Introducing A Design Creativity Card Tool For Students Of Architecture

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ABSTRACT

Architectural educations' main goal is to provide students integrated skills and knowledge. Design studio has significant role in this educational procedure. In this different environment, transmitting the knowledge is taking place through critiques. While more or less, finding design solutions and creating creative forms by students under controlled supervision taking place in different design semesters and years, students' independency is expected to increase. Despite many educational attempts at design studios still this objective is not achieved and lack of supportive educational methods or tools is acknowledged by many scholars.

The aim of this research is to develop an auxiliary tool called flash card system, to be used in parallel with design studio critique sessions, and help students in decision makings and aids them to manage their own design process.

Multilayered methodology is used in this study which consists of two phases. First phase tries to find student's critical stages in their design process by conducting interviews with instructors and distribution of questionnaire among architecture students at EMU. In the second phase, studying, analyzing and categorizing features of three well-known design methods presented by Alexander, Schon and Fakhra, this study tries to coincident their strengths with needs and expectations of case study (department of architecture EMU) and develop a user-friendly model in flash card format.

The data analyses have shown that students' and tutors' are all agree in two main critical stages of design which are data development (synthesis) and form making.

The developed and proposed model and flash cards are trying to bridge those critical stages, which are mainly escaped by students with other stages of design process. Since all of presented instructions and clues in proposed flash cards are stem from direct observations at midterm and final jury sessions at EMU, it could be acknowledged that existing procedure at studios are covering any aspect of design from tutors side but students need to adopt and equip with sequences, priorities and creativity in each step, to have better time managing as well as good outcomes. Final results of this study reveal the flash cards are properly serving what was expected from it.

Keywords: Architectural education, Design process, Design auxiliary model, Flash card

ÖZ

Mimarlık eğitiminin ana amacı öğrencilere karma bilgi ve beceri sağlamaktır. Tasarım stüdyosu bu eğitim prosedüründe önemli bir role sahiptir. Bu farklı ortamda, bilgiler kritik yoluyla iletilmektedir. Öğrencilerin bağımsızlığının farklı tasarım dönemleri ve yıllarında gerçekleşen tasarım çözümlemeleri bulmak ve yaratıcı formlar oluşturarak artması beklenir. Tasarım stüdyolarındaki bir çok eğitsel girişimlere rağmen bu hedefe hala ulaşılmış değildir ve destekleyici eğitim metodlarındaki ve araçlarındaki eksiklikler birçok araştırmacı tarafından kabul edilmektedir.

Bu araştırmanın esas amacı tasarım stüdyolarındaki kritik oturumlarıyla paralel kullanılacak bir yardım aracı geliştirmek ve karar alma aşmasında öğrencilere çok bağımlılıktan az bağımlılığa yumuşak bir geçiş konusunda yardım etmektir.

Bu çalışmada kullanılan çok katmanlı metodoloji iki aşamadan oluşmaktadır. İlk aşamada, öğretim elemanları ile röportaj yaparak ve DAÜ mimarlık öğrencilerine anket dağıtarak öğrencilerin tasarım süreçlerindeki kritik aşamaların bulunması hedeflenmektedir. İkinci aşamada ise Alexander, Schon ve Fakhra tarafından sunulan ve çok iyi bilinen üç tasarım metotlarının özelliklerinin çalışılması, analiz edilmesi ve kategorize edilmesinde örnek olayın rastlantısal güçlü yönleri ile ihtiyaçlarını ve beklentilerini denemek ve flaş kart formatında kullanıcı dostu bir model geliştirmek hedeflenmiştir.

Veri analizleri göstermiştir ki; öğrenciler ve öğretim elemanları tasarımın iki ana kritik süreci olan gelişim (sentez) ve form verme sürecini kabul etmektedir.

Geliştirilen ve önerilen model ve de flaş kartlar bu kritik aşamalarda, özellikle öğrenciler tarafından gözden kaçırılan tasarımın diğer süreçlerinde köprü olarak kullanılmaktadır. Tüm talimatların ve ipuçlarının önerilmesinden dolayı flaş kartlar DAÜ vize ve final jüri oturumlarında direkt gözlemlerin temelini oluşturarak, öğretim elemanları tarafından mevcut stüdyo prosedürünün herhangi bir yönünü kapsayarak kabul edilebilir. Ancak öğrenciler iyi sonuçların yanında, zamanlarını daha iyi kontrol edebilmek için her adımda, sıra, öncelik ve yaratıcılık gibi unsurları benimsemelidirler. Bu çalışmanın nihai sonucu, flaş kartların kendilerinden beklenen hizmeti düzgün bir şekilde sunduklarını ortaya çıkarmıştır.

Anahtar Kelimeler: Mimarlık Eğitimi, Tasarım Süreci, Tasarım Destek Modeli, Flaş Kart

To My Family.

For their endless love, support and encouragement

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INTRODUCTION

1.1 Research Background

Architecture education has different aspects that each needs to be studied. Accreditations of education processes, curriculum, professionalism, pedagogy are only some of these aspects. For many years experimental learning through the studio has been at the core of these. The design studio is a type of professional education, traditionally in schools of architecture, in which students undertake a design project under the supervision of a master designer. A characteristic feature of the architectural design studio is its learning methods, which are rooted in experiential learning or learning by doing (Biggs 1999).

The project as a vehicle for learning by doing is recognized as a highly successful mechanism for developing and embedding knowledge and skill (Manley & Claydon 2000). As an activity the design process, in education and practice, has been used as an exemplar by schon (1983) and others of how reflection in action operates. The iterative nature of the design process also mirrors Kolb's learning cycle and connects theories of individual learning styles and preferences (Honey & Mumford 1992; Honey & Mumford 1996). Researchers such as Kolb (1984) and Cowan (1998) have shown how learning can be enhanced when it organized around cycles of learning activity and reflection. Cowan (1998) distinguishes three different types of reflection that can contribute to learning and development:

- Students can reflect before they engage in activity (that is reflection for action)
- They can reflect while in activity (reflection in action)
- They can reflect after an activity (reflection on action) and before going on the next activity

Each of these three helps develop deeper and more elaborated knowledge and skills. While active learning is a necessary condition for the development of personal understanding it is not sufficient on its own, according to learning research (Brockband & McGill 1998). To develop understanding from experience requires students consciously and systematically to reflect on the experiences that result from action (Brockband & McGill 1998; Walker 1985).

Critical reflection is a process of analyzing and evaluating personal experience, and making sense and generalizing from that experience so that future learning is more skillful and better informed. Reflection is a way of linking together theory and practical experience so that both inform each other. Key principles of effective learning are learning as an active rather than passive process, and collaborative learning enhances individual learning. Research on learning in higher education shows that what the student does is actually more important in determining learning than what the teacher does (Shuell 1986). The development of autonomy in learning requires that students learn not only how to judge their own design output (product) while learning, but also how to evaluate and improve upon their own learning processes from one design project to the next. More specifically students need regular opportunities to step back from design project activities in order to analyze and evaluate how they learned through those activities and to provide their own

feedback (Volwes 2000). While reflection in action is not new to architectural education there is a need to plan for it in the design courses.

1.2 Problem Statement

The design studio sessions and critique sessions, are the maximum part of architecture education and the most effective. The project review or critique has been the cornerstone of architectural education for generations. In it, each student will have a chance to express own perceptions and ideas and make a dialogue with teacher and expose himself to judgments and in this way by gaining experience try to upgrade problem solving skills. This method is based on reminding the learned issue, data analysis and creativity in re-employing experiences and knowledge and all the efforts are to increase student's self-criticizing ability by continuous criticisms (Schon 1987).

Although tutor's critiques in studio help students develop their own critical abilities and improve reacting to the consequences of each action and gain self-conscious experience about what they are doing, but surprisingly what rose as new challenge and dilemma in architecture education is students ability to realize how to start the design procedure and how to control it during designing. In order to realize this challenge the question is; which part of design process is difficult for design students in their designing? and which method help the students to manage their own design process? There are several theoretical studies on design process but this topic suffers from severe lack of studies and proposals in a usable manner at studios work together with critique sessions at studio (Fakhra 2012). These proposals and methods will enhance students self-conscious decision making ability and procedure control. But it seems that such studies are not taking enough consideration for mainly two reasons.

Firstly, few critique sessions programs are consciously structured to lead students manage their own design process during undergraduate years.

Secondly creativity and proper decision making in design process is discussed ambiguously and is very much dependent to students' talent or tutors ability. The given critique at studio would seem to be an ideal method to develop learning skills but other potentials seems not fully realized and used. So there is a severe need to do some study and discourse on possible supportive methods or guidelines to weekly critique sessions at design studios.

1.3 The Importance of the Thesis

Education is a contiguous and consecutive process. Thereby learning skills and knowledge in any context, requires strong and potent academic basis. On the other hand designing is a procedure that requires a controlled conduct. But in any discussion about the design procedure and form making at schools we quickly find how slippery the object (Fakhra 2010).

Remarkably little has been done about compatibility among well-known theories presented by most cited scholars (Schon, Alexander etc.) with real expectations, needs and concerns in architecture design studios. This study, therefore, will help in the development of future studies and its potential for positively influencing learning in higher education. This study will present flash card set to support students while there are in challenge of design and tries to enable them make more matured decisions by reminding necessary issues they have learned before, on time and give them variety of possible choices that may increase their creativity level especially in form making stage. This study is important because it tries to avoid students explicit tendency to escape from necessary stages of design (analysis to form making and

ignoring synthesis part as example) and just rely of intuitions, creativity and tutors comments. These proposed flash card set is important because it could cover all the exigencies of design process and work as very user-friendly method.

1.4 Objectives of Thesis

The objectives of this research are described as follows:

i. To document, study, explore and analyze different theoretical approaches, methods and practices of design process and form making methods.

ii. To critically analyze the design procedure and form making strategies based on tutors and students experiences, comments and direct observations at department of architecture EMU.

iii. To reconstruct the idea of form making approach based on three introduced (Schon, Alexander and Fakhra) models.

iv. To develop, evaluate and analyze flash card sets proposed based on three introduced models (Schon, Alexander and Fakhra) and obtained results from case study (EMU department of architecture students).

1.5 Methodology of the Research

This study provides an in depth study as literature about most cited theories on design process and form making. In this study a multilayered methodology is deployed in two phase. Phase one intends to understand the student's critical stages in their architectural design process. So in order to find out the critical stages, by interviewing from instructors and distributing questionnaire among students at department of architecture EMU, it was tried to evaluate students' design weaknesses and strengths for achieve better clues to make reliable model in helping the students to manage their own design process parallel with instructor's critiques.

Two methods of data collection were applied for the questionnaire and interview. A questionnaire contains the Likert measurement and some open-ended questions. In phase two, after interviewing the instructors and distribution of questionnaire among the students which lead to recognize the student's critical stages in their design process, it is intended to propose a model which students can manage their own design process parallel with instructor's critiques. In this phase, three well-known methods are introduced and by analyzing their strengths and weaknesses, it is tried to superpose those strengths with needs and expectations of case study. Then it tries to introduce a new auxiliary tool by use of flash card system as a supportive tool to help the students to solve their design management problems and ease creative form making. Moreover direct observation was used for the whole study period.

1.6 Limitations of Research

This thesis is based on a qualitative and quantitative approach to explore perceptions of critique employed in the studio. The qualitative approach is used to construct the boarders of research and quantitative analysis is used to provide an indication of the effectiveness of the implemented model. So the general outline of the thesis is:

1. Case studies of this research are Eastern Mediterranean University, department of architecture students.
2. The proposed flash card set is able to just give support to its users in parallel to weekly design studio critiques to early stages of design and it is not claimed to serve independently.
3. The proposed flash card set will cover the stages of design from site analysis to geometrical factors in form making. Therefore structural and internal space

organization is part of this study limitation and proposed as future work of this study.

4. Final distributed questionnaires and interviews among students and instructors are, only to evaluate and confirm recommended flash card set and finding the further development stages and not on the overall process.

1.7 Structure of the Thesis

In chapter one a research background presented. Then the problems, purpose of study, limitations and scope were discussed. In chapter two, the relevant literature about architecture education generalities, design process, creativity and form making with theorical support reviewed. Following that, chapter three provided an action research and a multilayered methodology is deployed within two defined phases. Chapter four illustrates the findings based on instructors and students perceptions and point of view. Then will discuss on the findings based on Case study result and three introduced model (Shon, Alexander, Fakhra) to find strong and weak points of them and present Flash card set and the reflections on the proposed model which come from questionnaires among students and instructors. Finally, chapter five would present the conclusion, significant contribution of the research and suggestions for future works. The diagram for thesis structure is presented in Figure 1.1.

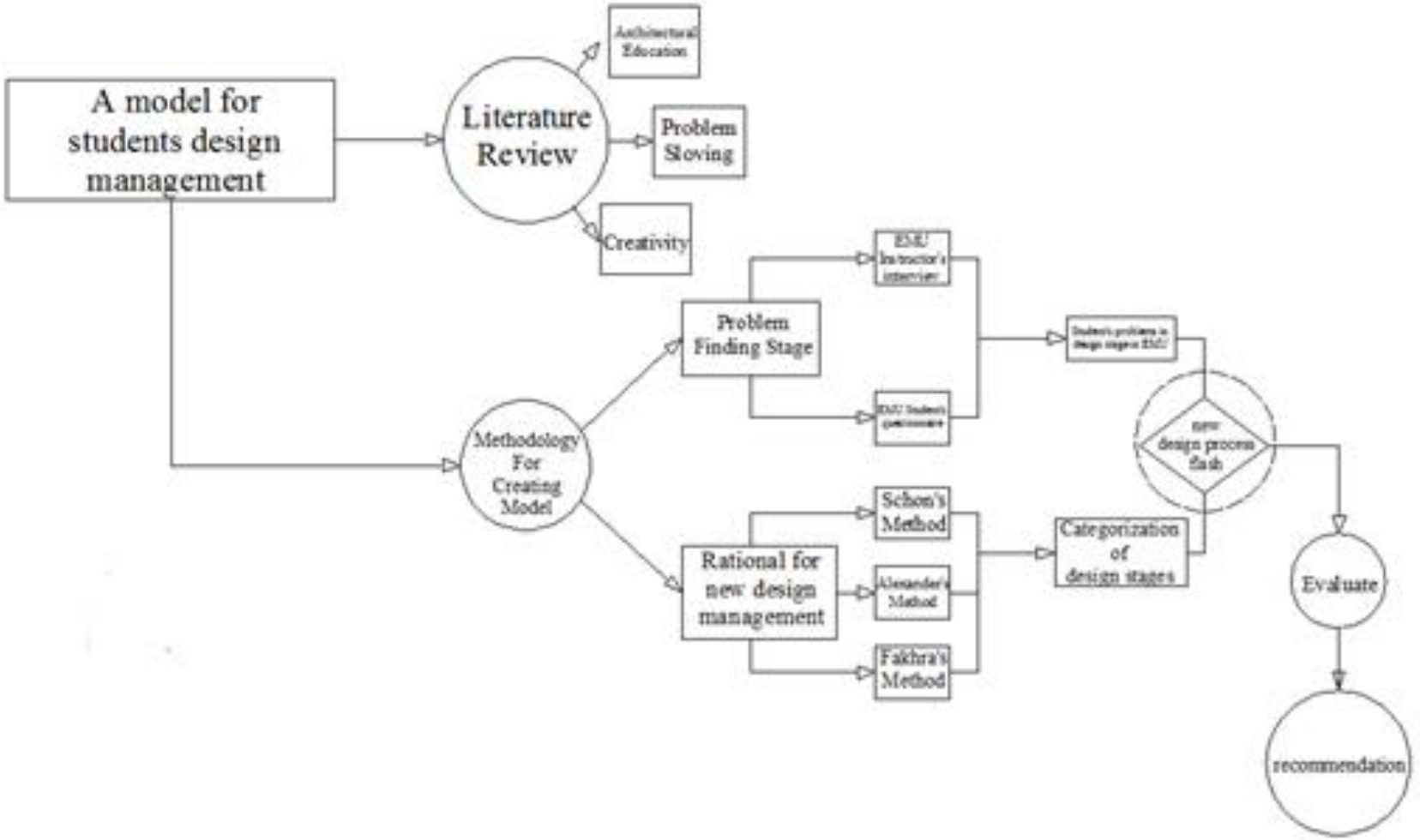


Figure 1.1 Thesis Structure

Chapter 2

LITERATURE REVIEW

2.1 Introduction

This literature review focuses on three relevant areas: Architecture education, design process, and creativity. The first area is architecture education, specifically on the characteristics that make this education different from conventional models. This research examines the evolution of architecture education which is a relevant discussion to understand how the design studio functions, what the architecture design studio pedagogy is, and what interaction in the design studio normally is. Second relevant area is design process is well established and respected. Design process at school design studios, however, have not received its due amount of attention and is not well understood. There exists a need to further develop and understanding of it, particularly as a main feature of the studio setting, to contribute to student's understanding and learning. The following literature review covering several topics relating to design process, such as problems solving, problem type, compatibility and source of good fit, conscious process, program and realization of it. Creativity in architecture design process and supportive models to enhance students' creativity discussed as well.

2.2 History of Architecture Education

Before the design studio education, design was learned through student-master model (Fisher 2000; Kostoff 1977). Current method at any institution is the result of synthesizing the educational systems from several countries. The origins of the

design studios are attributed to four different systems: Britain, France, Germany, and United States.

1. The UK Model

The natural mode of education in UK is the self-controlling mechanism of apprenticeship. This was a modification of the medieval model. This model lasted five or six years and often included attendance at a local arts academy, and perhaps foreign travel. The United Kingdom pioneered the concept of professional association, Royal Institute of British Architects in London (RIBA) in 1837. The first school in the United Kingdom which offered a structured program of instruction was the Architectural Association (AA). UK model has strict emphasis on apprenticeship model.

2. French Model: *École des Beaux-Arts*

The *French Académie Royale de Peinture et de Sculpture* (The French Academy of Painting and Sculpture) (Draper 1977; Kostoff 1977; Zanten 1980), was established in 1648 (Lagasse et al. 2001). The dominance of the master studio remained. The French architectural field was structured very differently to the British and France invented academic architectural education. It means that Learning by doing, a process where the design problem took preference over the lecture and became the vehicle by which architecture was taught, was introduced into art and architectural education at the *Ecole Nationale et Speciale des Beaux-Arts* in Paris in the 1890s. The focus of student life and activity of the Ecole was the design studio where competitions were carried out. Most studios were run independently by design professors. The newest student and the senior helped each other. The cornerstone of

the Beaux Arts system was the design problem assigned to the student early in the term. It began as a sketch problem. The Beaux Arts teaching systems relied heavily on brilliant teachers and learning-by-doing. (Littmann 2000).

