
- Formal: An environment which promotes a sense of formality.
- Open: An environment which promotes a sense of spaciousness and freedom.
- Reassuring: A stable environment which creates a sense of belonging. Tradition.
- Community: Domesticity and reliability.
- Hopeful: An optimistic place, which promotes a positive view of the future.
- Comfortable: A place that creates a sense of warmth and coziness.
- Symbolic: The representation of certain feelings through an environment or feature.
- Emotive: A place that provokes affective impressions or creates emotive states.

The study proposes to use these affective dimensions as objectives in the design process of interiors.

Design process

The design process is defined as a sequence of operations. Potentially, design tasks have a large variety of alternative solutions that may fulfill the requirements of the design specification. The design process, in terms of interior considerations, was explained. This first involved the design problem being defined, and then goals and objectives should be set. During the analysis of the problem, the problem itself is broken down into parts, where issues are clarified and values are assigned to the various aspects of the problem. The analysis also involves gathering relevant information. As we cycle through the design process, a cleaner understanding of the problem should emerge. New information may be required or uncovered which could alter our perception of the problem and its solution. There are several approaches one can take to generate ideas and synthesize possible solutions to the problem:

- Isolation of one or two key issues which have value or importance assigned to them, and development of solutions for them.
- Study of analogous situations and utilization of them as models for developing possible solutions to the problem at hand.
- Development of ideal solutions for parts of the problem which can then be integrated into whole solutions (Ching, 1987).

Defining and understanding the given design problem requires conceptions of possible solutions; the information needed to understand a problem

depends upon the designer's idea for solving it. Conceiving and developing a solution scenario at the same time is tied to a conception of the future; during the design process, images of a desirable future are developed in order to guide the process of planning and action that will eventually approximate a selection of these images (Herr, 2002). The indicators of the proposed design decisions are as follows: (1) design decision categories, (2) attributes in design decisions which include description, design rules, design constraints, consequences, and probabilities and constraints, and finally (3) relationships between design decisions. Furthermore, design decisions are always difficult because they cross-cut and intertwine. Decision-making can work at two different levels: (a) at the localized level, where decision making deals with a specific decision topic or a decision issue; (b) at the cross-cutting design decision level, where localized design decisions may be refuted if intertwining design is considered. Finally, the decision-making loop consists of the following steps: (1) identification of the decision topic from concerns; (2) determination of the set of alternatives; (3) determination of criteria that will be used to rank the alternatives; (4) ranking of the alternatives; (5) selection of an alternative which then becomes a design decision; (6) identification of new concerns and decision topics that are led by the design decisions (Bu *et al.*, 2009).

The complexity of the design is one of the key properties of designing, but not all states of the problem are considered during any one design process; the same holds for the state-to-state transitions from the decision. Also, at any given instant during the problem solving stage, for example with particular problems states such as the current ones, it is unusual for all possible outgoing transitions to be considered for the subsequent actions. Rather, preferred sequences exist in which values are assigned to a problem's individual features, resulting in preferences in exploring, considering, and choosing certain substructures of the decision space over others (Katz, 1994). The characteristics of architectural design decisions were specified as: (1) decisions that are made to satisfy requirements; (2) architecture is described as a set of decisions; (3) decision constraints provide dependency relationships between design decisions (Choi *et al.*, 2006).

Design decisions may be classified according to an interior's vocabularies according to the following items: perceptual reality, design elements (e.g. line and dot, shape types, texture and value, color and light). This literature highlights the importance of perceptual reality as one of the main

vocabularies that the interpreter is influenced by in interior space. Moreover, it is focused on the visual language and use of methods to organize these elements in order to achieve the distinguished characteristics of perception through its complex systems. Finally, it refers to the role of personality and spatial qualities of the interior (Malnar and Vodavarka, 1992). The elements of interior architecture are classified, and through this a distinction between architecture and interior design is revealed:

- The relationship between the interior and exterior, where interior architecture respects the content and structure and uses it as a point of departure.
- The third dimension takes into account the shape, size, and proportions of the space.
- The fourth dimension is generated by extension of human experience in space and time.
- Light is distinguished as a medium of the initial definition of space.
- Color, material and properties of interior architecture.
- Furnishing as an extension of interior architecture and designed elements (Kurtich, and Eakin, 1993).

Creativity and the design process

The design process of interior architecture is characterized by mainly aesthetic criteria and creativity. A great deal of literature highlights these issues. Alternatively, the occurrence of a creative idea, object, or action as determined by the joint relation between those three elements was highlighted (Csikszentmihalyi, 1996). The creative process was described in terms of three stages. There is generation and invention which involves the creation of new ideas and rules, exploration and evaluation, and consideration of constraints (Candy and Edmonds, 1998). Various creative design processes recognized for their efficiency in producing creative design solutions were presented. These include: combination, transformation, analogy, emergence, and basic principles (Gero, 2000). Furthermore, the design process is discussed in the majority of the literature and addressed as a nonlinear process. It is meant to be nonlinear and each designer approaches the design problem from a different point at that design process. The literature has recognized that one of the most important stages in enhancing creativity is the preparation stage. Preparation widens the designer's knowledge and enriches it before

incubation. Incubation involves digesting knowledge and sorting it in one's mind (Cross, 2000). Subsequently, various thinking methods and creative tools can be used to enforce the generation of creative and new concepts. It was proposed that the creative-based design process should integrate systematic design methodologies with the creativity method. This process then contains four personal behaviors: looking, thinking, comparing, describing, and stimulation (Hsiao and Chou, 2004).