3. Germany School

In Germany, architectural education was taught at technical universities. German professions arose with the development of powerful civil services in the late eighteenth century (Fitch 1960; Nerdinger 1985; Frampton 1985).

4. United States Model

European tradition has greatly influenced American architectural education. They were looking at Europe for a standard. The Ecole's philosophy was imported to the United States, and most architecture schools in the early part of this century had at least one Paris-trained professor. The major differences between the British and American systems of the professions are the much weaker historical continuity and associationalism of the latter. No architect needed to be licensed until 1897. American Institute of Architecture (AIA) has established on 1857 but it has never exerted the control of professional education that the RIBA does: the National Architectural Accrediting Board, loosely associated with the AIA, only began its work after World War II, while the RIBA was exerting direct control over university schools from their foundation.

The history of design education illustrates some important characteristics of the current design studio mode from its inception; however, Austerlitz (2000); Aravot & Ben-Ze'ev (2002) outlined four characteristics that make the modern day design studio a different learning environment than it was in the past:

(a) The reflective learning component

(b) The personalized design process, which implies creativity

(c) The instructor's influence on the product of the project

(d) The fact that a student's actions, personality, and feelings are laid out in the open

Indeed, other characteristics suggested by Lueth (2003) also make the design studio a unique educational environment unlike other environments: (a) the influence that students have on each other; (b) the influence that students could have on the instructor (in terms of creating an environment that may or may not be conducive to teaching); (c) the influence of the physical environment; and (d) the influence that the products created during class time and outside of class time might have on the students' learning.

The educational environment in the design studio, therefore, is defined as the components of the physical, pedagogical, and virtual (the classroom through the internet) space that have an effect on the education of the participants (students and instructors). The most significant change that took place in the design studio since the 1930s was the gradual evolution from closed juries to open juries. Open juries later became something of a status symbol for educational institutions, a means by which prospective students could sit in on a critique and form an opinion on the intellectual rigor of a particular school (Anthony 1991).

Today's design studio model which focuses on learning by doing, is based on traditional form of schools of architecture, in which students after taking courses, basic architectural graphics and communication , architectural building subjects may be given a diploma for bachelor's degree in architecture. Most of graduates have

gone through similar programs. The intentions of the architects may be the same but the training procedure, criteria and curriculum may differ depending on the schools (Lackney 1999). The understanding of the architecture studio based learning and their problems contribute to the development of a set of recommendations for improvement.

2.3 An Overview to the History of Design Process

In these days, researchers of design theory, scientists, experts and also designers, have projected a wide demonstrations to explain the core and principles of design activity (Achten, 2008; Alexander, 1964; Clarkson & Eckert, 2005; Cross, 2011; Lawson, 2006; Moore, 1974; Snyder, 1979). Design process have advanced over the centuries when the human intended to create some instruments for his/her regular activities, even can be related to thousands of years ago. The starting point of the design process comes from the Vitruvius. He created the first design principle and method and worked on the town planning, construction and design education in 25 BC (Gelernter, 1995). His first concepts started from imitating the nest of birds to build out shelters. More elements were added based on their needs to adopt themselves with the environmental changes. They improved these first imitations and experiments by observing and adding needed elements according to their own perceptions from the living environment (Vitruvius, 1914). The first systematic definition of process for designing was introduced in the 1960s (Archer, 1968). Four steps which acts like close loop was suggested by Markus (1967) and consequently Thomas Maver(1970) which are including from: analysis, synthesis, evaluation and decision (Lawson, 2006).

In this way, John wade (1977), divide the design process into 3 parts: primary state, method or process of transformation and imagined future statues. He believed that the design process is known as generating the suggestions which helps to transform the things in a way that can be better. So in John's process, the designer is a person who understands the problem and achieves for solutions and implement those solutions.

But MacGintry created another steps for design process. He suggested 5 steps of process from primary to future state which are: Initiation, Preparation, Proposal Making, Evaluation and Action (Snyder, 1979).

The initiation step is problem defining or in a better word, finding the needs and requirements. So after understanding the needs it is the time for collecting data and information which is related to that problem and needs which "Programming" is the term for a system of information framework (Snyder, 1979). Making proposal or so called synthesis is another step of the design procedure. The proposals are a kind of physical dimension of integrating very large number of issues and parameters and all these criteria are overlaying layer by layer to fulfill the problems and requirements of the project. The next step is evaluation that can be applied in different dimensions like: generating potential design, creating the systematic management for the projects, the measurement of proposed solutions and building the goals for the design and finally the action stage which the project is step by step going to be prepared and confirmed (Snyder, 1979).

But in 1970 James Snyder proposed different process for designing. He believed that design process is an endless repetitive cycle which includes from six steps. As Figure

2.1 presents, the first step is known as “brief” and in other words it starts from a programming. Then the important information or data is gathered in “Analysis” stage. The third stage is contains from “Synthesis”, which is blending from large number of issues and data. Then the “Implementation” is done by designer. After that if the design was successful and logical that accepted by clients, it will be preceded to communication and if not this cycle will be repeated again until the design gets complete and successful.

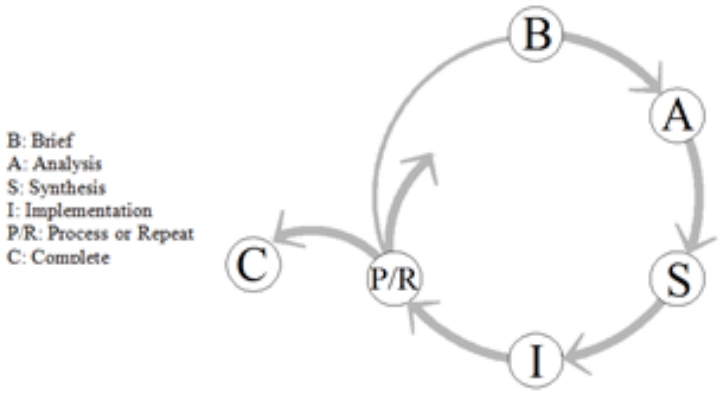


Figure 2. 1. Snyder's cyclical design map (Snyder, 1970)

Lawson (2006) believes that there are no steps in design process. He points out that both problem and solution are in a way to reflect each other and they are not separated. As it can be seen in Figure 2.2 the activities of analysis, synthesis, evaluation and solution are definitely involved in the process but the map does not show any starting and finishing points or the direction of movement from one step to another one and it is far from a simple activity and needs complex mental process.

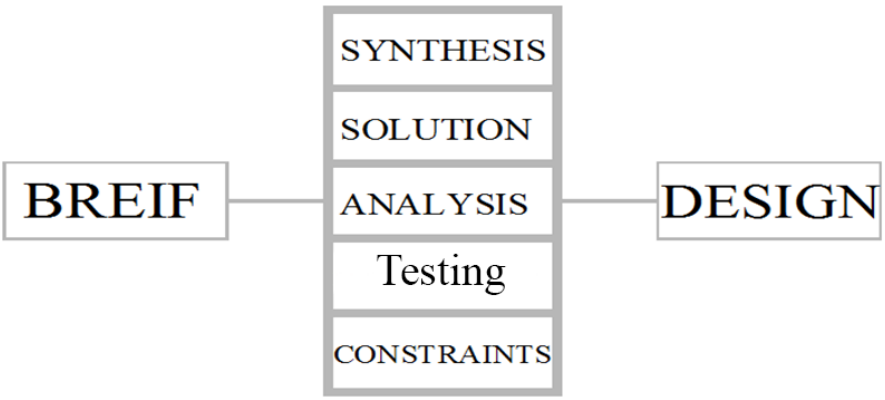


Figure 2. 2. Lawson's idea about design map

Alexander (1964) emphasized a cartesian rationalism for the solving of design problems. His book “Notes on synthesis of form” is supplemented by modern set theory and graph theory. In his provided design process, Problems are broken into their smallest components and each component need to be solved separately, and then finally synthesized into a grand solution (Alexander, 1964).

Alexander (1964) states that final object of design is form and the problem of design is “to fit the form to its context”. Form is a significant part of the design over which designers have control. Context is also part of the design which puts demands on this form (Grabow, 1983). Alexander focused on methodology but not on providing the “ultimate solution”. His method included regrouping the misfit variables, working out a solution to each of these groups, and combining these solution groups into a new whole (Alexander, 1964).

2.4 Problem Solving

The critical concerns of designers and architecture students are related to designing. Designer needs to create beautiful and functional products. Therefore design demands more than an aesthetical realization and on the other hand needs complex mental process of integrating large variety of information, skill with the set of

coherent ideas and to create forms (Schon, 1983). Herbert Simon (1976) introduces designing as process of optimization and tool for solving the problems in the best way. In this regard Dewey (1938) defined designer as a person who alters the ill-defined problems to well-defined problems by optimal solutions.

2.4.1 Problem Types

Design actions can be perceived as the reasoning from a set of necessities, requirements and purposes to come to reality, containing of a (physical) configuration and an intended use (Drost, 2003). This procedure of reasoning is known as non-deductive; there is no 'closed pattern' of reasoning to attach the needs, necessities and purposes with a form of an product and a mode of use. This 'openness of a design problems were presented in 1972 by Rittel and Melvin as wicked problems. These problems are known as ill- formulated which the information are unclear or the number of variables, clients and decision makers are somehow confusing. Later in 1973 Simon mentioned that the problem space in wicked problems is considered too huge; in another word in ill-defined problems the possible solutions cannot be counted. Upon better review Drost (2003) found two ways that a design problem becomes ill defined: [1] an explanation in terms of needs, necessities and purposes cannot be complete (Roozenburg and Eekels 1995) and [2] needs, necessities and purposes relate to different conceptual worlds (Meijers 2000). These two kinds of ill- defined problems cause to make a gap between design problems and design solutions and usually make it somehow impossible to solve the problem. For solving these problems designers try to put different things together and due to the variables, constraints, primitive information and discoveries, create new things (Schon, 1988). In a better way Schon mentioned designing as complication

and synthesis which Alexander (1964) called it as the compatibility of form with its context.

2.4.2 Compatibility and the Source of Good Fit

Alexander (1964) in his book "Notes on synthesis of form" discussed about the reasons of form existence, and the compatibilities of the form with its context. He refers that if the world is ordered there shouldn't be any form and everything should be without shape and perfect but disordered world tries to compensate its disorders with adaptation of itself and thereby accept form. Arcy Thompson (1917) mentioned considerable idea about form. He stated that a form is the diagram of forces on the disorders. These disorders are known as the sources of functionality of a form. It means that these functions specify the incompatibilities and disorders and define the existence of form.

Alexander (1964) refers that there will be no readable physical form until the designer doesn't make any readable program in his mind at the beginning of design. So if a designer wants to reach a readable form he/she should initially follows the basic functional roots of the design problems and after that finds a pattern for it. He also stated that in order to solve the design problems, the form should have compatibility between its context, but the main point is, reaching to this purpose, needs internal organization and also compatibility between the elements and components inside the form. (Alexander, 1964). Form is a part of the world that it can be controlled by designer, the part that designer intend to shape, while the context is a part of the world which suggests the needs to the form (Alexander, 1964). So it can be said that whatever in this world that creates the needs is called context and the compatibility is the ability of connection between these two (context

and form) (Alexander, 1964). In fact, we want to divert the context and form to a kind of relation that is free of abnormalities and contradictions. Form and context are complementary of each other. Realizing the context and discovery of the form which can be compatible with it (context) in fact are two aspects of the process. Because the context is vague and ambiguous that makes the compatibility of the form to be confused (Alexander, 1964).

Although compatibility and good fit is always known as positive concept in everyday life, but it seems that it originates from the negative points to a large extend (Alexander, 1964). The imbalance and inappropriate aspects always attract designer's attention, so it can be said that considering the special points of incompatibilities between form and context, is one of the simplest ways for defining the compatibility and good fit. Designer is looking for a harmony between two inconsistencies; a form which is not designed yet and a context which cannot be explained in a correct way (Alexander, 1964).

2.4.3 Unself-Conscious and Self-Conscious Design Process

The best example for understanding the compatibility between form and context can be found in primitive civilizations while these days by developing the technology, everything can be gained easily by spending money. For example instead of putting the building in the logical direction in the context, designer try solve the incompatibilities by coolers, lamps and other types of arrangements. Mousgoum cottage in the Cameron can reveals how the primitive civilization forms were compatible with their context (Alexander, 1964). In those cottages the hemispherical shape of roof is playing an important role for transferring the heat and maintains the inside from heat of the tropical sun. On the other hand, the cottage sits beautifully on the dents and troughs of the ground. The grouping of cottages, show the social order

of their residents. The cottage of every men, surrounds with cottages of wives and subservient. While in this method, the subservient creating a wall surround the chief's cottage and thus protect chief and themselves from invaders and wild animals (Alexander, 1964). But in comparison with primitive civilizations, organizing the form under new complex restrictions are problems of these days civilizations which primitive civilizations didn't confronted with these complex problems. Alexander divided these civilizations into two groups. He called to designing process of specific primitive civilizations as unself-conscious process and these days' civilizations as self-conscious process (Alexander, 1964).

In unself-conscious process, creation of forms was educated by duplication and modification while in self-conscious process education of creating a form is done based on academic procedure and clear rules (Alexander, 1964). In the unself-conscious process, a similar form, repeats again and again and for learning the creation of from, the people just need to learn how to repeat a physical pattern while in self-conscious process, new ideas and subjects plays an important role. A person who creates a form should always confront with the new and developed ideas (Alexander, 1964).

In the unself-conscious process, one aspect of the form generating system is contains from special and fixed patterns that originates from traditions, fictions and restrictions and are resistant against arbitrary changes. The form makers apply the changes under critical emergencies, it means, without any severe abnormalities the form doesn't needs to be repaired (Alexander, 1964). Directness is the other important aspects of form generating process in the unself-conscious system. In this system, the problems and corrections move head to head. There is no distance

between realizing a problem and re solutions of it. This fact that the owner is the builder of his own house is also in interconnected with directness (Alexander, 1964).

Thus only the necessary and urgent changes are allowed to be occurred. When a form was compatible in a good way, there will be no changes again, until the compatibility is going to be fails and disturbs. If it does not happen, the repercussions and ripples (which is started by smallest problems) will develop bigger and wider which cause to be impossible to correct it (Alexander, 1964). Whenever a small problems occurred, reaching again to equilibrium is certain and not only the forms can be well compatible with its context but also it will be in active equilibrium. In this case it is important to know that the person, who is maker in this process, needs no creativity. It is not necessary for him to make the form improved. His duty is just solving the confronted problems (Alexander, 1964).

But self-conscious process is different in comparison with unself-conscious process. Basically if one of the advantages of unselfconscious is producing the compatible forms, in the opposite side, forms in self-conscious process have bad fit. The reaction to the problems in unselfconscious process was direct, but now in self-conscious process it is not. In the past when the process has slow movements and had more time to adopt itself with the changings, now the process of adaptation can’t keep up with that because the speed of the development is increased too much and the modification of forms cannot adopt itself with these fast changes.

The most significant feature of self-conscious process is emphasizing of the maker on individuality. He is willing to separate himself from others by inventions and making creative forms, because architects livelihood is obtain by reputation

(Alexander, 1964). But the individualism in self-conscious process is not arbitrary. This individualism is the outcome of natural decision of a person which spends all of his life on an activity which called as "Architecture" (Alexander, 1964). For converting the architecture to a dependent discipline, basically, many changes need to be done in the form making process. This kind of architecture in fact failed from the beginning of its starting (Alexander, 1964). With invention of "Architecture" as a teachable discipline, the older form making process got weak and lost every opportunity that could cause to a success (Alexander, 1964). The self-conscious realization of an artist from individuality of himself, effects deeply on the process of form making. In this case, form is seen as a production of an individual work and the success is related to the individual himself. Self-conscious process intends to break the roles and boundaries which is an opportunity for experiencing individualism, escaping from traditions and reaching to a dream of self- determination (Alexander, 1964).

In another way, the low capacity of a designer makes the existence of self-conscious problem unavoidable. The self-conscious is not weak only. When designer understands his weakness in fighting with the problems, he/she put some steps for solving them, and again these steps cause bad effects on the methods of form making process and in fact it can be seen that the lack of success in the self-conscious system, is not only merely related to low capacity of the person, but also depends on the other factors such as the endeavors to overcome to his low capacity (Alexander, 1964).

So Alexander reveals that to overcome the complexity of problems in self-conscious process, designer should categorize the various aspects of the problem and

incompatible variables and put them in discipline. In order to be more understandable Alexander (1964) gives an example about designing a simple kettle. The designer has forced to design a kettle that can be compatible with its surrounding context. the kettle should not be too small, when it is hot picking it up should not be difficult, shedding the water from inside should not be too difficult, the water inside the kettle should not easily get cold, the materials that the kettle builds from should not be too expensive, cleaning the kettle should not too difficult, the kettle must be in a shape that producing it can be easy, the kettle should not rusting in a kitchen that has much water vapor, it should have warning sensor system that when the water is going to finish during boiling, can turn it off automatically (Alexander, 1964). This simple example of kettle can includes many incompatible variables while in a complex design like designing a residential complex contains a long list of these variables.

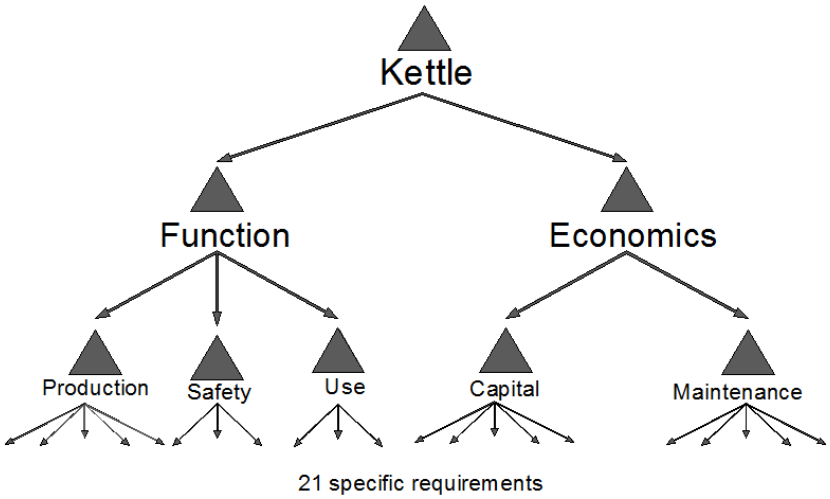


Figure 2. 3. Categorization of Incompatible Variables of a Kettle (Alexander, 1964)

Then designer tries to classify them into two groups for example function and economics like Figure 2.3 and put all other variables into their subcategories. By this work designer makes a discipline for categorizing the variables which Alexander (1964) called “program” for this discipline which is the starting point of designing.