At the conceptual stage of the design process, the creative process then establishes which behaviors are mainly present in order to enhance the designers' ability to create alternative options. These creative enhancements are: search and widening knowledge, brainstorming, concept mapping, analogy, combination, evolution, emergence, and collaboration (Feda, 2008).

Design process models

In its most basic form, to elaborate on a model of the design process means to map a route through the process from beginning to end. The idea is to identify the actions of the designer in order to achieve a desired solution.

A generalized map of the design process is established and suggests that activities such as analysis, synthesis and evaluation occur in sequence. Analysis involves breaking down the problem into fragments so that each fragment may be separately solved, whereas synthesis is characterized by an attempt to create a response for the problem; evaluation involves the critical appraisal of suggested solutions against the objectives identified in the analysis phase (Alexander, 1964; Broadbent, 1973). Furthermore, the model as analysis-synthesis (A/S) was identified (Bamford, 2002). Both the analysis-synthesis model and the model of conjecture/analysis (C/S) have been contested. There is a belief that the rationalization of the design process proposed by the analysis-synthesis paradigm is unworkable because it suggests that design should be derived from an analysis of user requirements rather than of the designer's preconceptions, whereas in reality, a complete account of the designer's activities during the design process would still not reveal where the solution came from. The purpose of analysis is to test conjectures rather than optimize a synthesis of the logical procedures proposed. Instead of displacing pre-conceptions, the role of pre-structuring problems and the need for a critical analysis of such pre-structuring in a process of reflective design were emphasized. The conjecturing solution early in the design process helps the designer better understand

the problem (Hillier *et al.*, 1972). An elaboration of the model that consists of generative-conjecture/analysis was proposed. It was observed that architects in practice tend to hold onto a relatively simple idea or generative concept early in the design process, and this is known as the 'primary generator'. The benefit for the designer is that the primary generator reduces the variety of potential solutions (Darke, 1979). The design is defined as a "reflective conversation with a unique and uncertain situation", and proposes a model for the design process as 'reflection-in-action'. It was suggested that the designer approach reframes the situation in an iterative process of appreciation, action and re-appreciation (Schön, 1991). Furthermore, a design process was initially developed by clarifying design objectives followed by establishing functions, setting requirements, and determining characteristics. Design methods were classified into two major groups: creative methods used to stimulate creative thinking by increasing the flow of ideas and removing mental blocks that inhibit creativity, and widening the search area; these are rational methods which encourage a systematic approach to design. These processes complement each other to reach a systematic approach. Moreover, some design methods are new inventions of rational procedures, whereas some are adapted from operational research or other sources, whilst still others are the result of a formalization of the informal techniques already used by designers (Cross, 2000). The models of the design process were synthesized according to two principal paradigms that have their roots in different conceptions of the scientific method. The A/S paradigm proposes that design starts by dismantling problems into fragments, synthesizing and evaluating possible solutions, and it arose at a time when designers were attempting to make design more rational and systematic. In contrast, the C/A paradigm proposes that design starts with ideas that can be quickly tested against constraints, where there is enormous value in making mistakes. The A/S model is mostly prescriptive and can be placed in the realm of design methodology, while the C/A model is mostly descriptive and can be placed in the realm of design theory (Bamford, 2002).

Design methods and mechanisms

The literature has pointed out that many forms of mental activity are covert during the design process, and do not show up externally: these include mental transformations performed by the designer that include arranging and supposing; designers suddenly have ideas, they imagine and speculate, they dream something up, they examine, or they calculate.

Several of these mental operations take place subconsciously, while other activities are intentional and take place in a considered and controlled manner (Bertel, 2004). The literature refers to the top-down process which is set hierarchically to refine the design to a point where the forms of components on the lowest-level of abstraction are completely specified, and their functional adequacy can be demonstrated. Top-down methods begin with a concrete aim and lead to the production of a fully-specified design conception by dismantling the problem into sub-problems. The procedure requires abstract and well-defined problem specifications that are applicable to the sections (Mitchell, 1990). In addition to this literature, there are bottom-up methods that involve the configuration of an overall design solution by successive abstraction, and the formation or recursive combination of basic design components. The complexity of bottom-up compositions in the design process results from developing accessible ways for constructing high-level functions from lower ones. The literature also refers to the use of 'big ideas' in the design process. The big idea can lend further structure by implicitly or explicitly introducing structural analogies to problems, solutions, and methods in other domains. In addition, big ideas often promote more artistic aspects of architectural design. Furthermore, they focus on the constraints in the design that largely result from the required or desired relationships between two or more elements (Bertel, 2004). Other features identified by the literature include 'thinking in layers' in design processes. Architects are trained to draw and to describe ideas and suggestions. The characteristic of a designer's sketching action is "redrawing", in which the designer repeatedly outlines a particular area of a drawing. The combination of redrawing techniques with tracing paper as a medium serves as a complex and efficient design method to the experienced architect (Do, 2002). The abstraction is key to effective design problem solving. 'Abstraction' stands for an arbitrary means of omitting types of knowledge in a representation. In an architectural design, abstraction is employed to control, to design, or to generate new facts. What abstraction means can vary between abstraction levels, or from situation to situation, where a single mode of abstraction is insufficient for architectural design (Liu *et al.*, 2003). The number of different abstractions considered for a design usually depends on the methods that are applied to structure the design process.

Finally, the literature has pointed to more complex architectural forms and configurations. Relations between the elements of architectural form

at early stages in the development are simple; they get more complex with the application of methods such as superimposition and deformation of elements and by more abundant use of curving forms. It seems that the first step from initial and simple configurations is made using the method of superimposition, be it a superimposition of element upon element, or operation upon operation. Superimposition is considered a method for increasing complexity (Kulic, 2001).

In sum, the above literature clarifies that architecture problems are complex and characterized by a wide range of limitations, at various levels, ranging from functional to aesthetic. Different methodologies, methods, and mechanisms in the design process were proposed.

Hypothetical Model of the Design Process

Usually the problems of interior architecture have a high degree of complexity and diversity, so it is hard to treat each in the same way. For example, the problem of function tends to be rational, while aesthetic problems are clearly embodied by form, color, lighting and so on; these have less rationality and tend to be more subjective.

In order to reduce the variety of potential design approaches, the proposed design process centers around the pursuit key of a psychological objective derived from affective qualities as a generative concept and uses as the big idea a creative formal metaphor drawn from art and nature references. Additionally, there is a continuous dialogue between the designer and his drawings through the use of computer technology, and this dialogue is important in the appreciation of the outcome. As a starting point, a general model of A/S and C/S models is relied on to drive a new conceptual design model of interior architecture. This new model classifies the design process into the stages of analysis, synthesis, modification, and feedback. The adoption of the high level design approach alone is insufficient for finding appropriate ways to resolve all problems in interior architecture. However, to divide these design problems in a preparatory analytical stage and find an appropriate approach for each, effective mechanisms must be considered which exclude possible conflicting elements. It seems that the approach of thinking in conceptual layers can fragment design problems into three independent analytical layers: functional, formal, and color and lighting. Accordingly, fragmenting the process into layers enhances the representation of certain aspects and reduces the perceptual processing load on the

designer. Thus, the content becomes more concentrated, and the synthetic analogies between the problem and solution become stronger. This may run with differing degrees of efficiency.

By assuming the problems are fragmented into separated parts, it is necessary to present a synthesis stage through the adoption of a superimposition mechanism that focuses on perceptual aspects of the solution in a comprehensive manner. It should also evoke different aspects of the problem while raising the awareness of the interior architectural designer at different times during the solution. The synthesis stage requires the evaluation and modification of conflicting design decisions through different layers and between layers, mainly according to aesthetic criteria, while the feedback stage can support the best design decisions for the product. Two design approaches – bottom-up and top-down – are proposed to deal with the design process of interior architecture. The analysis stage of the functional layer relies on the bottom-up method to treat problems, such as those involving circulation and varied activities as a rational method to develop efficiency, performance and utility. However, it is possible to rely on top-down methods to deal with the problems relating to the metaphor of formal creation, and color and lighting as a whole, and then gradually to start the elaboration to the required level of detail. The designer can take advantage of the mechanism of abstraction in the top-down method by using formal references to achieve the aesthetic criteria represented by metaphors taken from art and nature. The abstraction is considered the key point of access to an effective solution for the formal design problems, as it is based on the deletion and reduction of the varieties of knowledge representation.

In summary, the structure of the proposed model highlights the following variables of design process in interior architecture:

1. Design problems focused on by this model are function and aesthetics.
2. Design stages that consist of analysis, synthesis, and evaluation.
3. Design approaches are composed of bottom-up and top-down.
4. Design mechanisms of fragmenting the problems into layers during the analytical stage and superimposing the solutions at the synthesis stage.
5. Aesthetics approaches which depend on a generative concept derived from affective qualities, and a big idea derived from formal and artistic metaphor.

Figure 2 shows the psychological model of the design process.

Applied Procedures and Analysis Processes

Applied procedures

The procedure includes five phases that lasted approximately four months. The initial samples were taken from 50 architectural students and conducted on the subject of interior design at the Applied Sciences University in Amman. A qualitative approach and descriptive method have been adopted.

The first preparatory phase aimed to identify the vocabulary and other fundamentals of interior design, interior architecture, as well as the psychological dimensions of the built environment. This was achieved through a series of intensive lectures supported by slides that lasted for four weeks at a rate of five hours per week. The path of the proposed psychological model, affective qualities of the environment, and sequences of metaphor follow similar steps of abstraction, as discussed. In addition, design rules, design constraints and consequences were described. The second phase focused on the initial setup of the interior architecture design process. The students were divided into two groups based on metaphoric and formal references to art or nature. Furthermore, the division criteria were subject to equivalent distribution of the student's rank, style and preference, group number, and gender. The projects were identified and involved allocating alternatives to the existing interior architectural space of an area of 27 m² as an experimental space for design, with a base map provided. Many topics were suggested for projects, for example different uses of spaces such as residential, commercial, office, artistic, hospitality, and science fiction. The students were free to choose the type of function and the title of the space they wished. Then they had to provide a generative design concept that had affective qualities on the environment. Next, the students had to select a big idea for a formal reference to nature or art, where the idea had to be compromised with a generative concept and to some extent with function. Finally, the students were informed of the requirements and regulations of the design submissions. The scale of drawings was to be 1:20. For a unified perception consideration, the used paper must be white. The submission requirements were a ground floor plan, two interior sections and elevations, optional exterior elevation, perspective, and model for each design stage. Furthermore, students were expected to submit a report in the final stage that explained the paths of the stages, and of the design process and the

contributing design decisions. In order to carry out the design process of interior architecture, the students prepared a plan and two sections using computer software. The third phase included four design stages. The students started first with an analytical stage by fragmenting design problems into

three specialized areas organized into sequence layers. These are functional, formal, and color and light layer, separately. The process lasted two weeks for each layer and there was a drawing submission for each design layer.