2.4.4 The Program

So the first step to reach readability of form which can adopt with its context is finding a suitable and readable program (Alexander, 1964). In the unselfconscious process this process is simultaneously done and no need for this program at all. In this system the builder can't change the pattern of process because he doesn't have enough ability to control the process.

But in self-conscious process the situation is changed. In order to overcome to the confusion of variables, invention is playing an important role in this situation and designing is getting necessary. However, for better understanding of this issue, it should be understood the role of designer. Alexander compared the processes with each other by mentioning three patterns.

In the first pattern as presented in Figure 2.3 the complex bilateral interactions of C1 and F1 happens in the real world. This process is direct relationship between context and form that cause to produce unself -conscious process.

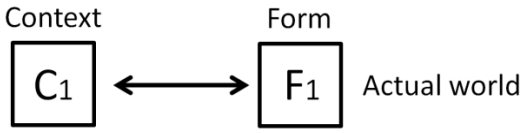


Figure 2. 4. Unself- conscious Design Process

In the Second scheme (Figure 2.4) which is known as self-conscious process, form is made not just by interaction between the real context 's needs and the actual incompatibilities of the form , but it includes from a conceptual interactions between the conceptual image of the context that the designer has learned and invented, and on the other hand the ideas and diagrams and drawings which match with the form.

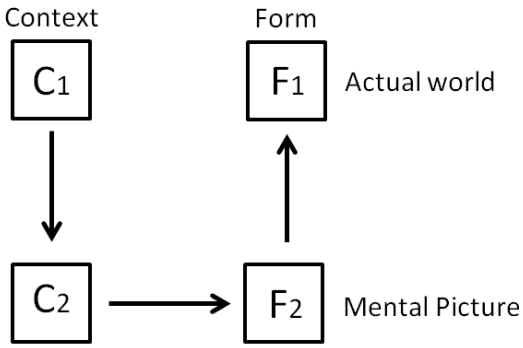


Figure 2. 5. Self-conscious Design Process

In this process designer tries to find the main problems and also create forms that can satisfy them but the exact nature is vague, so the forms are not usually fitted into the context. In unself conscious process there is no image in the producer's mind, so the form will not be wrong, because it is in sever interaction with its context but in self-conscious process, designer designs by the image made in his mind and because this image didn't tested, will be almost wrong.

In the third scheme shown in Figure 2.5, Alexander considered the further abstract and logical image from the first image (C_2). The vague and wrong image from requirements of C_2 is followed by the third logical and mathematical image (C_3). All demands and needs are reviewed logically, misfits are specified clearly and the interaction between requirements and misfits are determined.

Then this image is shifted to F_3 before F_2. Now it can be said that this form is understandable and solvable because it shaped far from the vague picture of C_2 and F_2 (Alexander, 1964). Alexander reffered that the third image or C_3 is contained from mathematical entities called 'sets'. The elements that existed in the sets can be real or virtual but it must only be possible to recognize them and to separate them from each other. In fact, a set is a problem analyzer tool so different kinds of misfits

from different issues give the sets real and capable characteristic. Some of misfits conflict with each other, some have common physical implications and some still do not have interacted at all.

Now if designer focus on the structure, the important feature of each structure is its articulation. Designer can show this feature with concept of decomposition. The most famous diagram for decomposition concept is tree diagram of sets. Decomposed elements placed under its own set and easily can be specified (Figure 2.6).Alexander called for this kind of decomposition as “program” (Alexander, 1964).

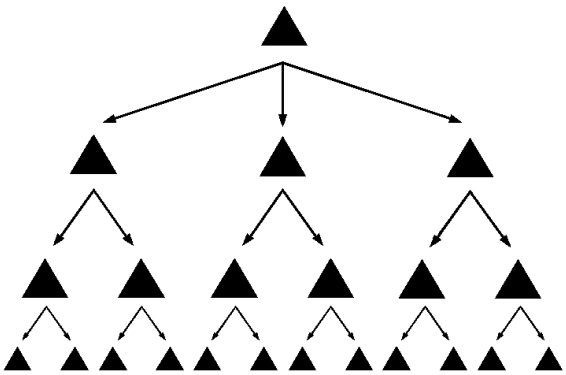


Figure 2. 6. Categorization of Sets Based on Tree Diagram (Alexander, 1964)

2.4.5 Realization of Program (Synthesis)

After analyzing the process and finding a suitable program for designing, designer reaches to a new phase which is called synthesis. Synthesis is the phase that form is going to be resulted from the program so synthesis is the bridge that connects program with form. Alexander called this phase as realization of the program. Building diagram is the starting point of synthesis and the end product is a tree diagram of diagrams. When the needs in a set divided into smaller subsets, in realization of program these needs build small diagrams and with putting these diagrams together, the more complex diagrams are built. In fact Alexander defines

the diagram as abstraction of a real situation, conveys the physical influence of certain demands or forces". The civil engineer's initial draft for a building structure system can be a diagram. After creating the first calculations, he starts to draws some lines to illustrate how the building 's major members might be resistant against earthquake, the given required span , and so on.

Diagrams divided into two types which are form diagram and requirement diagram. The form diagram specifies the physical aspects of an object briefly such as material, pattern, fit, size and beauty and usually limited just as a description of the morphological characteristics. But the requirement diagram shows the set of functional characteristics or limitations briefly which this type of diagram shows a kind of description of problems. However if a diagram can represent both requirement and form diagrams simultaneously, it can be said that this diagram is "constructive diagram" (Alexander, 1964).

Every form can be defined in two types: functional description and physical description. When we talk about the physical aspects, we talked about the physical description while functional description shows the function and reaction of the form against the surrounding environment in different contexts and if we can reach to a unity of both functional and physical description, it can be said that we reach to a constructive diagram. In other word, the solution of a design problem is creating a unified description of form and requirement. However the way of reaching to a perfect designing is not only solves the problems and misfits, but also cause it to be readable. So it can be said that the realization of program is a way for searching about the nature of the context. Like hypothesis, every constructive diagram gets better by increasing the readability and decreasing the using of symbols and

describes both form and context which can control both of them at the same time. So this diagram plays an important role in designing because fundamental characteristics of form are presented in constructive diagrams right before designing a form. In program, the small sets join together in bigger sets. It is natural that in synthesis, the diagrams are created for even smallest sets which are made by program and with these small diagrams again combined diagrams are created and finally by integrating these diagrams, we are reaching to a whole diagram (Figure, 2.7).

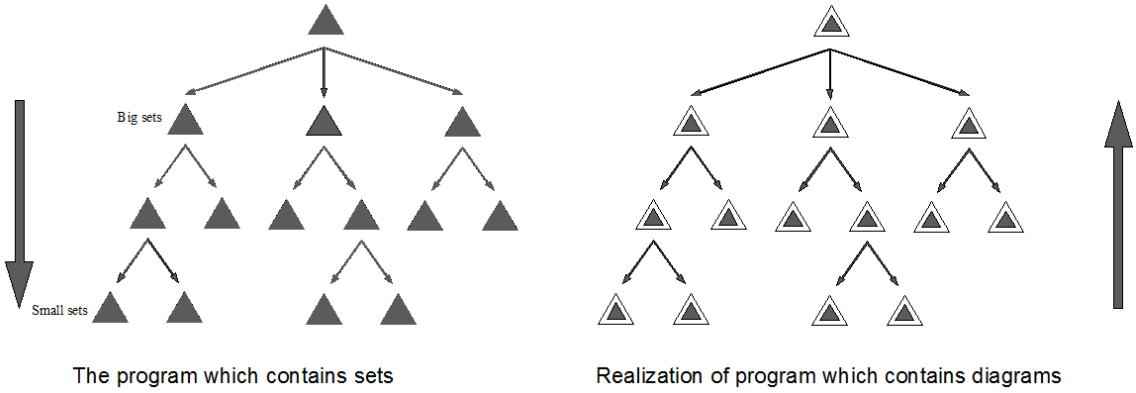


Figure 2. 7. Comparisons Between the Program and the Realization of Program in Tree Diagram

And briefly program phase starts with a whole and divided into smaller subsets of needs. In this phase the movement is from whole to part but in synthesis is starts from making diagrams and blending of subsets together the movement is from part to whole.

2.5 Creativity in Architectural Design Process

Nowadays psychologists recognize creativity as the integration of factors such as: basic cognitive processes, core domain knowledge, environmental, personal, and motivational which cause to the product that finally on one hand is new and on the other hand is useful and appropriate (Ward & Saunders, 2003). In art and architecture especially in designing part, the purpose is making not only original and new

products but also be useful to others (Lawson, 1994). In another way, creativity is the attempt of solving problems by new ways and cause to have efficiency or to increase the performance. Briefly, Wyckoff (1991) called creativity as “Novel” and “Useful”.

As well, refer to the novelty of the product; we consider the originality of it in comparison with other products that should be noticeable (Fang, 2008b; Giachetti & Lampel, 2010; Katila, 2002; Martin & Mitchell, 1998; Sethi, Smith, & Park, 2001b; Wu, Balasubramanian, & Mahajan, 2004). One of the important facts in creativity is that, how much an individual can be creative? Or who is the creative person? And what are the factors that cause a person to be creative?

2.5.1 Background

Creativity in west usually is considered as a kind of gift and blessing of god or as genetic predisposition of an individual, but the eastern perspectives to creativity is different with the western (Sternberg &Lubart, 1999). The Eastern emphasized more on the discovery and believed that the existence of creation from nothing is actually impossible (Boorstin, 1992). Here the difference of the insight is that the Western believed creativity as academic psychological literature and Eastern dominated as a process of understanding and enlightenment (Batey & Furnham, 2006).

However, people related creativity as the abilities of the person, but the research on the creativity began about early 1950 (Nuade, 2005). At first the concentration was on the internal traits of the individuals but about 1980’s and 1990’s the researchers started to focus on the social and environmental factors and broad researches was done (Ryhammar & Brolin, 1999).

2.5.2 Types of Creativity

Creativity at all levels has benefits and importance and creative products may not be useful and important to others such as individual, social group or culture but it can have benefits for the individual him/herself. (Csikszentmihalyi, 1996; Sternberg, 1985; Sternberg and Lubart, 1991). Creativity can be divided into three types include everyday creativity, personal creativity, historical creativity.

a. Everyday Creativity

All of the people born with intrinsic abilities and talents that enable them to create original ideas and products that can be meaningful in our everyday life (Richards, 1988). Our daily experiences and interactions are the factors which create everyday creativity. Actually this type of creativity is known as the lowest level of creativity that can be experienced in everyday activity.

Runco (2007) mentioned that everyday creativity is related to activities of a person as an individual level and sometimes as social affair. Mostly it is difficult to understand the daily creativity endeavors but it can be said that, all works, activities, choices and decisions are to some extent creative and is peculiar to the individual him/herself (Zausner, 2007). One of the obvious examples of everyday creativity is language (Maybin& Swann, 2007). Any individual knows alphabet and words but the way these alphabets and words are used is different by everyone, so it can be considered as kind of creativity. Thus it confirms that, everyday creativity can be existed in all our daily fields (Maslow, 1971; Ripple, 1989; Runco, 2004; Ivcevic & Mayer, 2009) and this is not related to a specific person with special talent (Ivcevic & Mayer, 2009).

b. Personal Creativity

Novelty of a product for an individual's mind called as personal creativity that Margaret Boden (1990) refers it as P- creativity, though this novel product may

create or invented by others before. In this case, Nierenberg (1982) and Starko (1995) mentioned that, whenever a person do something or produce domain- specific products which is new and novel for him/ herself it is called as personal creativity.

c. Historical Creativity

In comparison with personal creativity, Historical creativity is related to new ideas, concepts or products that impress the whole world and history. Nake (2009) said that, whenever a product is historical creativity it will represent the work to criticism and the validation of experts in a domain. Fakhra (2012) also mentioned, it is true that historical creativity usually known as real creativity among the people (Aihara, 2006), but first an individual should know how to create creativity in him/herself, small communities and try to specialize in knowledge and experience then the individual will find the abilities to enter historical creativity and produce valuable and original products. That's why the personal creativity is plays an important role in higher education. This is the main purpose of this research which tries to help the students by achieving to personal creativity, can gain the self-confidence to reach for historical creativity in the future.

2.5.3 Components of Creativity

Teresa Amibile (1997) determines creativity components as knowledge, creative thinking and motivation as Figure 2.8 shows.

Figure 2. 8. Three Components of Creativity (Amibile, 1997)

Knowledge is the information that an individual requires for gaining creativity in the specific field. Whatever the information is getting more, the amount of tools for creativity is increasing (Amibile, 1997).

In this case, Haward Gardner (1993) expands this subject more and explains we need two types of knowledge for creativity. On one hand, long-term focus on the subject and deepening the depth of the considered experience and information which cause the individual to be expertize in that case. Simanton (1997) explains that a person can be creative who could promote his knowledge in depth- domain expertize. On the other hand, the reason that causes creativity is the integration of precedent disparate elements with new ways and roles which related to a need for broader focus and varied knowledge. In other words, knowledge is the sea that whatever is getting broader and deeper, the amount of hunting is increased (Amibile, 1997).

Thinking is the subject which known as the main factor in the creativity. Undoubtedly, without thinking, no creativity can be occurred. Amibile (1997) and

Gardner (1993) have tried to prove that thinking is known as the main factor in creativity. Amibile (1997) asserted four factors as key elements in creative thinking.

1. The ability of disagreeing with other ideas and finding the ways and solutions that can be different from the status quo.
2. Integrating the knowledge with the previously dissimilar fields.
3. The ability to persist through challenging problems.
4. Incubation

Later Sternburg (2003) referred 3 factors of intelligence that are important in creativity:

1. Synthetic: trying for creating the ideas that can be new, high quality and appropriate. The other aspects of synthetic are related to the performance of a person in redefining the problem in a way that can be useful and to think insightfully.
2. Analytical: the ability of the person in judging the value of the ideas to realize their weaknesses and strengths and understanding the ways to make them better.
3. Practical: Ability to apply intellectual skills in everyday contexts.

In this case, Sternburg (2003) emphasize on the importance of these three factors in his paper, "creative thinking in the classroom" and mentioned that these three factors play an important role in intellectual functioning and successful intelligence. This research shows that when the students were learned using these three factors simultaneously and at the same time, students have better performance than the students who insist only on analytical abilities.

Motivation also is known as one of the factors that is important in the subject of the creativity. Amibile refers that: "[we] have found so much evidence in favor of intrinsic motivation that we articulated what we call the intrinsic Motivation principle of the creativity: people will be most creative when they feel motivated primarily by the interest, satisfaction and challenge of the work itself and not by external pressure[i.e., extrinsic motivation]," (Amibile, 1997). But unlike the intrinsic motivation, the extrinsic motivation is take very short amount of time and have usually one specific path to solve. There are many examples that show the high degree of intrinsic motivation that cause many successes. Einstein, Picasso, and etc. are the examples that indicate the positive effects of intrinsic motivation. These are the individuals that intensively had sacrificed a great deal on personal level and spent their time, energy to solve a problem that they had in their mind. This is what Gardner called as, *Faustian bargain of creativity*: to obtain great results, person should sacrifice him/ herself, family and social life.

The research conducted by Smith and Tegano (1992) and Helson, Roberts & Agronick (1995) refers to remarkable features which are originality, flexibility, sense of humor, risk taking, openness to new experience, freedom and playfulness, also feeling happier most of the time, enjoy being with others and having better mastery and control over their environment can be added to the creative individual traits (Sternberg, 1995). Eysenck (1993) also emphasize to this point and refers to creative individuals as self- accepting, self- aware, aggressive, self- confidant, spontaneous and self- centered. To prove this trait, Getzels and Jackson in a study, compared the groups of students that gained high grade in creativity test with those who had acceptable performance in conventional intelligent test. The significant result from this study was the personal images that these two groups had from themselves.

The creative persons tried to be independent and emphasized on their own performances while the other group tried to satisfy the elder and the interesting part here is that usually the teachers like their creative students less than their intelligent students (Getzels and Jackson, 1962). Feldhusen (1995) also mentioned some attitudes about creative persons which are the capability of working long and hard, a questioning attitude and the ability to work in loneliness. Another core feature of creative individuals is intrinsic motivation. Creative persons trust on their own intrinsic motivations and this cause to the originality of the product but the reason that causes to inhibit the creativity is making evaluations and constraints that Amibile emphasize on the freedom of individual from these constraints (Stohs, 1992).

2.5.4 Creative Process

Process of creativity could be categorized into two groups. (i) Creativity based on activity based processes (ii) Creativity based on some cognitive process and

(i) Activity based process

This kind of process divided into two parts. The first one is related to creativity based on special form of problem-oriented processes and the other one is creativity based on form of ideation and self-expressive processes.

Usually the subject of creativity theory is constitutes from two main factors. One of them is problem solving and the other is problem finding (Jay & Perkins, 1996, Mumford, whitehouse & platts, 1991; Newell, Shaw, & Simon, 1962; Runco, 1994, 2007; Torrance, 1971; Wallas, 1926). The difference between these two is that, problem solving related to well- defined problems while problem finding emphasize on ill-defined problems. Runco (1994) identified that whenever a problem

discovered and redefined, creativity can existed. Because problem finding is including finding gaps, inconsistencies, or mistakes with the current state of the art and understood that problems exited instead of posing problems that I this way can be too general or too specific. Accordingly, Einstein and Infeld (1938) considered that how asking new and creative questions and formulating a problem and looking to old problems from new angles can guide an individual to a creative product.

The other type of creative problem solving and problem finding which was mentioned above is creative ideation and self- expression which more relate to the fields of design and art. The tasks that designers and artists follow is always not solving the problems, also include generating the alternative ideas and concepts in context of design and expressing the problems by ideas and techniques in field of art. For this purpose, it can be said that, creative ideation in design and creative expression in art can be understood parallel with ill- defined problems but this relates to how we define the “problem”.