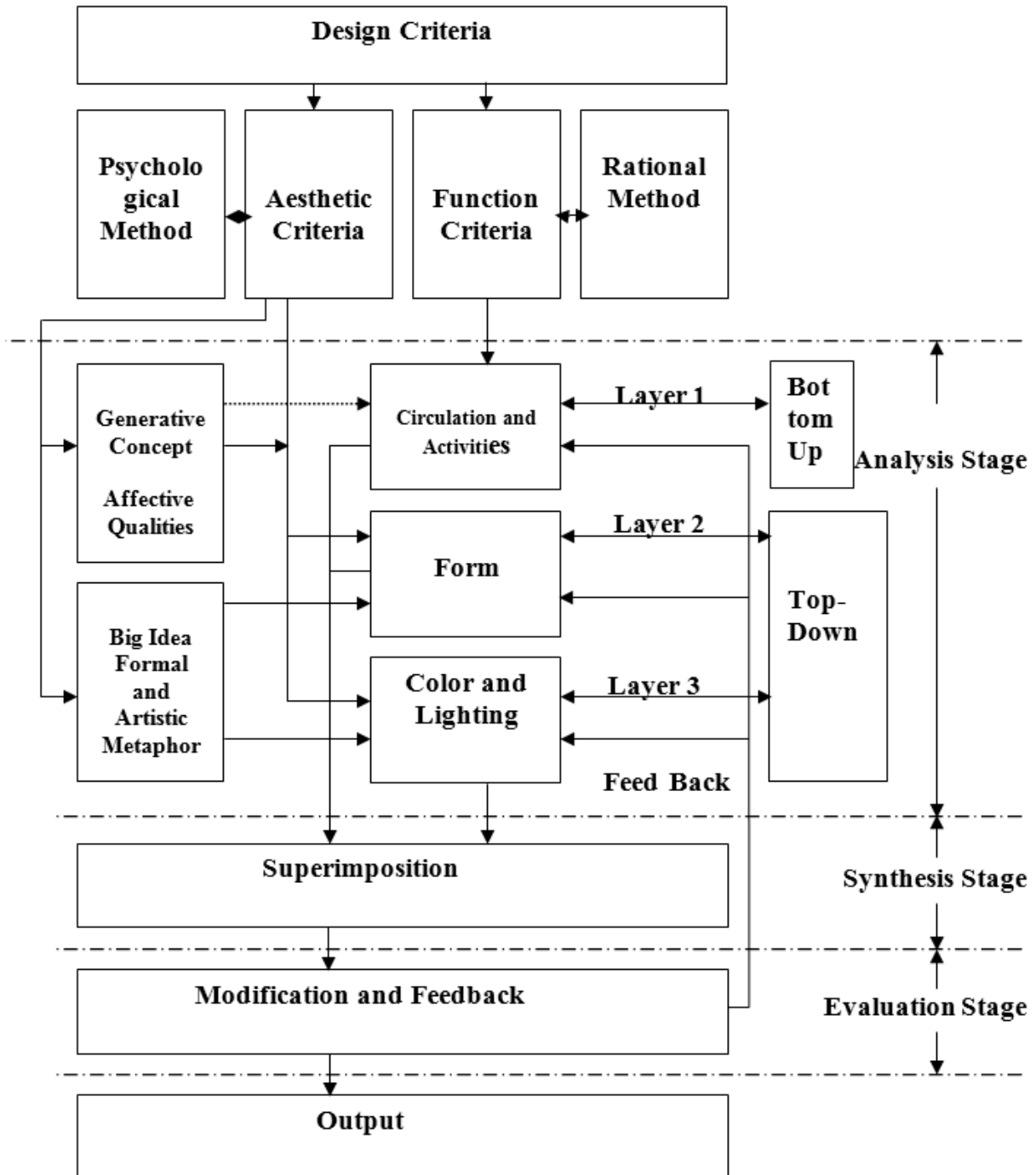


Fig. 2. Model of psychological design process for interior architecture.

The second stage included the synthesis of previous layers using the superimposing technique as a tactical procedure. To deal with conflicting design decisions, the students superimposed two possible layers separately like function and form, function and color and lighting, or form and color and lighting. Then they treated all layers together. According to the problem-solving operations, it is at the third stage of modification where adjustments and the possible transformation of contradictory or conflicting design decisions, together with continued evaluation, is required. This stage lasted two weeks. The fourth stage focused on evaluation and the possible feedback process, as well as the addition of accessories and other complements to the outcome of the interior architecture. Within one week and as a part of the project assessment, the data of design outcomes and student responses were gathered through a test of the top five projects for each approach.

After approximately two weeks, and as a requirement of the final course, the fifth phase showed re-evaluation and was started by a formal written assessment of two hours. According to semi-open structure technique, the students were asked to describe comprehensively the mechanism of the design process, the design decisions, and its constraints. Following this, the analysis of the submission outcomes, and the previous exams and reports were then transcribed. These transcripts were deconstructed and then regrouped according to varied themes and issues.

Analysis process

In order to find themes and issues, this item is going to discuss the generative concept and big idea, as well as provide a description of the relevant design decisions.

A) Generative concept and big idea

The analysis of generative concepts showed three perceptual student groups. The first group highlighted the vocabularies of comfort, relaxation, calmness, attractiveness, interest, romance, imagination, clarity and lightness, while the second group focused on excitement, surprise, activity and regeneration, among others. Finally, the third group dealt with vocabularies of happiness, transparency, flexibility, spirituality, and mystery. The analysis regarding the big idea focused on different formal references identified by nature or art. The natural formal references included sea creatures like shellfish, the pearl of the sea, deep-sea fish, waves and coral reefs. It also included species of birds, butterflies, flowers, leaves and snakes, as well as

other formal references from the universe, galaxies and astronomical phenomena. On the other hand, the artistic formal references highlighted paintings of cubism, deconstruction, other movements of plastic art, paintings by famous artists such as Kandinsky, and reflected on specific artistic styles such the Victorian. Finally, an artistic composition dominated by curved lines was created by students themselves. The analysis of the relationship between the generative concept, the big idea, and the proposed function may be classified into three groups, as seen in the following examples.