(ii) Cognitive and Activity-Based Stage Models of Creativity

The mathematician Henri Poincaré (1924) divided creativity process into five phases. First a period of initial investigation of the problem in hand that followed by a more relaxed period of apparent mental rest. moreover, an idea suddenly comes to mind in a situation that is unexpected. Finally the solution needs elaboration, verification and development. He explains about how he found a series of mathematical functions known as Fuchsian. He talks of working hard for two weeks to prove such these functions. However, suddenly one evening when he couldn’t sleep, drunk a black coffee and records that “ideas rose in crowds" (Poincaré, 1924). Designers, poets and musicians seem to have such experiences.

The First insight is a period that contains the existing of a problem and makes the person curious on salving it. The next phase is “Preparation". After finding the problem, it needs more study, working hard and considerable conscious efforts for solving the problem and at least in design, there is likely to be some coming and going between this and the first phase as the problem may be reformulated or, even, completely redefined as the range of possible solutions is explored. However, is that this period of intense, deliberate, hard work is frequently followed by the more relaxed period of “Incubation” (Lawson, 1994).

Incubation is defined as a process of unconscious recombination of thought elements that were stimulated through conscious work at one point in time, resulting in novel ideas at some later point in time. Alexander Moulton advises:” I’m sure from a creative point of view that it’s important to have one or two dissimilar lines of thought to follow. Not too many, but just so that you can rest one groove in the mind and work in another”.

After incubation phase the magic that we expect is happen and the idea comes to our mind in fantastic way like a gift from unknown source. “Illumination" as we have already talked about that is a real sense of insight, acquiring a deeper understanding of something; a result of new connection of elements residing within our perceptual field. Some argue that during the incubation period the mind continues to reorganize and re-examine all the data which was absorbed during the intensive earlier periods. Finally, we come to the period of “Verification” that is checking the solution. Making sure the ideas turn out to value. Testing and evaluating the creative solutions.

The other factor that emphasizes more on that is the environmental factor. Most of the people believe that creativity is related to the personality of the individual, but the environmental factors are playing an important role in the creativity. So creativity should not be realized as one-dimensional factor. Specific social and physical environment (Ryhammar& Brolin, 1999), settings, other people, time, and domain-specific knowledge also influence creativity (Torrance, 1979; MacKinnon, 1978; Treffinger, 1991; Harrington 1990).

The effects of press can be situational such as schools and organizations or can be interpersonal or can be related to large cultural context that adapts to principles and beliefs. Sternberg and Lubart (1991) emphasized that with letting the students define problems, putting more emphasis on ill-defined rather than well-defined problems, encouraging legislative intellectual methods and styles, training knowledge for practice and use rather than for exams, encouraging risk-taking, and placing more emphasis on intrinsic motivation rather than inspiring through grades in schools, the creative environments could be developed. While Fakhra introduces four card-sets as creativity sparking model, his study just confined to the idea generation and exploration which is the first set.

2.6 Design Creativity Cards Tool (Flash Cards)

In 2012 Ahmad Jasem Fakhra presented a model to spark creativity in students design process. His model designed based on four sets of cards that each card, created for an especial goal and shows components and ideas caused from the conceptual model of design creativity (Fakhra, 2012).

Card- set 1: This card is named as “Idea Generation and Exploration”, include conceptual combination and emergence of the form to help the designers and students create new ideas.

Card- set 2: The second card-set is called “Cognitive Habits”. This set tries to develop certain behavioral habits related with observe, capture and gathering the inspirational ideas and basic information which cause to generation and exploration.

Card- set 3: The name of this card-set is “Cognitive Style”. This set includes four cognitive styles which are: divergent and convergent, lateral and vertical, sequential and holistic, and impulsive and reflective styles. These cards help designers and students identifying their own main cognitive style. These cards help to improve the creativity by changing the way of thinking which relates to particular cognitive style.

Card- set 4: Fourth set of cards is known as “Cognitive Traits”. These cognitive traits are including: mindfulness, cognitive-preparedness, and attention deployment. These cards try to improve and develop certain cognitive traits related with certain products with some methods.

While Fakhra introduces four card-sets as creativity sparking model, his study just confined to the idea generation and exploration which is the first set. Under the first set he presents six cards with titles Modify, Bisociation, Impersonate, Challenge Assumptions, Dissect and Transform, a Five-Principle. These six cards help students to generate ideas and looking at form making process from different angles. The logic of these designed cards is divergent thinking method and includes cognitive mechanisms such as conceptual combination, association, expansion and emergence.

In each of these cards a key word or key phrase is given as representative of step. Moreover, a brief explanation about the realization and a short instruction to ease implementation of it has been provided. Finally for better understanding examples and stimulating questions were answered.

2.6.1 Idea Generation and Exploration Card Set

As mentioned before this set includes six cards which described as below:

1) Modify Card

Based on invented creativity method named "SCAMPER" (Substitute, Combine, Adapt, Magnify, Put to Other Uses, Eliminate or Minify, and Rearrange or Reverse) by Osborn & Eberie (1977), Fakhra retrieved the "Modify" card. As Figure 2.9 shows card users are asked to change some aspects of their design such as size, material, color, function and etc, by implementing these five methods; Distort, Exaggerate, Simplify, Substitute, and Transform.

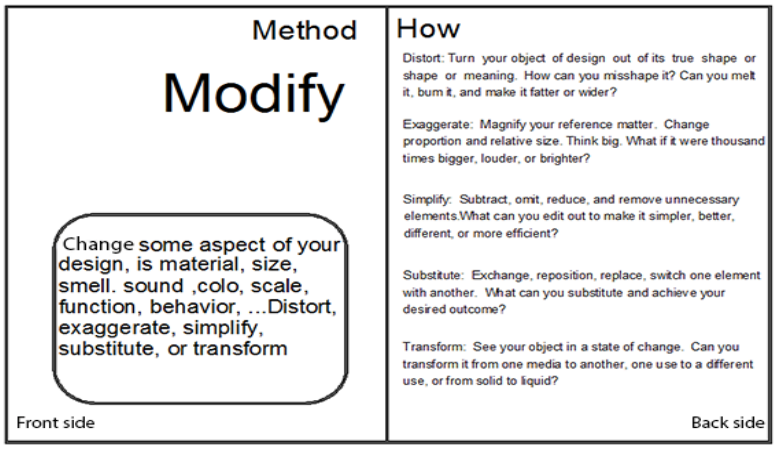


Figure 2. 9. Design Creativity Cards of Modify (Fakhra 2012)

2) Bisociation Card

Bisociation is a process of simultaneous connection between two ideas or concepts that are not generally related to each other and tries to enhance creativity by explaining the association cognitive process (Fakhra 2012). In this card, it is asked to integrate or blend between two concepts, image or object that are not basically

related to each other at all. As Figure 2.10 reveals card users are guided with two questions: a) what logical or illogical relations can you make between the aim and source? b) What stimulation can you draw from the source?

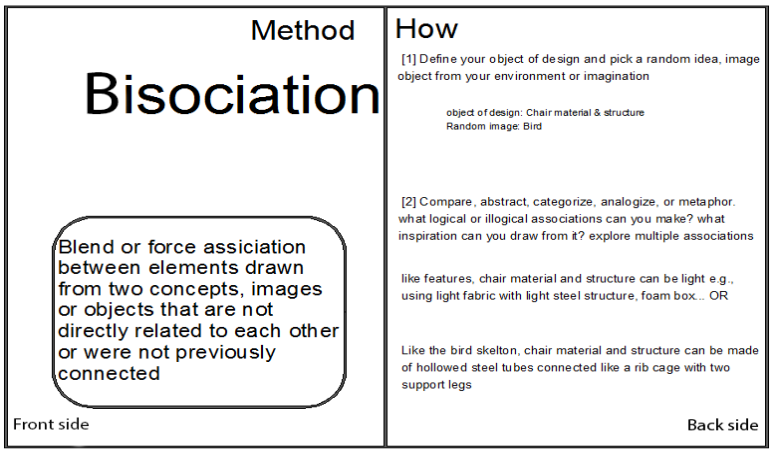


Figure 2. 10. Design Creativity Card of Bisoication (Fakhra 2012)

3) Impersonate Card

Impersonate originates from synetics (Brainstorming 1957) which initiates from the use of descriptions and similarities to break old associative relations (Gordon, 1961, 1966, 1981). In the card presented in Figure 2.11, designers and students are asked firstly assumed to be someone else and then imagine others can approach to their designing or how they will solve the problems. By this method, Fakhra tries to help them generate more idea and solutions.

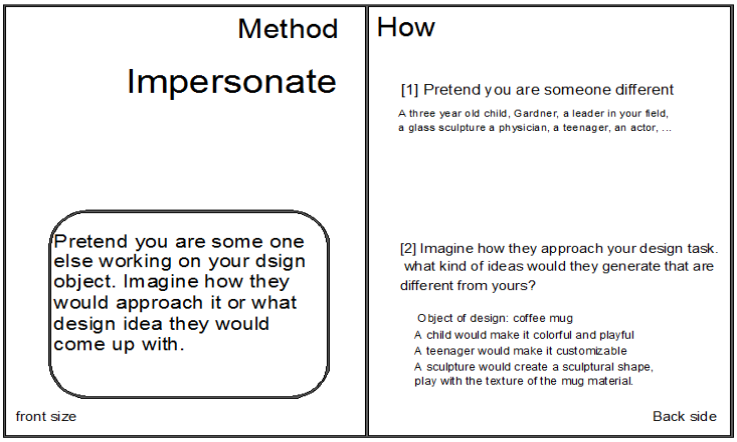


Figure 2. 11. Design Creativity Cards of Impersonate (Fakhra 2012)

4) Challenge Assumptions Card

This card asks the designer to use assumptions based on conceptual structure and specific objects of design. To make it easier, designer asked to make some questions from clear information which is located in their object of design. This card contains two phases. In the first phase, designers are requested to imagine their object of project and list all assumptions related with it by answering six questions as mentioned in Figure 2.12.

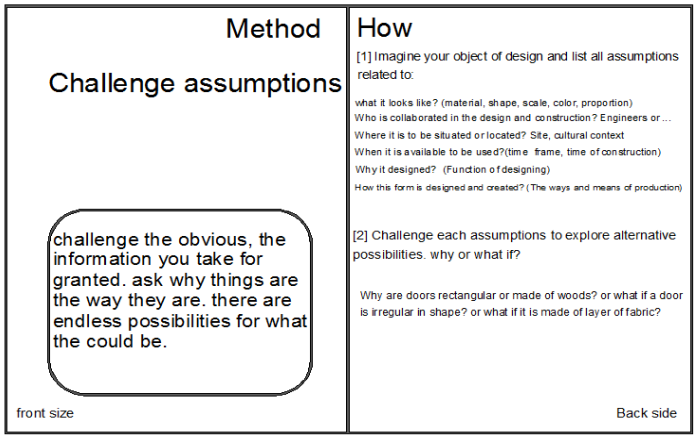


Figure 2. 12. Design Creativity Cards of Challenge Assumptions (Fakhra 2012)

5) Dissect and Transform Card

This card intends to help card user (designer) to realize the essential parts and components or properties, break down the object into its basic and necessary parts or components (Dissect), then convert and transform the conventional form and situation to other situations and forms (Transform) (Figure 2.13).

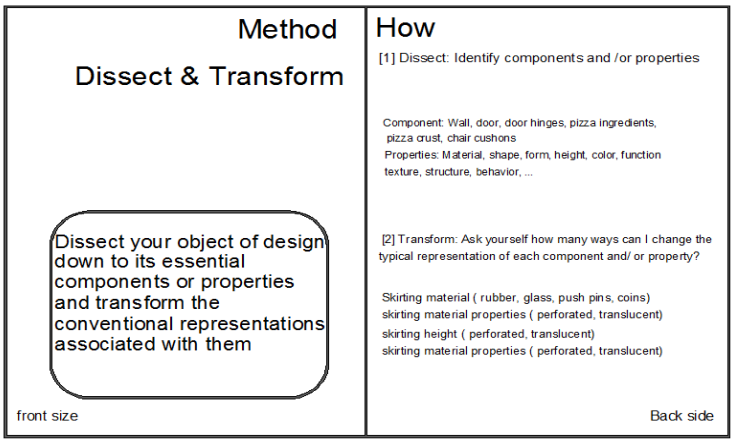


Figure 2. 13. Design Creativity Card of Dissect and Transform (Fakhra 2012)

6) The Five Principles Card

In the sixth card, Fakhra tried to orient the card user to be more creative. To facilitate this as Figure 2.14 illustrates a checklist to be considered include five principles such as: 1. Create many ideas 2. Produce Variety of ideas and concepts 3. Pursue unique or exclusive concepts 4. Delay judgment of ideas 5. Elaborate on your ideas.

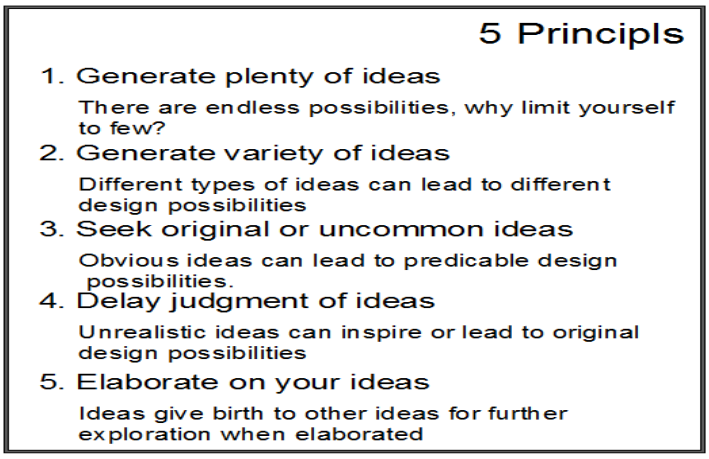


Figure 2. 14. Design Creativity Card of Five Principles (Fakhra 2012)

2.6 Summary of the Chapter

In this chapter it is tried to study three relevant areas. Initially it was concentrated on architecture education especially focused on the features that illustrate this education different from conventional models. Then it is focused on the history of architecture design process and different types of the processes during the history. In the

following literature review different topics about design process studied like problems solving, problem type, compatibility and source of good fit, conscious process, program and realization of it and then creativity in architecture design process and supportive models (Flash card) to enhance students' creativity discussed as well.

CHAPTER 3

METHODOLOGY AND PROCEDURES

3.1 Introduction

This chapter describes the general methodological approach that used for this study. It explains the reasons why qualitative research was a necessary methodology to use and what theoretical perspectives helped frame the study. The selection of the appropriate methodologies was based on the type of data being sought; the narrators' experience, voices and perspectives. In this chapter, the phenomenology as a qualitative methodology (which is consistent with this research's methodological and theoretical perspectives), introduce the participants in the study, describe architecture student's main problems in design stages, discuss the methods used for data collection and analysis. The first phase of this chapter outlines the method for a study to find the teacher and student perceptions about the main critical stages in the design process. The measurement strategy employed to collect data in this research was surveyed questionnaire and interview.

First, a qualitative study of EMU professor's intentions about student's main problems in design stages and the way of designing was conducted using interviews. Second, feedback received from the teacher's interviews was used to create a questionnaire to be distributed to wide range of EMU architecture students. The questionnaire was used to determine student perspectives on their difficulties about design process in the design studio. In the second phase a model proposed to help the

students to manage their own design process parallel to studio critique sessions. In this phase three different approved methods introduced and by studying the strength and weaknesses of each try to coincident each of them by needs and expectation of the case study. Then the flash card system, as an adoptive learning model introduced in order to be an auxiliary tool for younger architecture students to be parallel to the given critique to them at design studios.

3.2 Why Qualitative Research?

This section will describe why a qualitative methodology is important same as quantitative methodology and both are essential for this research. The design studio is an environment in which subjectivity is at the center of its functioning (Anthony, 1991). To recognize the role that social constructivism plays in the design studio, a qualitative strategy was very suitable to help in the understanding of the learning experiences that the members have in this setting (Taylor & Bogdan 1998) or how people understand, order and frame their everyday experiences. Qualitative researchers try to realize how people see things (Taylor & Bogdan 1998). This research brings me back to the main research question; how do particular architecture students manage their own design process in design studio at university Eastern Mediterranean University? This is a qualitative example that helps in this understanding because it is not only a theory about knowledge and learning, but it also describes both knowing and how one ‘comes to know (Fosnot 1996).

3.3 Action Research

Naturally, action research is a reflective process which is mainly done in a school setting. Action research is an action between classmates searching for results to everyday, real problems experienced in schools or looking for ways to recover instruction and increase student success. Rather than dealing with the theoretical,

action research permits practitioners to address those concerns that are closest to them, ones over which they can show some effect and make alteration. Practitioners are responsible for making more and more choices in the operations of schools, and they are being held publicly responsible for student accomplishment consequences. The process of action research helps teachers in assessing needs, recording the steps of survey, analyzing data and making informed decisions that can lead to desired results.

According to the specialists, it is a cycle of posing questions, gathering data, reflection and deciding on a course of action. Miller (2007) defines it as a process of planning, action and searching and Learning point. (McFarland & Stansell 1993) describes it as survey or research in the context of focused efforts to improve the quality of an organization and its performance. It is a cyclical process that begins with a problem then potential solution would be designed and then an action would be taken on the solution, then the reflection would take place on the consequences and lastly the learning would be caught. This process would be repeated many times again and again (Noffke & Stevenson 1995).

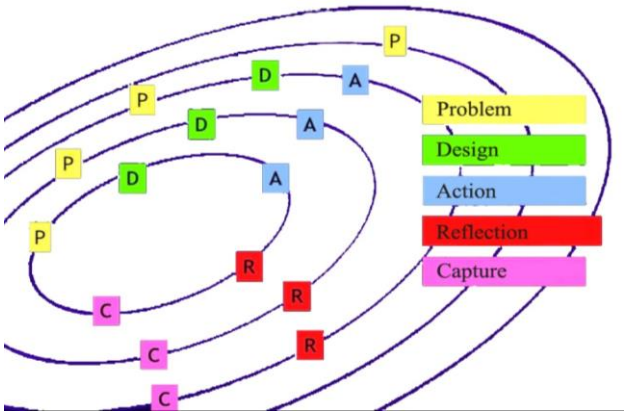


Figure 3. 1. Cycle of action research

Action research needs reframing the problem by viewing at it in diverse contexts and different perspectives as a part of bigger system and making comparisons and applying the problem to different groups. As the plan applied the progress needs to be controlled and the data and evidence needs to be gathered to present periodic reports. Another necessary component of action research is reflection. A cycle of action and reflection is the core of action learning.

Reflection is a process of entering into discourse based on the data collected and being guided by a systematic outline to realize the basis causes of the organization's program. Action research is not a library project where we learn more about a topic that interests us. It includes people working to improve their abilities, techniques, and strategies. Action research is not about learning why we do certain things, but rather how we can do things better. It is about how we can change our instruction to influence students.