Group I:

- Planets and the universe, symbolizing calmness and mystery – fitting for the bedroom of a painter.
- Flowers to achieve relaxation and attractiveness, to fit the bedroom of a little girl.
- Birds to achieve harmony and fit with the living room.
- Butterflies, representing lightness and softness. It fits with a shop selling children's clothing.

Group II:

- Deep sea fish, to achieve excitement – suited to an office of travel and tourism.
- Coral reefs and marine biology, to achieve excitement, interest and the spirit of exploration. Also suitable for a tourist office.
- Butterflies, achieving activity and regeneration and suitable for a make-up shop.
- The leaves of plants achieve excitement, and are suitable for living rooms.

Group III:

- The peacock achieves superiority and fits with the sale of jewellery in a gallery.
- The viper brings flexibility and is suitable for a shop selling women's leather bags and shoes.
- Marine creatures symbolize recovery and are suitable for a seafood restaurant.
- Butterflies symbolize transparency and are appropriate for a shop selling women's accessories.

The analysis shows the relationships between generative concepts and the big ideas of formal artistic references that vary in the same way. For example, a varied composition of artistic lines

achieves comfort and is suitable for a bedroom. The creation of artistic space brings excitement and fits with the shop selling women's clothes. Finally, the dismantling of drawing lines of space achieves ambiguity and interest and is suitable for an art gallery.

The analytical process of the previous examples shows four main themes and many sub themes of the outcomes of the design process and the student responses. These were:

- The outcomes of the design that were less dependent on functional criteria and performance, such as the travel and tourism office, the selected big idea of a formal metaphor from nature like marine life, and the generative idea that depends on affective qualities like excitement, were more compatible and dynamic according to students responses (see Fig. 3).
- The outcomes of the design that were more dependent on functional criteria and performance, such as a living room, the selected big idea of a formal metaphor from nature, e.g. birds, and a generative idea that depends on affective qualities like harmony, were less dynamic as formal metaphors embodied as 2D (see Fig. 4).
- The outcomes of the design that were less dependent on functional criteria and performance such as artist shops, the selected big idea of a formal metaphor from artistic drawings, and a generative idea dependent on affective qualities like excitement, were freer as there were fewer constraints (see Fig. 5).
- The outcomes of the design that were more dependent on more functional criteria and performance, such as an art gallery, the selected big idea of a formal metaphor from deconstruction architecture, and a generative idea that depends on affective qualities like calmness and attractiveness, were less compatible as they need more intellectual activities (see Fig. 6).

Also, the analysis showed different sub themes derived from mixing the main themes.

B) Description of design decisions

This item deals with the design decisions of analysis, synthesis, modification and feedback stages.

1. The analysis stage:

The analysis of the functional layer described the rational thinking of spatial organization that relies on activity requirements and circulation. The design decisions of activities were according to the following types: location, dimension, zoning and direction, as well as the interrelationship between these activities at different horizontal and vertical levels. The analysis highlighted circulation decisions according to origin and destination of axes, the degree of flexibility, and the relationship between circulation and shape of different activities. Generally, the circulation was linear, which was appropriate to the rectangular shape of the space. Furniture decisions were related to the number of blocks, intensity, and furniture layout and organization, to compromise with affective quality, or subjected to intended scenes and the degree of transparency to connect the exterior and interior. Finally, the analysis referred to the location and distribution of focal points and visual display fields vertically or horizontally to achieve a degree of clarity or interest.

The analysis of the form layer focused on the decisions taken during the process of preparing the big idea through creative metaphor, by drawing on natural or artistic forms and the mechanism of abstraction. The form was characterized by organism, fluidity and irregularity. The curved lines with a high degree of symbolism dominated surfaces in order to achieve an atmosphere of comfort and enjoyment, together with forms characterized by uniqueness, novelty, and creative references. Finally, the mechanisms of abstraction focused on the degree of deleting and reducing features and aspects of the essential properties of the original form.

The design decisions regarding the form were influenced by: selecting the formal reference, the degree of compatibility between the formal reference and generative concept, and how to achieve the degree of high fluidity and harmony. In addition, the analysis showed: the degree of interdependency; the interlock and overlap of lines and forms, and the adoption of distinguished lines of the varied reference to ensure deliberative connotations and desired meanings. Finally, some constraints were noted, including: overcoming the contrast between the regular geometry of a given interior space and the organism of the formal reference, adapting the formal reference to be used in furniture, and embodying the abstracted formal reference for a whole spatial territory or part of the space.

First: Analytical Stage

A: Function Layer



Plan

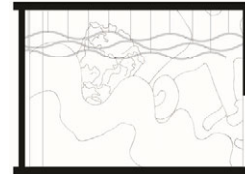


Section

B: Form Layer

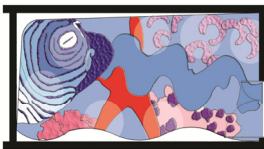


Plan

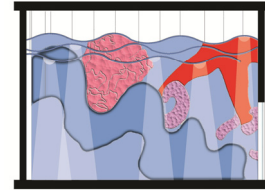


Section

C: Color and Lighting Layer



Plan

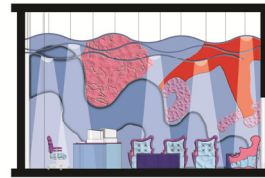


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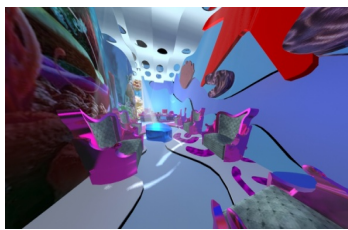
Second and Third Stages: Superimposition and Modification