3.4 Case Study

The Eastern Mediterranean University (EMU), located in Northern Cyprus, was established in 1979 as a higher-education institution of technology for Turkish Cypriots. In 1986, it was converted to a state university. The campus is located 10 km from the city of Famagusta. The university's initial establishment was called Institute of Technology, for that reason traditionally engineering fields considered as its founding departments. In 1984, Civil Engineering, Electrical Engineering and Mechanical Engineering programs were extended to four-year programs. In the following year, governments of Turkish Republic and Turkish Republic of Northern Cyprus mutually agreed on opening a university called "Eastern Mediterranean

University". Members of the Turkish Republic Council of Higher Education visited the Institute of Higher Technology with the aim of transforming it into a university.

Eleven years later, department of Architecture, which has some of the best educational facilities among the architectural departments of the region is established in 1990. a learning environment with a contemporary approach to education for young people of diverse cultural backgrounds, is one of the largest at Eastern Mediterranean University with nearly 600 students. With increasing demand for enrollment from Turkey and the third countries, the student body in the Department is increasing in number, but one to one relationship between the student and the instructors in design studios is still sustained; in a democratic milieu of education where free discussions and creativity are valued.

3.5 Phase One: Qualitative Research

This phase intends to understand the student's critical stages in their architectural design process. So in order to find out the critical stages, by interviewing from instructors and distributing questionnaire among students, tried to evaluates students design weaknesses and strengths for achieve better clues to make reliable model in helping the students to manage their own design process parallel with instructor's critiques. Two methods of data collection have applied questionnaire and interview. A questionnaire was contained Likert measurement and some close-ended questions.

3.5.1 Instructor Interview

To understand instructors concerns, attitudes, experiences and approaches to design process in architectural design studios a personal interview was conducted with four studio masters of architecture department at EMU in fall 2014-15. Three out of the four instructors who were interviewed were female. The scope of instructors

interviewed was limited to instructors teaching studio classes with more than 10 years' experience in academic and practice. (Appendix A has presented interview questions). The interviews took the form of a conversation, creating a participant-led interview process. Seidman (1991) stated that, the in-depth interview is designed to ask participants to reconstruct their experience and to explore their meaning. This interview format also helped in the data analysis process because this thesis used the protocol that Seidman (1991) suggested which included three different focuses;(a) The life story of the participant; (b) the concrete details of the participants' present experience (Seidman, 1991) in the design studio; and (c) reflection on the meanings of these experiences. These focuses aided the interpretation and reflection on the participants' experiences. The interviews lasted approximately 30 to 45 minutes per interview, depending on the responses of the participants, and interviews occurred within 10 days, depending on the participant's schedule in October 2014. (Appendix B presents the transcription of interviews).

Figure 3. 2. Professors who attended in Interview

As figure 3.2 shows attendant from right to left were prof. Dr. Kokan Grcev, Asst. Prof. Dr. Nevter Zafer Cömert, Asst. Prof. Dr. Guita Farivarsadri and Assoc. Prof.Dr. Mukaddes Faslı (CV s have been presented in Appendix C). All of interviews took place at department of architecture, university.

Design instructors were asked the following questions about the design process stages, student's main problems in these design stages and discussion about instructors' critiques given to students in each stage such as data analyzing, synthesizing and form making steps and surveying their main principles. By such questions author tried to understand critical stages of design for students, reach a logical structure and type of clues that studio masters suggest to students in their critique sessions.

In the creation of the interview questions as a survey research instrument, a concerted effort was made to ask questions which were not biased. This was achieved by asking questions that did not lead or encourage the response given by instructors. The interviews were tape recorded and later transcribed by the author. The findings from the interviews were used in order to develop to be used in proposal.

3.5.2 Student Questionnaires

Student questionnaires were distributed to 67 students in different level of design during 2013- 2014 spring and 2014-2015 fall semesters. The items used to collect data in the student questionnaires were based on the answers received during the earlier phase of the research, which utilized teacher interviews. The questionnaire used for this research covered design stages and their feelings and level of success in each of them (Appendix D contains students' questionnaire form).

In the chosen survey research instrument of a questionnaire, a challenging effort was made to ask questions which were not biased. This was achieved in the student questionnaire by asking questions posed a scale of point between the end points of a positive and negative continuum and by asking open-ended questions, which allowed

the students, respond in their own words. Figure 3.3 shows some of students who attended in this survey.

Figure 3. 3. Some of students who attended in survey

The questionnaire consists of five questions as an initial part of our research and distributed among students. All the questions in the survey have a Likert-type attitude measurement items having five levels (Appendix C presents students' questionnaire form).

Likert scale	Very Good				Very Bad
	1	2	3	4	5
Smiley's*					

Figure 3. 4. Given smiley faces to students and their equivalent in Likert scale

3.5.3 Data Analysis

The method of analyzing the data in phase one is consisting of qualitative research which by interviewing with four instructors it was tried to realize the student's critical stages in their design process. On the other hand this phase has quantitative methodology also. After getting clues from instructors about the student's critical stages, the questionnaire was distributed among 67 design students in order to find

out their strength and weakness stages in their design process. This was done through distribution percentage tables and graphs which excel software used to calculate the percentages of quantitative data.

3.6 Phase Two: Direct Observation

After interviewing with instructors and distribution of questionnaire among the students which lead to recognize the student's critical stages in their design process, the second phase of the research intends to propose a model which students can manage their own design process parallel with instructor's critiques. In this phase three well-known methods introduced and by analyzing their strength and weaknesses, trying to superpose those strengths with needs and expectations of case study. Then it tries to introduce new auxiliary tool by use of flash card system as a supportive tool to help the students to solve their design management problems, ease creative form making.

3.6.1 Proposed Model

In order to create a reliable auxiliary tool to be used at design studios parallel to given critiques by instructors, three introduced methods in literature review chapter discussed. These three methods studied (Alexander, Schon and Fakhra) discussed in terms of strengths and weaknesses and coincident by needs and expectations of chosen case study (EMU- Architecture department). The study tried to get maximum benefit from strength points of them and cover the weaknesses. In order to create the structure of the research and on the other hand help to complete the creativity part of the research Fakhra's method introduced. In this regard, because the problem solving process is known as an integral part of designing, Alexander's logical method is added to reveals a rational structure of the process and Schon's method was surveyed

to facilitate in reaching a reliable categorization of design process for designing an auxiliary tool.

3.6.2 Why Flash Card System?

Adaptive learning is one of the most significant components of technology-enhanced education methods (De Bra, 2000). An adaptive learning environment affords personalized course material for each pupil based on his/her current learning method and level of information and knowledge (Specht, 2002). Systems based on adaptive learning let students to modify their learning settings and select flexible answers that fit their real-time wants. Meanwhile there is no teacher; students can measure their development by their learning knowledge. In another words, adaptive learning aids users by providing learner-customized way. The flashcard system is known as an adoptive learning tool.

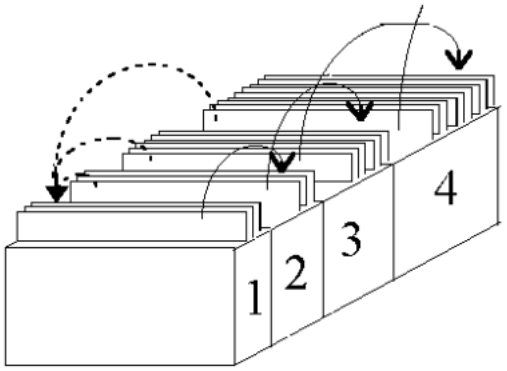


Figure 3. 5. Schematic representation of Leitner's study system

This system is a collection of cards containing data, as words or numbers, on one or both sides, used in classroom works or in private learning. People usually use flashcards to help them memorize learning materials, such as vocabulary and formula, etc. Flashcards can carry words, historical periods, formulas or any issue matter that can be educated by a question and answer format (Williams, 1997). So flashcards are extensively used as a learning tool to help learners via way of spaced

repetition. Flashcards keep ready the mental procedure of active recall. The system of flash cards is also used in architecture design. In 2012 flash card system was designed by Ahmad Jasem Fakhra according to ways, tactics, and concepts developed to stimulate cognitive mechanisms, styles, and skills normally related to creative productivity.

The proposed model by him is flash card system in post-it notes format. This physical way of representation is used for practical aims. Like other post-it notes, the cards can be used in various surfaces like PCs, desks, door, refrigerator, books, models, and can be transported to several locations, e.g. Work location, car, kitchen, and room. So the user can have access to these cards whenever and wherever he/she wants. This availability inspires common use, includes the use of the cards in design processes, and provides exposure of the means to other designers. The cards can also be simply used by others and can arrange for a media for presentation. Being an external partner of thinking reminding or recalling is the other role of these cards in order to help the designers to manage their own design process, in fact it can be said that these cards work as an auxiliary tool for the designers to remind how to stand on their own feet among the process of designing. It also help designers go into the implicit constraints related with certain conceptual structures embedded in design task requirements and thus allow them to produce and discover creative ideas.

3.6.3 Data Analysis

This phase includes qualitative analysis .Firstly, the presented model will be given to the instructors and assistants in form of flash cards and by interviewing at about 20

minutes, their opinions, critiques and suggestions about model's functionality would be realized.

Then these flash cards will be offered also to students in order to find out performance of the model. These cards will be given to them in one of their designing sessions and ask them to use from these flash cards during their designing. Then at the end of the day their results will captured by filling questionnaire and interviewing about flash cards functionality.

3.8 Summary of Chapter

In this chapter initially tried to realize architecture student's critical stages of their design process. This realization was done in both qualitative methodologies like interview by instructors and student's questionnaire. When the critical stages recognized, it was tried to propose a user friendly and reliable model to help students to manage their design process parallel with instructor's critiques. Therefore, to reach a rationale for new design management proposal, three methods introduced (Fakhra, Alexander and schon). Then founded common procedures and steps presented in the form of flash card system and evaluated by interviewing with EMU instructors and examined by EMU architecture students.

Chapter 4

FINDINGS AND THE PROPOSED MODEL

4.1 Introduction

This chapter contains two phases. In the first phase the critical stages for students in their design process is recognized by conducted interviews with instructors and distributed the questionnaires among the architecture students. The results presented in percentage format by tables and graphs with use of excel software. On the other hand by the common schedule of EMU design studios understood and each stages the factors realized in order to make a reliable model for design students to manage their own design process.

In the second phase the logic to structure a new design management auxiliary tool surveyed. For this purpose, parallel with EMU instructor's viewpoint, three different methods were used. In order to create the structure of the research and on the other hand help to complete the creativity part of the research Fakhra's method introduced. As the synthesis known as one of the most difficult stages for students, Alexander's method introduced as rational structure for the process and schon categorization used in new proposal. Integration of these three methods with instructor's interview became origin for a logical structure of new proposal. Then the model presented in flash card format to aid students. Finally proposed model tested by instructors and architecture students at EMU department of architecture by distributing questionnaire and results presented on graphs and tables.

4.2 Phase One

At the first stage an interview and questionnaire done and distributed respectively to have a general view of instructors and students to design process at studio and their feelings to find critical stages and difficulties as well as expectation and common process.

4.2.1 Instructors' Interview Result

Altogether, a total of four design instructors participated in the study during October 2014. All responses were tape recorded and transcribed at a later date. The results then were analyzed to find common categories of answers and a brief summation of the range of answer (appendix A Contains interview questions). Instructors were asked about the schedule they follow at studio in each semester. There was a consensus among all of them on sequential steps start from initial research (like case studies), then site analysis and synthesis, conceptual design approach at given site, development of design idea in terms of plans, elevations, section etc. In site analysis part students need to gather data about the context and site to understand the location and immediate surroundings.

Two of instructors mentioned about compatibility among context and form; "the form should belong to the site and its own context". That's why we are asking them to do site analysis. They mentioned about six main issues that should be analyzed by students like historical analysis, town scape analysis, lynch analysis, solid and void relation, figure ground analysis and land use analysis. Instructors pointed out about natural and built environment beside socio-economic environment analysis; which include factors such as (topography, climate, vegetation, sun direction, wind and many more) (appendix B). Interestingly it was mentioned that spending two or three

weeks on analysis and synthesis at studio is not that much useful and nothing will change; “Giving limited time to the students on analysis and spending more time on synthesis and proposal starting stages seems to work better” (Interview). One of the problems opened by the other instructors explicitly was since nobody explains students why they need to do analysis and how they will get benefit of it, normally the usage of analysis in the next step synthesis part and transformation of those gathered data will be missed. “Students escape the synthesis part and directly jump to form making from data analysis. Main reason is no body explains them why they need to do it and how they have to do that” (interview).

Most of the instructors mentioned that all of these analyses at the end would be synthesized in SWOT table. SWOT table includes natural environment, built environment, social environment and analyzes the strength, weakness, opportunity and threats of the site. SWOT table is important because it is helpful before strategic planning in most of the fields such as economic, management and GIS and it plays an important role in architecture as well. One of the instructors asserted that at EMU, we are asking them to provide SWOT table in immediate session after site analysis but most of the time their results are wrong. Mainly instructors suggested that it would be better for students to do the analysis and SWOT table together with teachers and even students might be force to collect the information in one sheet; “It provides opportunity for students to collect all the information and to be more aware about the analysis and synthesis” (Interview). Instructors discussed that in conceptual design approach studied moreover creativity need to do functional organization and layout orientation which all will come from provided SWOT table and their studies”. The factors of finding the orientation of the buildings should be analyzed based on

climatic condition, sun direction, wind and main pedestrian access for example" (interview).

Vital role of basic design principles repeatedly mentioned by instructors, but time to time students forget the importance and the use of these basic lessons on form making and they can't design based on them (interview). Model making provides better understanding about their proposed form and the relations between the buildings. "The best way to emphasize on integrating geometries together in form making is sketching and making model" (Interview). Reminding the design principles like solid and void relation, balance, proportion and scale, unity (establishing common language), repetition and etc., which are the tools for form making stage will help the students to integrate the geometries and finding creative forms based on the logical analysis which has done before.

After that the students try to make decision about their elements of their design and by this way the form is step by step completed. Perception tools: (figure ground, alignment (how to lines follow each other), similarity, putting the forms into groups, common movement, center of gravity), Designing tools (Order, after order it should contains unity (one language), balance (symmetric, asymmetric, radial), harmony, repetition (repeatition is so useful in making unity), proportion, contrast, rhythm (static, alternative, variable), dominance(focal point, emphasizing), hierarchy, scale , transformation, solid and void, subtraction and additive form, exaggerate, mentioned as keys of design). In terms of form organization, students are needed to remember: grid, radial, cluster, urban and linear forms and relation of forms between each other face to face, pulls up, in tension position, near to each other, far from each other and

also considered the power of the form with each other are mentioned as used strategies.

Relating of the inside and outside in proposed form, use of cantilevers, extracting the form from the ground are other mentioned techniques. One of the instructors mentioned that "the main use of these tools starts in the upper design levels when the data analysis is integrating with form making and because the students forget these design tools in upper designing levels they are not able to design in the right manner. So it can be helpful to have a tool to force the students to remind these tools step by step in their designing process" (Interview).

One of the instructors emphasized on visual thinking as a starting point in every design classes. It was believed that this aspect is one of the most important aspects in design education which includes from four factors; metaphor, model, manifest, and mind map. "Model creates from experiences this Experience originates from people, activities and context and based on these designer should design a model which is meaningful, pleasurable, convenient, usable, reliable and functional model" (interview).

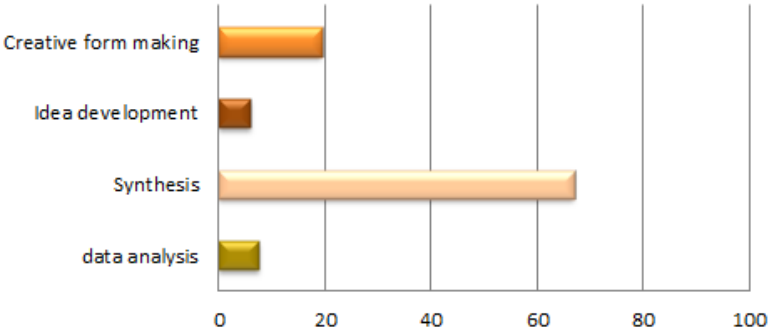
He asserts that the intersection between plan and improvise create manifest. When designer can integrate creative thinking and strategy for designing, he/ she can be successful to create a good design. Necessity of reminding six steps of thinking visually such as: empathize (means see the world as a child. This can be gain by observe, ask and explore), memorize (commit thoughts to memory), analyze (take a step back), synthesize (filter signal from noise), visualize (it means see it, and then do it), materialize (at last make it tangible, make it stick).

4.2.2 Students Questionnaire Result

In order to reach to a suitable model for designing an auxiliary tool for architecture design students and enable them have better control on their design process, students difficulties recognize in different stages of their design should be found. Totally 67 questionnaire were returned by students.

The result from students is discussed in this section. The organization of information is based upon each of the questions were asked in questionnaire. The result of each question is displayed in the charts. The questionnaire is including five questions in likert measurement from scale of one to five. The first question is asked “In which stage of design process do you have main problem?” The objective of this question was to find out the critical stages of the design process from students point of view.

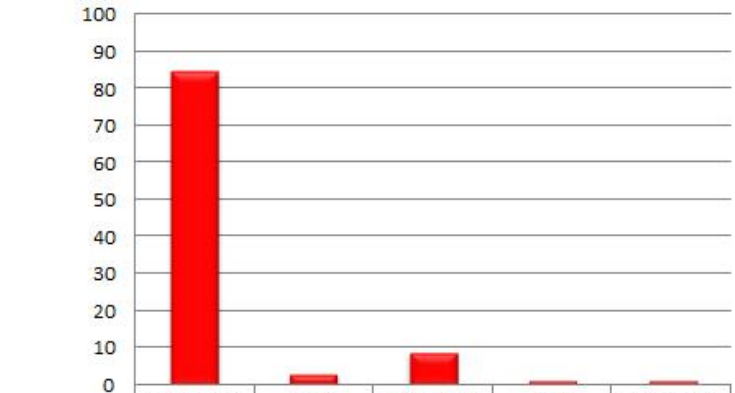
As Results are illustrated in Figure 4.1, Forty five students (sixty seven percent) believed synthesis is the most difficult and problematic stage for them, moreover they had difficulties of creative form making (19%) and data analysis (8%) and idea development (6%). In open-ended section they mentioned “integrating data to reach reasonable logic between context and form is confusing”.



	data analysis	Synthesis	Idea development	Creative form making
Percentage	7.6	67	6	19.4

Figure 4. 1. Students Response to the Question: During your designing at studio, which Stage of Design Process is the Most Challenging Part for You?