Plan



Section



Perspective

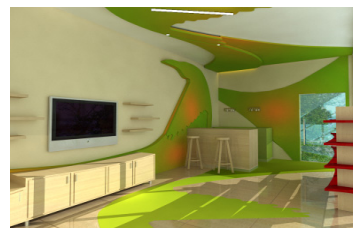
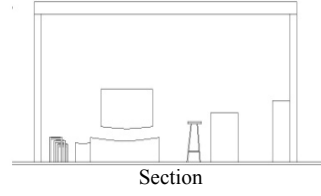
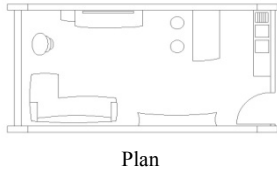


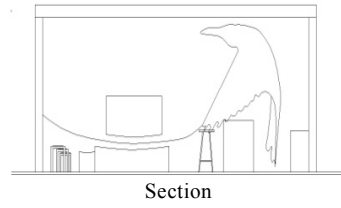
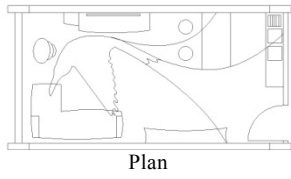
Fig. 3. Natural reference – first theme.

First: Analytical Stage

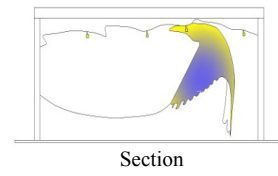
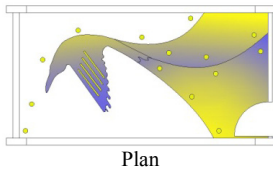
A: Function Layer



B: Form Layer



C: Color and Lighting Layer



Second and Third Stages: Superimposition and Modification

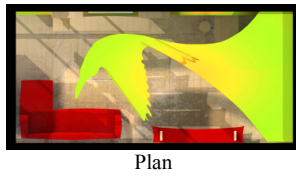
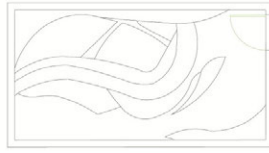


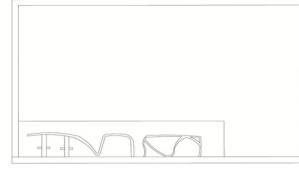
Fig. 4. Natural reference - second theme.

First: Analytical Stage

A: Function Layer



Plan

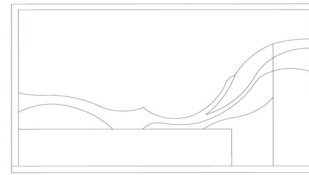


Section

B: Form Layer



Plan

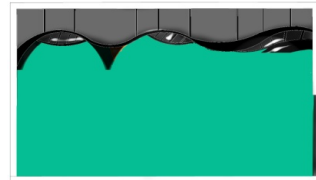


Section

C: Color and Lighting Layer



Plan

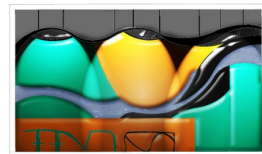


Section

Second and Third Stages: Superimposition and Modification



Plan



Section

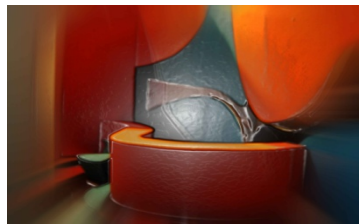


Fig. 5. Artistic composition - third theme.

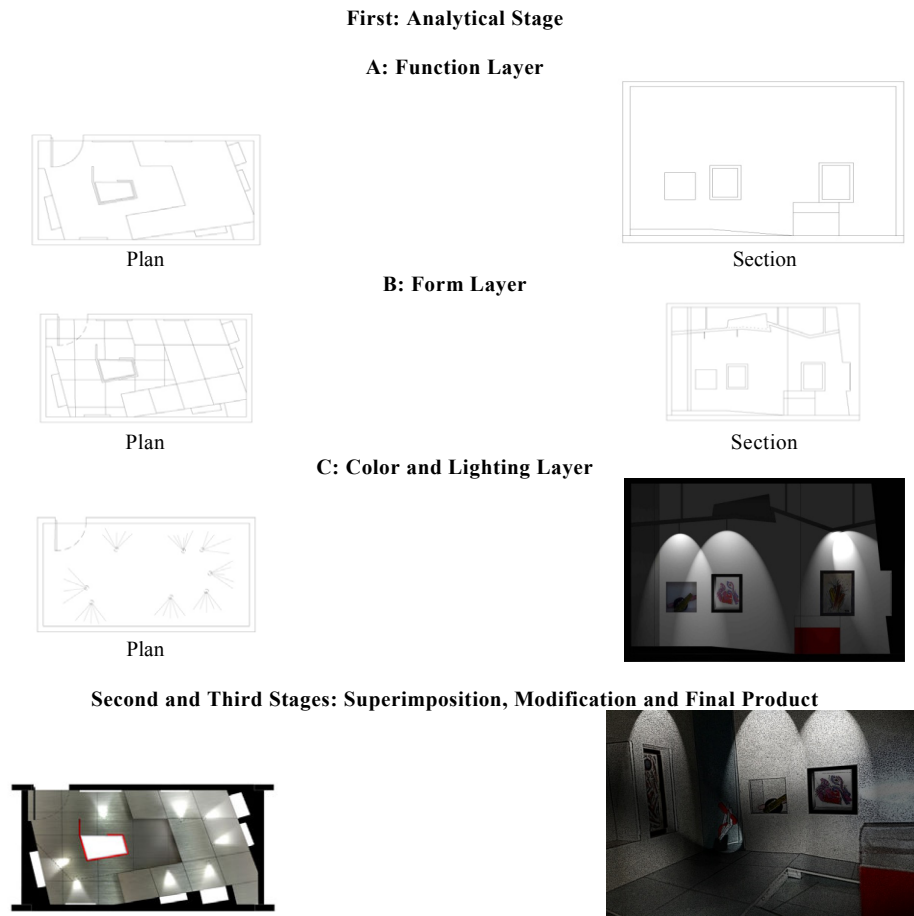


Fig. 6. Deconstruction composition - fourth theme.