In response to the question how much do you feel successful in data analysis step, fifty seven students (eighty five percent) felt very much in successful and just three percent were feeling very little (Figure 4.2).



	Very much	Good	No feeling	Bad	Very little
Percentage	85	3	9	1.49	1.49

Figure 4. 2. The Students' Response to the Question: How Do You Feel Successful in Data Analysis Stage?

As it is shown in Figure 4.3 response to the question how you feel successful in synthesis stage, sixty two percent of the students felt little and seventeen percent very little successful while just fifteen percent were feeling very much and much successful.

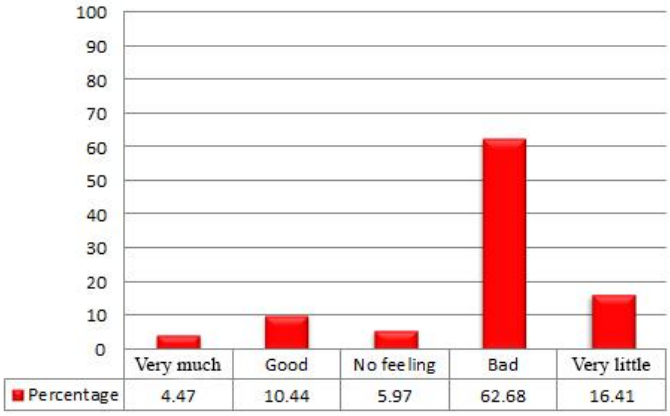


Figure 4. 3. The Students' Response to the Question: How Do You Feel Successful in Synthesis Stage?

Students in response to the question how do you feel successful in Idea development stage as Figure 4.4 reveals, 24 percent found this stage difficult while 55 percent found themselves successful.

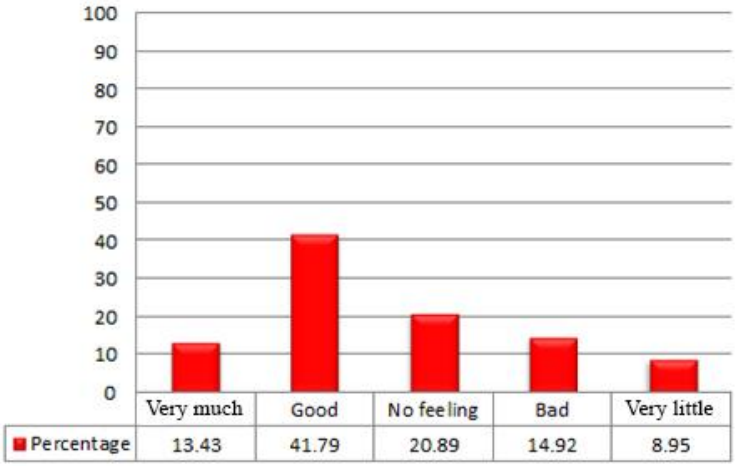


Figure 4. 4. The Students' Response to the Question: How Do You Feel Successful in Idea Development Stage?

Figure 4.5 reveals students response to the question "How do you feel successful in making creative forms" interestingly 80 percent found them very little and little successful while just 18 percent were good or very good in it.

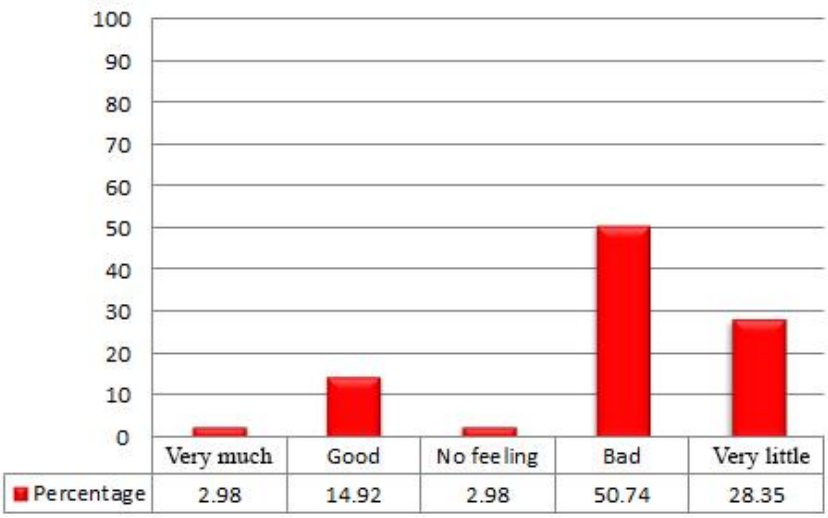


Figure 4. 5. The Students' Response to the Question: How Do You Feel Successful in Making Creative Forms Stage?

As Figure 4.6 indicates the most critical part from students perspective is synthesis and making creative forms which presented formerly by instructors in their interviews.

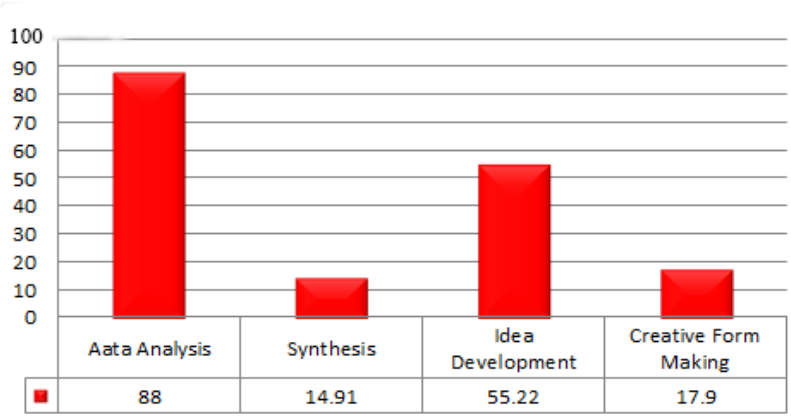


Figure 4. 6. Obtain Results from Student's Level of Success in Each Stage of Design

Instructors mentioned in interviews that students can do the analysis part and they are so good in gathering the information but when they need to integrate these data together to reach a logical result (synthesis) a big gap rises and that's why these analysis getting useless and no connection made between context and form and the

designers start to make conceptual pictures of context which these results are almost wrong. On the other hand, it seems that most of the students don't know how to stimulate their creativity, so if the creativity tools and design principles remind them repeatedly it can be helpful in order to solve their creativity problems. As one of the instructors mentioned educating the students how to think visually can be so helpful for the students. All findings from instructors and students confirm the exigency of proposing an auxiliary tool to facilitate and ease the process of design.

4.3 Phase Two

At the second phase, based on presented literature in chapter two, and proposed comments by instructors in their interviews, the study proposes a structure to be based to reach a reliable rationale for designing a proposal and make a helpful design managing model for students to serve in parallel with given critiques at studios. At the end the proposed model will be examined through interviews by instructors and students.

4.3.1 Rationale for New Design Management Proposal

Fakhra's main goal were introducing a design creativity card set, so tries to guide the use of design creativity by enabling its' user to build many different, exclusive and unique ideas, build concepts and improve those which are not correct to specific titles of concepts and develop it with details. Fakhra asserts that, this tool stimulates cognitive abilities and styles that associated with creative products and idea generation, also helps the designers to create large number of alternatives for form making (Fakhra, 2012).

Although Fakhra tried to create a very helpful, manageable and creativity based model, but seems the necessity of existing logic behind the creativity is missed. This absence may cause unexpected disconnection between proposed architectural form

and available context which discussed by many educators and scholars and as tricky method of design (conceptual or just creative based method) that is very dangerous especially for students and novice designers. Therefore creativity is one of important factors in architectural design but not the only factor (Lawson, 1977).

According to this, Fakhra's presented model gives minimum priority to deal with solutions to provide compatibility between context and form. Designing an architectural outcome should be in a way that the form can be match with its context and in other word, can belong to its own context (Schon, 1983). Alexander (1964) pointed out that logic enables the designer to make picture of reality and then seek to manipulate creativity in these pictures and generate new part of reality. It is the business of logic to invent purely artificial structures of elements and relations. Sometimes one of these structures is close enough to a real situation to be allowed to represent it. This model of designing increases accuracy and gives designer chance to sharpen his/her conception of what the design process involves (Alexander, 1964). Time to time many scholars promoted the architectural problem solving as a logical procedure (Simon, 1976; Schon, 1988; Dewey, 1938).

As mentioned in chapter two, Alexander believed that one of the most important issues in architectural design is solving the misfits and incompatibilities (Alexander, 1964). Moreover the other main concern of many scholars (Hassanpour et al. 2014) was students' over reliance on tutors that in long term turns them to draftsmen. In their studies, they focused on starting point of any design project and student methods of design. Hoskara and Fasli (2001) found students' problem from where to start design and how to advance the design process. According to direct observation and interviews done on spring semester 2013-2014 at architecture department EMU

(Appendix B), designing starts with studying the context and site by data gathering, analyzing the physical factors in context, drawing diagrams to make obtained information more understandable, find misfits and integrate all findings to propose very initial ideas.

In interviews all instructors named this process as site analysis. Interviewees continued that obtained results need to be progressed with synthesis to be used in form making stage (Appendix B). Hoskara and Fasli (2001) asserted about students problem in synthesis part. They believed that students are good in data gathering but normally they scape the synthesis part. So there is a sever need to provide supportive method to guide them how to use these information in their form making process and this study intends to combine discussed method and models in chapter two and coincide them with expectations and requirements obtained from EMU. According to Alexander as Figure 4.7 presents (C_1) step is the existing context of given site with its realities.

This raw context needs to be surveyed and reinterpreted to fit the proposal properly. Based on chapter two discussions, in (C_2) step, form is designed by conceptual picture of the context or site that the designer has learned and conceived. Here is self- conscious process happens while (C_2) ends with (F_2).

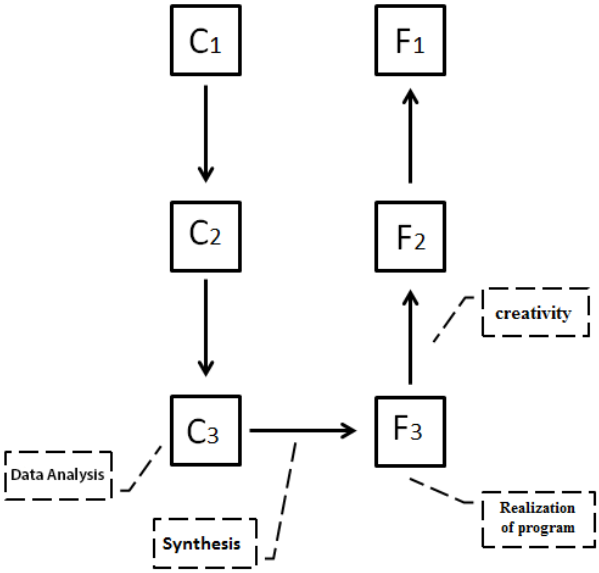


Figure 4. 7. Analysis of Presented Steps by Alexander 1973

Based on Alexander's notes which believed design process starts from (C_3) step and done interviews on spring semester 2013-2014, this transformation of studies to form (from C_2 to F_2) is not taking place. The reason is, the data of this picture from the context is on one hand not clear and on the other hand is not enough, so designer needs to analyze the existing data of the context logically or mathematically to reach for logical results. While if it doesn't happen, the form can be taken from its context or site and put to another one. So designer needs to have more than a conceptual picture, in other words the logical picture. So he/she needs to go one more step forward than (C_2) which contains (C_3). As Figure 4.7 shows, (C_3) stage contains data analysis, studying requirements and existing needs of the context. This step prepares the designer to create initial ideas with maximum compatibility and adoptability with context. Then through synthesis, (F_3) as first stage of realization of program would be met. As defined in dictionary, Synthesis is the logical combination of components or elements to form a connected whole. From this point to F_2, any number of alternatives might be produced and creativity plays an important role. As discussed, Fakhra's flash card system just support F_2 to F_3 stage.

Although Alexander's model is logical and very much effective but being multilayered, complicated integration turns it to a difficult model for students to be used as supportive method. It covers all expected design stages logically but it discusses any stage very general and compact in a way that all of the needs and misfits should be solved in one diagram. This special characteristic makes this model complicated and not enough user-friendly especially for novice and young architecture students. So the author decided to develop the alexander model by working on each stage of it. In this manner each stage's misfits will be introduced to be solved. On the other hand, since designing is a procedure and stages are chained to each other, solving misfits of one step will provide a good base to start the next step. It enables novice designers and students to deal with each stage in detail and get better control over procedure. Moreover as Figure 4.8 reveals Alexander's method present in diagram is unilateral and there is no way back to previous steps, while always further steps can be a good source for previous steps to reach better final outcome. Therefore, to develop new model, Alexander's presented diagram developed in a manner to be more detailed stages and provide the chance to produce dozen of alternatives as well as backward steps.

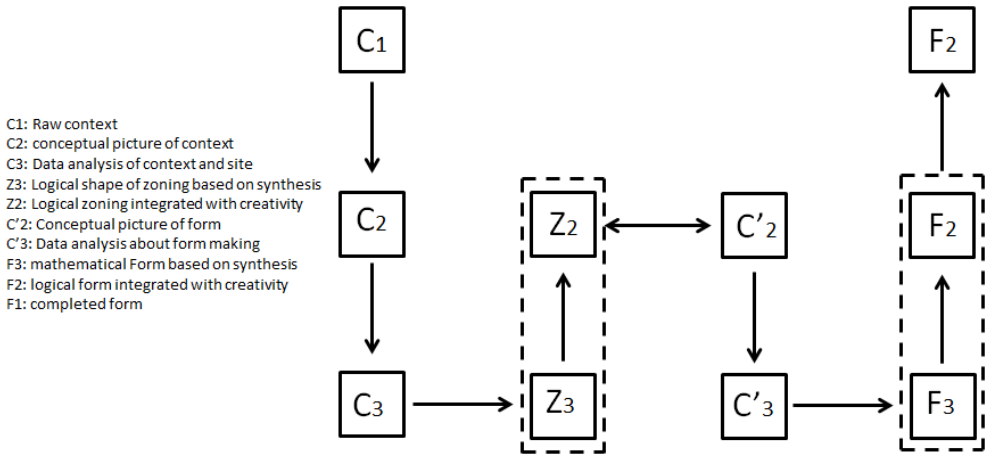


Figure 4. 8. Alexander's Design Process Diagram Developed by Author

To reach this goal, EMU professors interview used as a reference for this study to categorize the stages of design process into certain steps for better timing control and students not to escape any step. As Table 4.1 indicates the common procedure at EMU studios is to start from site analysis- synthesis- conceptual design approaches at given site and development of detailed design.

Table 4. 1. The General Schedule of EMU Design Studio

	General content and schedule of design studios at EMU
1	Site analysis
2	Synthesis
3	Conceptual design approach at given site
4	Development of detailed design

Therefore any proposed supportive model to be reliable and beneficial to them should follow these aforementioned steps which are somehow compatible with Alexander. Of course discussed steps by instructors will get support from lectures and critiques during the semester but still as students results revealed in section they are in sever need of support in transformation of synthesis step to conceptual design approach and create a creative form. So in order to propose auxiliary model, Donald Schon's domain categorization tried to get accommodated with Alexander's developed model and discussed instructors approach. Schon's design domains consist of twelve components with given description for each. In program/use stage, Schon pointed out the function of the buildings which is going to be located in the site such as residential, commercial, museum, school and so on and the way of using these functions or the experience of using them such as "how to pass through the museum space" represents how to use from the functions.

Table 4. 2. Normative/ Descriptive Design Domains (Schon.D, 1983)

Domain	Definition	Example
Program/ use	Function of the buildings or building components; uses of building or site; specification for use	"Classroom", "auditorium", "gym"
Sitting	features, elements, Relations of the building site	"Slope", "hill", "gully", "land contour"
Building elements	Buildings or component of buildings	"Gym", "kindergarten", "wall", "roof"
Organization of space	Kinds of spaces and relations of spaces to one another	"A general pass-through", "layout"
Form	1. Shape of the building or component 2. Geometry 3. Marking of organization of space 4. Experienced felt-path of movement through spaces	"Hard edge block" "A geometry of parallels" "Marks a level difference from here to here" "Carry the gallery through and look down into here, which is nice"
Structure/technology	Structure, technology and processes used in building	"A construction module for these classrooms"
Scale	Magnitude of building and elements in relation to one another	" too small in scale to do much with"
Cost	Dollar cost of construction	
Building character	Kind of building, as sign of style or mode of building	("Warehouse," " hanger," "beach cottage")
Precedent	Reference to other kind of buildings, styles or architectural modes	" An artifice… the sort of thing Aalto would invent"
Representation	Languages and notations by which elements of other domains are represented	"Look at in section", "1/16 scale model"
Explanation	Context of interaction between designer and others	" the sort of verbal order you could explain to someone"

The organization of space is another domain that Schon considered. This domain represents the way how the functions are located in the site, the relation of functions with each other and also the relation of them with their surrounding environment (Schon, 1983). The form is the other domain that consists of geometry, shapes of the building, and organization of space. Then Schon referred to the structure as another domain. This domain shows how the building is going to be built and the technology used in the building; concrete structure or steel structure and the like, for special functions as examples of this domain. Precedent domain refers to the other

architectural styles and modes which help the designers to enhance creativity based other architects work (Schon, 1983). In this way, it seems this insight about the design domains can be more helpful than others in designing an educational auxiliary tool method for students and designers in design studios. Although schon's model provides the designer a list of necessary objectives, components and domains to be considered but there is no hierarchy of stages and clue to be used by novice, students and less experienced designers. To propose an auxiliary flash card to support student's findings strength and weaknesses of each to be considered is very important for this study.

As table 3.2 reveals the proposed model to be used as auxiliary model at EMU design studios should have maximum number of these strength and minimum number of named weaknesses.