The analysis of color and lighting layers dealt mainly with creative design decisions. The analysis of color layers indicated various design decisions influenced by the degree of color brightness, intensity and saturation. The decisions were influenced mainly by generative concepts and the big idea as the basis of the selection process depending on color schemes or formal reference. The analysis indicated three main groups: the contrast color scheme to achieve exciting, surprising, etc., as well as the homogeneous color scheme to achieve harmony, comfort and so on, and the third group, which tried to gather the decisions between the two previous groups.

The analysis focused on the general tendency to reduce numbers of used color in order to govern space balance and ease of single color significance. It also explained many constraints such as the difficulty of choosing the color of furniture due to the lack of experience in dealing with color schemes and the willingness of the students to experiment, the students' insufficient experience of methods of color-

mixing, how to adopt color treatments appropriate to the proportion or size of the space, and how to distribute the color in the space.

The analysis of the lighting layer indicated a variety and multiplicity of design decisions. The decisions focused on location, color, intensity, and brightness of lighting. It also referred to compatibility with natural lighting, lighting methods resulting in the virtual form, and types of sources such as linear or spotlight, which focus on a specific activity to demonstrate a sort of feeling of shade and shadow. For example, the analysis confirmed the correlation between warm lighting and excitement and interest, and between cool lighting and calm and stability. It showed a clear tendency for the direct lighting scheme to achieve comfort and clarity. The indirect and semi-direct lighting schemes which achieve strong shadows were used for the excitement, surprise and interest. Many design projects used more than one lighting scheme according to the location of different activities in the interior space. The analysis

focused on the problem of generating technical lighting using 3D Studio MAX, and compatibility between lighting point and activity. It seems that the variation between degrees of the previous lighting decisions, especially between the spatial content and the physical elements of the walls, ceiling and floor, increases the degree of fallen shadows and therefore affective quality. Therefore, the possible and favorite solutions visually took the appropriate creative decision and modified those decisions in accordance with the feedback process.

2. The synthesis and modification stages:

From the analysis of the problem and its parts, the students began to formulate possible solutions. This required synthesizing responses with the various issues and aspects of the problem, or bringing them together and integrating them, into a coherent solution. The synthesis of the design stage indicated conflict decisions that required changing. So, the synthesis relied on the superimposition of the functional, formal, and color and lighting solutions. These conflict decisions needed to be evaluated, modified and transformed as a whole. Also, the designers verified possible and favorite solutions to approach an appropriate decision. The feedback loop proceeded to address new concerns. The modification stage indicated that many design decisions were possible, such as adjusting the circulation and seating, embodying two-dimensional shapes to three dimensional forms, exaggerating formal volumes, and simplifying metaphoric form. Also, it reduced visual density by deleting and removing excess fonts as a result of the intersection with functional layer. The analysis showed the decision of the unsuitability of formal size with space size and thus the need for zooming, magnifying and modifying form angles.

The process of modification tended to reduce the visual intensity, transforming forms and its proportion, adjusting lighting angles toward activities, modifying distribution and the degree of intensity and brightness of some points of lighting. It also showed the adjustment of the varying degree of the color and lighting scheme, existing spatial proportion due to the space height, and accessories or complements. Finally, there were many feedback paths, some of which were taken during or after the stage of the synthesis and modification.

Results

The result of the current design process demonstrated many issues. The majority of students highlighted the potential of the current design process

through fragmenting design problems into operational layers. This process definitely explored problems and evaluated possible solutions more easily due to the limited variables and reduced perceptual loading, and increased the concentration of the designer. Thus, there is the possibility of more efficient design formulation. Obviously, the clarity of the process makes the process easier to explore and helps in identifying a separate solution for each problem.

Furthermore, the result revealed that the design of interior architecture adopted on functional criteria has less opportunity to use big ideas derived from formal metaphors of nature and art, with special constraints for natural metaphors. On the other hand, a generative idea depends on affective qualities to make it more suited to different functions, as it needs fewer types of design decisions such as color scheme, and does not require formal transformation. However, the student response tended to be influenced mainly by the big idea.

The results revealed that this process provides the designer with more time to integrate rational requirements and creative solutions. Different problems were raised at different times during problem solving. As a result of increasing the number of drawings, this mechanism increased the period of a dialogue happening during different stages, and therefore focused on details and elaboration. It was considered an interesting experience to move towards the unfamiliar atmosphere of interior architecture. The results explained that the small size of the given space leads to increased elaboration on one hand and some constraints on the other. This process is subjected to creative formal and symbolic spaces; therefore, it is not relevant for all projects. The greater understanding of the project through a more comprehensive way of thinking, achieved through increasing the concentration of the designer, facilitates the focus on specific objectives which assist him/her in the determination of multiple design decisions. It develops concentration and enhances imagination. The results show that the product of the design process encourages the user to stay longer in the space, verifies a new method to realize the interiors, and contributes to the concept and active formal semantics. This method increases the user's interaction because of offering a creative aesthetical visual scene and affective qualities. Accordingly, it increases the time of apprehension and interpretation of intellectual and emotional significance. However, many constraints of current methods, such as the frequent use of the space, may generate boredom while the different tests of the designer and user may reduce the degree of interaction. In order to practice

the current method, the designer needs to deal with many important issues like metaphor and abstraction processes, superimposition, and affective qualities. The product may be influenced by the psychology of the designer and needs more concentration to focus.