Table 4. 3. Strength and Weaknesses of Proposed Models by Alexander, Schon and Fakhra

NO	Names	Year	Weaknesses	Strength
1	Alexander	1973	- Design as a unilateral process. -Design as multilayered and integrated approach which is not dividable into steps.	-considering logical approach in design. -Data gathering and classifying. -Synthesizing the data to reach good fit between context and form.
2	Schon	1983	-Lack of defined steps and sequence for mentioned domains	-presenting variety of domains as guideline (12 domains)
3	Fakhra	2012	- sever lack of rational approach (site analysis and synthesis) and overreliance on creativity.	-tries to enhance creativity by presenting instructions. -Creating an auxiliary tool method(flash cards) to stimulate students creativity

4.3.2 Proposed Model

To design an auxiliary supportive tool and make it adaptable and efficient to reality of design studios, it is necessary to follow common schedule which students are needed to follow. According to conducted interviews, the routine design process in architecture design studio at EMU starts from site analysis, synthesis of obtained information, initial form proposal and form development. According to the named steps, Author tried to get use of special features and potential of each discussed models by Schon, Alexander and Fakhra. Figure 4.9 indicates the overlapping stages of design process between EMU, Schon and Alexander's model.

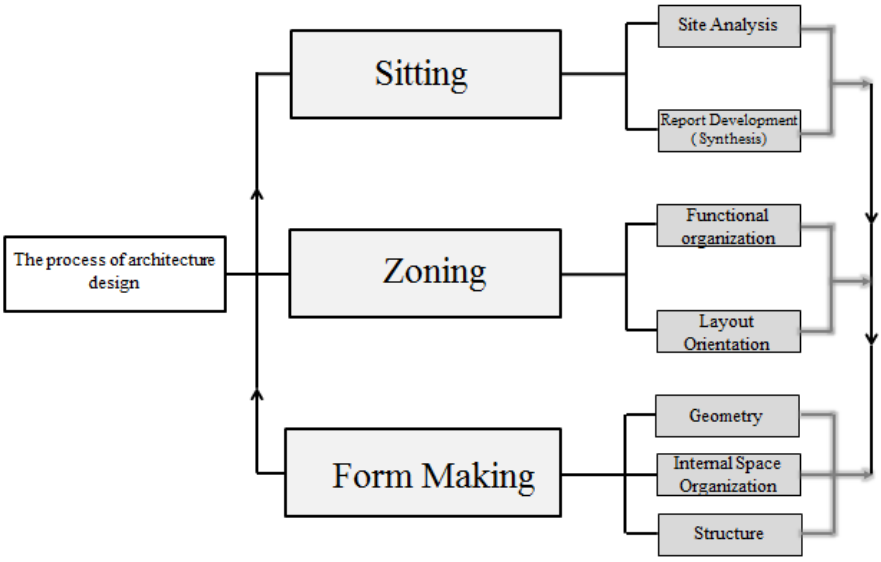


Figure 4. 9. Model for Categorization of Design Domains Based on Method of Alexander, Schon's Model and Fakhra's Creativity Based Model (Author)

As Figure 4.9 shows three main indicators are provided which starts from siting, zoning and finally form making. Presented stages are based on time controlling expected at studios, Alexander's structure and defined domains by Schon. Each indictor has its own determinant part which provides detailed requirement, expectations and necessary practices needed to be done. This feature together with

provided turning points gives the chance for revisiting alternatives and proposals in any stage.

Table 4. 4. Categorization of Architectural Design Procedures

Domains		Sub-domains	Definition
A	**Siting**	Site analysis	Special analysis of context and site that categorizes into three parts: Natural environment, man-made and socio economic analysis
		Report development (synthesis)	a clear report of the effect of the outcomes from site evaluation and recommendations on the suggested building program. (SWOT)
B	**Zoning**	Layout organization	Organizing the location of the function in the site based on report development of site evaluations
		Layout orientation	Layout direction in the site based on report development of site evaluation.
C	**Form making**	Geometry	Visual appearance, constitution or configuration of a function.
		Space organization	Organizing the inside of the geometry in order to make it as a usable function
		Structure	Structure, technology and processes used in building.

In order to design an auxiliary tool method for young architecture students and enable them easily reminding the critical points in every stage of the process, table 4.4 defined. As table shows, three domains introduced to be part of our flash card strategy. First domain introduced as siting and has subdomains such as site analysis and report development. In the two sections special data and information about the site will be collected then SWOT table will be prepared.

In second domain named as zoning, layout organization and layout orientation expected to be proposed. In these two sections the proposed flash card will help the user to be able to convert Domain (A) findings' to decision making tools and find most relevant strategies accordingly.

Third domain (domain C) is form making stage. In this domain Fakhra's creativity concerns became a foundation for development. This domain includes geometry, space organization and structural issues as subdomains. As research limitation, this study just focuses on geometry.

4.3.2.1Siting

First step of any architectural design is known as site analysis. In this stage students are needed to gather data about the context and site understand the location and immediate surroundings and find out constraints of the site. As table 4.4 presents, this part is divided into two parts. (1) site analysis and (2) report development

(i) Site analysis

Obtained interviews result from EMU department of architecture professor interviews and relevant done studies, clarifies the necessity of natural environment, built environment and socio economic studies. Therefore two cards allocated for these studies and their subgroups.

In natural environment analysis, students have to study topography, climate, water and vegetation. As Figure 4.10 presents, flash card has two sides. On the front side the method is introduced and a brief definition is given. On the back side detailed items are introduced and a guideline presented. Based on done interviews and studies on natural analysis be used in architectural decision making, 5 key issues presented. (1) sun direction (2) wind direction (3) topography (4) vegetation and (5) water.

Studying these items enables designer to orient his/ her decisions toward characteristic of the site and make strong relation between proposed form and context, which is the most desirable result in terms of functional organization.

Sun direction, prevailing wind and summer breeze are very important to find the best orientation to get appropriate natural ventilation. So in proposed flash card users are asked to find the exact direction and angle of the sun during the different seasons, the direction of the prevailing wind, maximum, minimum and average velocities and direction of the summer breeze and also special forces such as tornados and hurricanes (Figure 4.10)

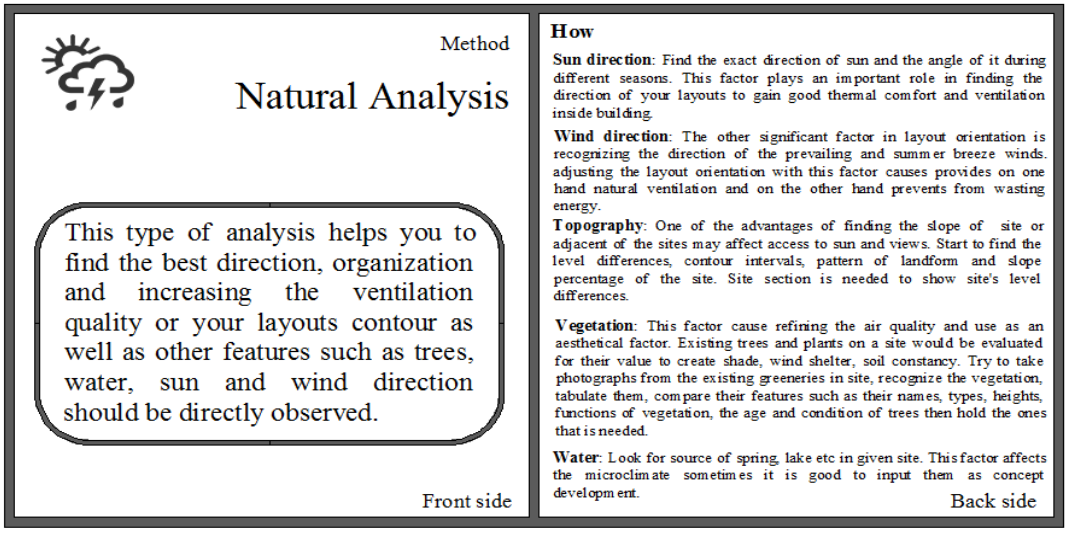


Figure 4. 10. Proposed Flash Card for the Stage of Natural Analysis

As mentioned above, topography is the other important factor in natural analysis. If site is flat, the topography might not affect the location and layout of the function, but on a sloping site, the topography is likely to be an important design issue. Topography either in natural uninterrupted or manmade situations has the capability to modify, improve or highlight climatic variations in different ways. Studying the slope of the site or the slope of adjacent sites may cause to access to the sun and views. For example, an east-facing hillside will have decreased afternoon and evening sunlight, mainly in winter, and depending on the height and steepness, a south-facing site may get little or no sun during the winter. So in recommended flash card students are asked to find the level differences contour intervals, pattern of

landform and percent slope of the site. They are requested to draw sections crossing those areas.

Vegetation factor also plays an important role in natural analysis. Vegetation lets refining the air quality, incrementing biodiversity and reducing urban heat islands thanks to its cooling and refreshing capacity, beside an aesthetical factor. Also sometimes vegetation can be defined as the identity of the site. Existing trees and plants on a site would be evaluated for their value to create shade, wind shelter, soil constancy and a habitation for birds. In this vegetation factor, students are asked to take photographs from the existing greeneries in site, recognize the vegetation, tabulate them, compare their features such as their names, types, heights, functions of vegetation, the age and condition of trees, the possibility of incorporating a tree or shrub into the building design and the degree of shading. This enables the students to realize which types of trees in the site should be increased based on their shading systems and which ones should be removed based on their damage to foundations from root systems.

The fifth factor of natural analysis is water. Water factor enables the designer to be aware of the water situation in the area. bodies of water, such as ponds, fountains, and streams, can affect the microclimate of a site by normalizing extreme temperatures and sometimes it is good input to designers for concept development. So the students are asked to look for source of spring, fountain and lake and existing drainage pattern

In terms of man-made analysis students have to study the located features built by human in the site. Some features such as historical, traffic modes, distribution of functions and legibility of the site.

Based on done interviews and studies on man-made analysis, six key issues are illustrated and mentioned in man-made analysis flash card. These issue are: (1) historical analysis, (2) figure ground, (3) solid void analysis, (4) lynch analysis,(5) land use analysis, and (6) accessibility, traffic and transportation analysis.

Studying these items assist designer to understand the potential opportunities which built by human and make a logical relation between the form and site potentials. One of the important factors in man-made analysis is historical analysis. Historical analysis presents the physical and functional characteristics of the area throughout the history. So in proposed flash card, the students are asked to do this analysis by providing maps that showing the evolution of the area, old photographs and etc. Evaluation of the area throughout the history can be supported with photos and some little explanations on the map. Also, if the site is historically important then a more detailed historic analysis is required.

The other significant factor that should be mentioned in the flash card is solid void and figure ground analysis. This analysis helps the designer to understand form of the development, street patterns and block topology around the site. In order to guide the designer in terms of block organization, students are asked to show the blocks with black color and voids (open land, road) with white color. In figure ground analysis also, in order to understand the distance between buildings students are asked to show street section or 3D characteristics of the area.

Land use is another essential factor among the others. This analysis helps the students to provide information about distribution of the functions on the concerned area. As it can be seen in Figure 4.11, in order to help the designers to understand functional characteristics of the site, in proposed flash card designers are requested to show different functions by different colors.

The other significant factor in man-made analysis is Lynch analysis which enables the user to understand the legibility of the site in the whole city. The introduced key elements by Kevin Lynch (1960) are mainly using in this analyzing part. Based on interviews and studies done, in this factor the students are asked to extract the Landmarks (buildings that have different form, scale from others), Nodes (the important junction points of many roads), Paths (the main channels of movement), Edges (roads, city walls, rivers can create edges), Districts (Districts are neighborhoods showing common physical and/ or functional characteristics). According to lynch, part of the cities "elements of the urban form" should be designed according to these requirements. But according to interviews and researches done, there are two scales of legibility. City scale and local scale. In order to enable the students to reach for local legibility, they are asked to obtain four main factors. These factors are: (1) location and linkage (2) enclosure (3) landmark in space (4) entrance point. The last factor in man-made analysis which should be mentioned in the flash card is accessibility, traffic and transportation analysis. According to Figure 4.11, students are asked to obtain all modes of movement in the area including pedestrian, car, bus, etc. and the provision for each of these modes in terms of circulation, parking and drop off points.

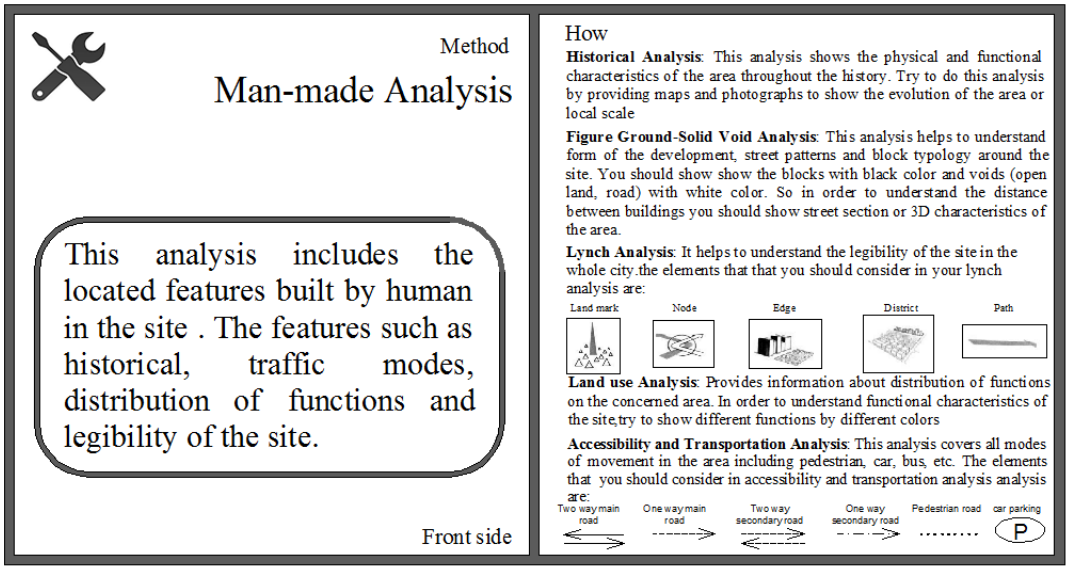


Figure 4. 11. Proposed Flash Cards for Man-Made Analysis

In socio- economic environment analysis, designers are requested to provide data regarding the demographic structure of the citizens and users in the area also provide the existing economic activities and employment patterns and deliver the existing laws and regulations (Appendix E contains physical factors of site analysis).

(ii) Report development (Synthesis)

The site analysis report contains property maps, site evaluation recommendations, and a clear report of the effect of the outcomes and recommendations on the suggested building program (Zimmerman, 2000).

So after site analyzing, students are asked to do the SWOT analysis, which is a kind of prerequisite for strategic planning. The SWOT analysis as Table 4.5 presents, need to be presented in matrix format (Moughtin, 1999).

It is powerful tool for dissecting the properties and potential of an urban area. If the examination of the data is structured as shown in flash card (figure 4.12), then the strengths and weaknesses of each category (built environment, man- made

environment and socio- economic environment) be addressed and analyzed. This stage is known as the important part in design process which based on interviewing with instructors and the results of questionnaires, students have problem in it.

In this stage as Figure 4.12 shows students are asked to make a SWOT table based on the done analysis, list the strength, weaknesses, opportunities and threats of their built environment, man- made environment and socio- economic environment analysis.

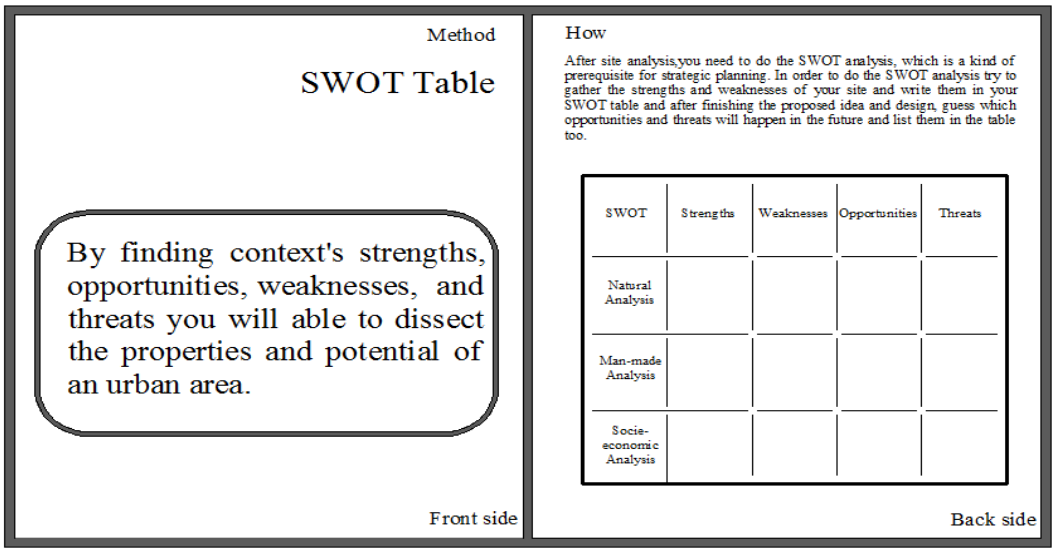


Figure 4. 12. Proposed Flash Cards for Man-Made Analysis

4.3.2.2 Zoning

Collected data about site and context and report development all required preparing a potent foundation for designer to define strategies toward form making. This was confirmed by EMU students and instructors as well as all discussed models in literature. On the other hand were found by EMU participant as one of the most critical stages. In this stage designer needs to combine and merge the data which are gathered in siting and try to find the suitable organizations and the best direction of buildings or functions in site. According to Donald schon's twelve categories and to

manage flash card structure as figure 4.13 shows, two sub groups introduced. These sub groups are layout orientation and organization.

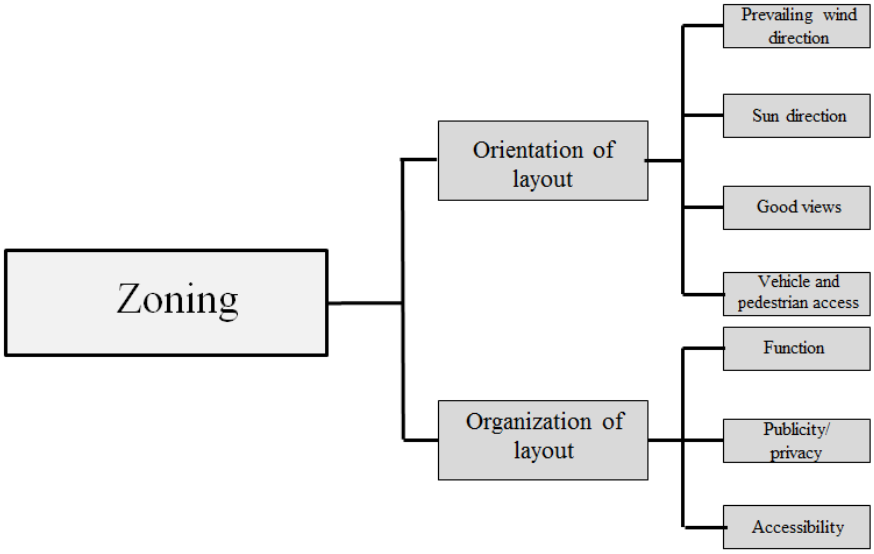


Figure 4. 13. Categorization of Zoning Stage in Design Process

To present appropriate flash card, based on Alexander strategy, the author tried to find most relevant and influential studied characteristic of the site in previous step under each sub-group umbrella and in this manner make decision making easier, especially for inexperienced students.