In summary, the study demonstrates the importance of the early stages of the design process in producing creative solutions. Superimposition is likely to present an active mechanism for the synthesis of conflicting decisions between layers supported by the feedback process. This design process largely highlights designer taste, personal sense, and psychological dimensions. This process shows a greater understanding of the project function, the big idea and the generative concept in a comprehensive way of thinking. Accordingly, the current design process gives priority to maximize the values of feeling and responses. Furthermore, it achieves creativity and aesthetic through formal and symbolic values of art and nature.

Conclusion

A universal methodology for conquering interior architecture problems does not exist. The aim of the design process may influence the composition of methodology, the types of mechanisms involved, and articulated design decisions. This paper has explained the central importance of different methods, models, techniques, and cross-cutting or intertwined design decisions that may fulfill the requirements of a design methodology for interior architecture. This study set out to give priority to the creative formal and symbolic aesthetic. In other words, the metaphor of an unfamiliar atmosphere may create the aesthetic on one hand, and support the derivation of a new composition of design method on the other.

The study revealed that the relationship between the generative concept, the big idea, and the nature of function are varied. In spite of that the big idea achieves more creativity and higher student response than the generative concept; the generative concept is more relevant to dealing with different functional spaces. It is clear that the function criteria is still in conflict with the big idea and the generative concept as a representative of aesthetic criteria, but it seems that there is an issue of more suitability between function and the generative concept, which more flexibly deals with the bottom-up method and selected design decisions. The study referred to the possibility of multiplying the visual design aims of the big idea and the generative concept in the design process in interior architecture. The fragmentation of the design process into operational layers definitely

makes the exploration of problems and possible solutions easier, and reduces perceptual overload; it thus increases the concentration of the designer. The current design processes intensify responsive values, and increase the thinking capacity of interpreters.

To sum up this investigation, the A/S model starts from functional requirements, while the C/A model starts from the designers' preconceptions. The current design process represents an appropriate selection of model, sequence of stages, concepts, and procedures and other design tools that shift attention toward subjective values and open ended qualities of desired perception and possible interpretation of occupant. It releases the mind from the rational association of ideas and the problem domain, and allows not only for new design processes to be shared that respond to individuality, but also for the changing nature of design problems which need to comply with various situations.

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نحو عملية تصميمية سايكولوجية للعمارة الداخلية

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الكلمات المفتاحية: العملية التصميمية، الآلية السايكولوجية، الفكرة المولدة، الفكرة الكبيرة، العمارة الداخلية.

ملخص البحث. تهدف العمارة الداخلية إلى التحسين الوظيفي والإثراء الجمالي وتعزيز السايكولوجي، حيث تبدأ العملية التصميمية بالمستوى العقلاني للتعامل مع الوظيفة، ثم تأتي الاستجابات العاطفية لاحقاً. ويعد التوفيق بين الوظيفة والجمال المتحقق بطرق سايكولوجية إحدى أهم تحدياتها. ولغرض إعطاء أولوية للجماليات لتحقيق الرموز والأشكال المددعة، يشرع البحث الحالي ببناء آلية سايكولوجية للعملية التصميمية في الفضاءات المعمارية الداخلية. وتكشف هذه الطريقة مسارات ومراحل العملية التصميمية وقراراتها التصميمية المساهمة. ولمعالجة المشكلة التصميمية، تضمنت العملية التصميمية مساهمة ٥٠ طالباً معمارياً خمسة أوجه مسحية استغرقت ثلاثة أشهر، واعتمد التوجه النوعي والطريقة الوصفية، وتضمن النموذج الافتراضي أربع مراحل للعملية التصميمية شملت التحليل والتركيب والتحوير والتغذية الراجعة. اعتمدت المرحلة التحليلية على آلية التشظية Fragmentation لفصل أو تجزئة المشكلة التصميمية إلى ثلاث طبقات Layerings تختص بالوظيفة، والشكل، واللون والضوء، حيث اتسمت الطبقة الأولى بالعقلانية والتعامل مع المعيار الوظيفي، واتجهت منهجيتها من الأسفل للأعلى Bottom-up. واتسمت الطبقة الثانية والثالثة بالتوجه السايكولوجي والتعامل مع المعيار الجمالي، فيما اتجهت منهجية تصميم الطبقتين من الأعلى للأسفل Top-down. واعتمدت المرحلة التركيبية Synthetic stage آلية التراكم Superimposition لوضع حلول الطبقات التصميمية المنفصلة السابقة فوق بعضها للوصول إلى الحل الكامل، ثم القيام بالعملية التحويرية والتغذية الراجعة. واعتمدت العملية التصميمية وبصورة متزامنة على الهدف السايكولوجي كمفتاح لفكرة مولدة Generative concept، والاستعارة الشكلية لمراجع طبيعية أو فنية كمفتاح لفكرة كبيرة Big idea.

أوضحت الاستنتاجات تباين العلاقة بين الفكرة المولدة والكبيرة وطبيعة الوظيفة، داعية إلى ضرورة تحرير عقل المصمم من المساهمات العقلانية للأفكار وإيجاد طرق تصميمية جديدة تستجيب إلى الفرد Individuality وتغير طبيعة المشاكل التصميمية في العمارة الداخلية.