Orientation of building plays significant role that enables the designer to find the standards of thermal comfort and ventilation inside building. Logical orientation increases the energy efficiency of building causes to reduce the need for extra heating and cooling and catch best views. Unlike, poor orientation can ignore winter sun, and cause overheating in summer by letting low angle east or west sun to strike glass façades. Based on done interviews and studies on layout orientation, sun direction, prevailing wind direction, vehicle and pedestrian access and good views found as influential factors to be considered.

Figure 4.14 shows proposed flash card to cover this step of design. In this card the user is asked to reconcile findings of each named factors (sun direction- prevailing wind and summer breeze, vehicle and pedestrian access and good views) and drawn diagram which prepared in previous step to find a maximum available orientation that provides best fit. For instance by finding the right wind direction and orienting building appropriately get good benefits of summer breeze, natural cooling, prevents waste of energy in summer and also in winter avoids from entering of prevailing wind to the building.

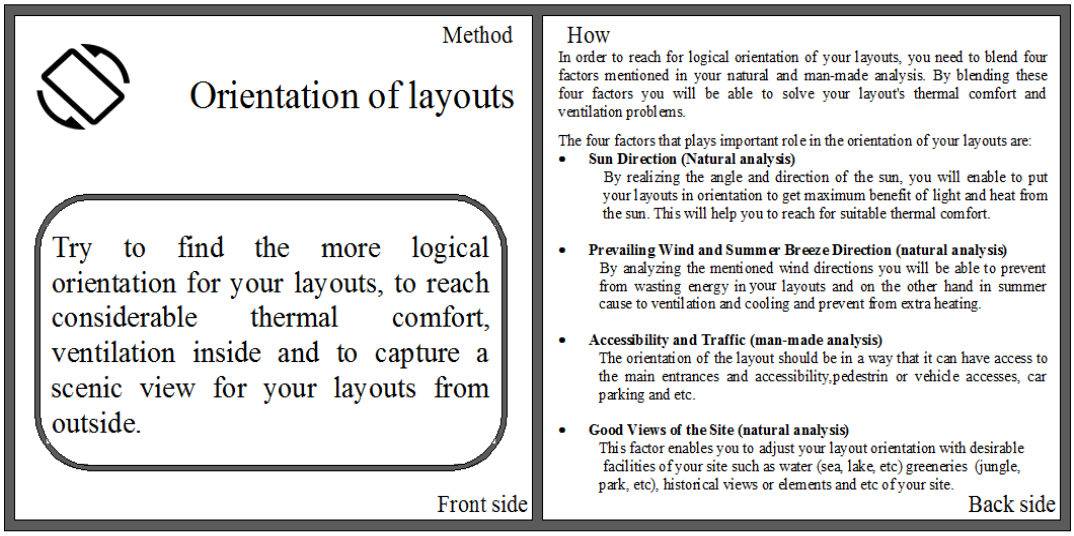


Figure 4. 14. The Orientation of Layout's Flashcards

As it was mentioned in natural analysis flash card, the parameters that students should mention in specifying the prevailing wind are: (1) the direction of the winds (2) Maximum, minimum and average velocities and also (3) Special forces such as tornadoes, hurricanes which should be mentioned.

As instructors mentioned in their interview, the other two factors which should be referred in orientation of the layout are good views and vehicle and pedestrian

access. In order to provide for a layout to see the best view of the site, designer should consider this factor as one of the layout orientation.

According to done interviews and researches on layout organization, figure ground (Solid Void) analysis, land- use analysis, publicity/ privacy and accessibility found as influential factors on decision making. Studying these items enables designer to find the logical organizations between buildings with each other and surrounding area in the site. The first factor in layout organization is figure ground (Solid Void) analysis. This factor helps the designer to shows the relationship between built and unbuilt space.The other important factor in layout organization is public/ privacy. As instructors mentioned in their interviews, the layouts that play important role in the program should be in private part of the site and the layout that can connect inside with outside of the site can be near to entrances such as commercial and official. The other factor that helps the students in reaching to logical organization as Figure 4.15 presents is accessibility. By analyzing the accessibilities of the site, students are being able to find logical organization.

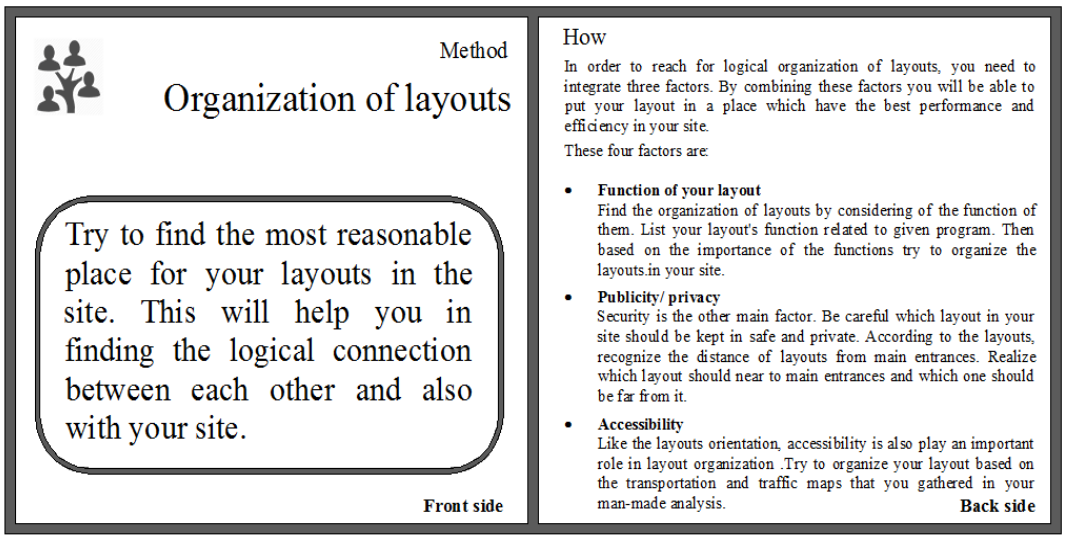


Figure 4. 15. The Flash Card of Organization of Layout

4.3.2.3 Form making

After compatibility of the layouts with site (zoning), students are requested to develop their forms based on initial proposed layouts. According to observations and studies, as Figure 4.16 shows, geometry, internal space organization and structure are main concerns. As mentioned before, geometry is part of this research scope and is going to be surveyed.

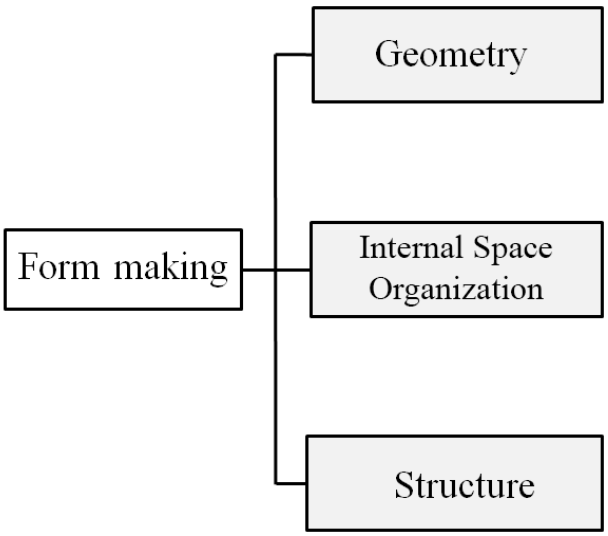


Figure 4. 16. Proposed sub-groups of Form Making Stage, Implemented in Flash Cards (Author)

As mentioned before students are asked to start creating geometry by the main idea. As one of the instructors mentioned, "Good design solutions are not simply physically exciting but are driven by basic ideas. An idea is a particular mental structure by which we organize, realize, and give sense to external understandings and information. The more specific a design idea is, the better its appeal is likely to be. Without basic ideas notifying their buildings, architects are simply space planners". So for developing this main idea students need to use principles, patterns and techniques which they have learnt in their basic design classes. These principles

are playing an important role in making creative forms. Although researchers explored about the categorization of these principles (Ching, 1979; Yilmaz, 1999; Pottman, 2007) but based on done interviews, it seems that still there is a need for educational auxiliary tools to support students. According to done studies; (a) design strategies, (b) spatial organizational patterns, (c) formal distortion are needed to be considered. Four cards prepared for this step (one card for (a) and (b) parts and two cards for section (c).

a. Design Strategies

In design strategy flash card, six applicable and useful factors (based on interview and literature). As Figure 4.17 presents, the flash card named design strategies and discussed principles and like (1) unity, (2) balance, (3) rhythm, (4) contrast, (5) proportion and (6) dominant.

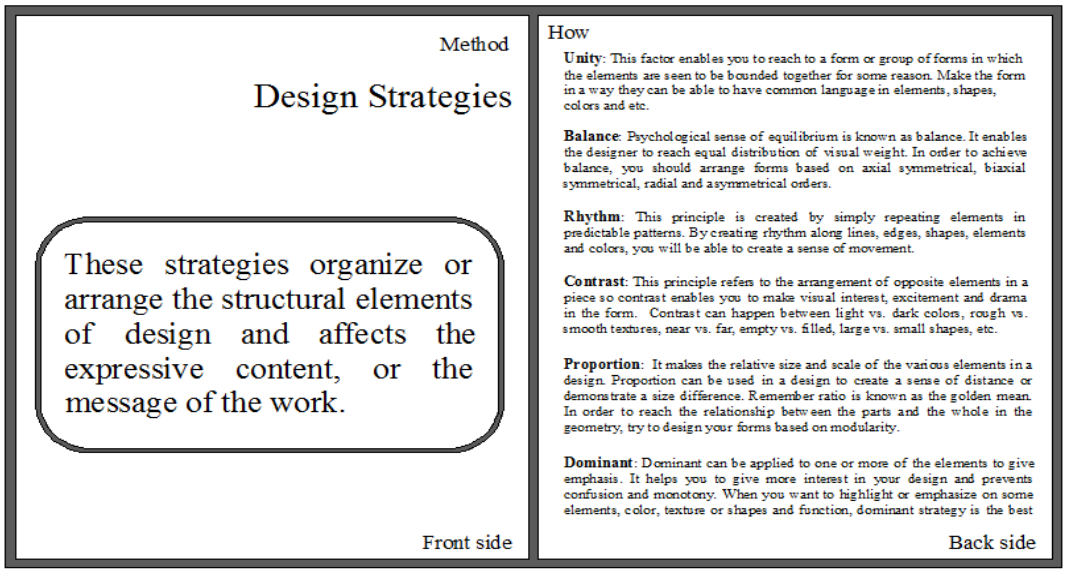


Figure 4. 17. Proposed Flash Card for the Design Strategies

Studying these items enables designer to organize and/or arrange the elements of design. The way in which these principles are applied affects the expressive content, or the message of the work (Ching, 1979). In unity it is asked to make common

language in element shapes, colors and etc. Unity helps students in reaching to a form or group of forms in which the elements are seen to be bounded together for some reasons (Interview). The other factor which is significant among the principles is balance. In order to achieve balance, users are requested to arrange forms based on axial symmetrical, biaxial symmetrical, radial and asymmetrical orders. Rhythm is also known as other important factor. It helps the designer to make continuity in form and lets to develop an internal consistency which makes it easier to comprehend. This principle makes recurrence, sequence or organized movement in space and time (Yilmaz, 1999). Contrast principle makes visual attentiveness, interest and drama in the form. In order to make contrast, students are asked to create an arrangement of opposite elements.

This enables designers to highly dominant or/and emphasize on any of the physical elements: shape, color, weight, and texture, size, etc. One of the important principles that emphasized by instructors in their critiques is proportion principle. Proportion aids students to make the relative size and scale of the various elements in their design and also it helps to have harmony, symmetry, or balance among the parts of a design. The most applicable proportion system is La Modulor by Le Corbusier. Le Corbusier established his evaluating tool on both arithmetic and the proportions of the human physique.

The aim of the modulor was to keep the human scale everywhere (Yilmaz, 1999). In order to reach the relationship between the parts and the entire in the geometry, students are asked to design their forms based on modularity. Dominance emphasizes

on one color, shape, form, element or special structure to make dominant forms. It helps students give their design more interest and prevents confusion and monotony.

b. Spatial Organization

Spatial organization can be seen as compositional patterns that several forms and spaces can be gathered and organized into an inter-related 'whole' by logical and ordered relation (Ching, 1979). As figure 4.18 presents, four patterns are going to be discussed in the spatial organization flash card which are: central organization, grid organization, linear organization and radial organization.

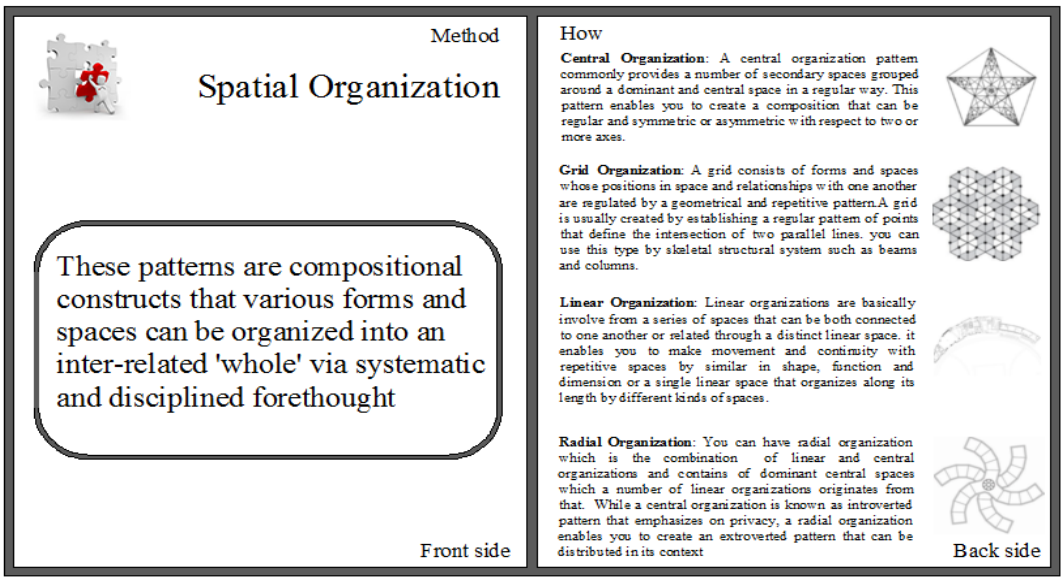


Figure 4. 18. Proposed Flash Card for Spatial Organization of Form

A centralized organization commonly use when a designer desires to make a number of secondary spaces grouped around a main and central space orderly. Usually this pattern enables the students to create a composition that can be regular and symmetric with respect to two or more axes in concentrated composition.

The secondary spaces may be alike and similar with each other in function, geometry and dimension, and generate a geometrically ordered and symmetrical configuration

or may be different with each other in shape or dimension in order to reply to individual needs of function and dimension. The other pattern which considered in flash card is grid organization. A grid pattern consists of forms and spaces whose positions in space and relationships with one another, are regulated by a geometrical and repetitive pattern. A grid is usually created by establishing a regular pattern of points that define the intersection of two parallel lines. In order to create grid organization pattern, students can use this type by skeletal structural system such as beams and columns.

Linear organization is another factor that should be mentioned. Linear organizations are basically involved from a series of spaces. These spaces can be both connected to one another or related through a distinct linear space. This organization pattern enables the students to make movement and continuity with repetitive spaces which can be similar in shape, function and dimension or a single linear space that organizes along its length which different kinds of spaces can be dissimilar in size, form, or function. In linear organization students have direction and then can have the starting and ending points, dynamism and development. On the other hand these organizations are flexible; it means that they can be cursive, curve or straight.

Radial Organizations also are combination of linear and central organizations which contains of dominant central spaces that a number of linear organizations originate from that. This organization can be developed by its linear arms and can connect itself to other site features. While a central organization is known as introverted pattern that emphasizes on privacy, a radial organization enables the students to create an extroverted pattern that can be distributed in its context.

c. Formal Distortion

In creating geometry of forms, there are some techniques that bring more creativity to proposals and alternatives and enable the students to change the forms to be more functional and aesthetic. In order to recognize these tools that mainly are ignored or unregarded by students in their form making process. To achieve those techniques the author attended in EMU jury sessions in fall 2014-2015 (three different level of design) and tried to record jury members critiques specially on geometry, layout development and form quality. These techniques were listed (as appendix G reveals). Obtained list together with instructors personal interviews summarize in two cards introduced as formal distortion [1] and [2]. In these two flash cards twelve techniques such as combine, transform, replace, extrude, move, break apart, adding parts, subtract, shell, and exaggerate presented to users of flash cards (mainly architecture students). These techniques enable students stimulate their creativity in creation of various types of forms on one hand and on the other hand solve their geometrical and functional problems in logical way. Formal distortion [1] includes five specified techniques such as combine, transform, replace, extrude and move (Figure 4.19).

One of the important techniques that students have difficulties in form making is combining the geometries. Most of the students almost make rigid and simple form. Combine is a technique which enables students to bring elements, ideas, forms and material together, incorporate, rearrange, Connect, link, unify, mix, and merge in order to reach unity, which can have common language (Fakhra, 2012). Transform is the other techniques which mentioned in critiques. In order to reach interesting and creative forms transform is another alternative which students can use from it. For example in order to define passages, students can transform their rigid forms into

semi open spaces and define their passages by those semi opens (based on direct observation). The replace is another technique. This technique helps students to exchange, relocate, substitute, change one element with another. For example it helps to change simple form to dynamic movements and elements or by replacing powerful elements helps to join the surfaces and floors in a best way (Fakkhra, 2012). Extrude technique reminds the students to increase or decrease the heights of their form. This technique helps them to take the form out of monotony and change the level differences between their functions and forms (based on direct observation). Moving the form in different dimensions also helps the designer to reach for useful spaces in forms. For example by elevating the form from ground it creates a semi open space (based on direct observation).

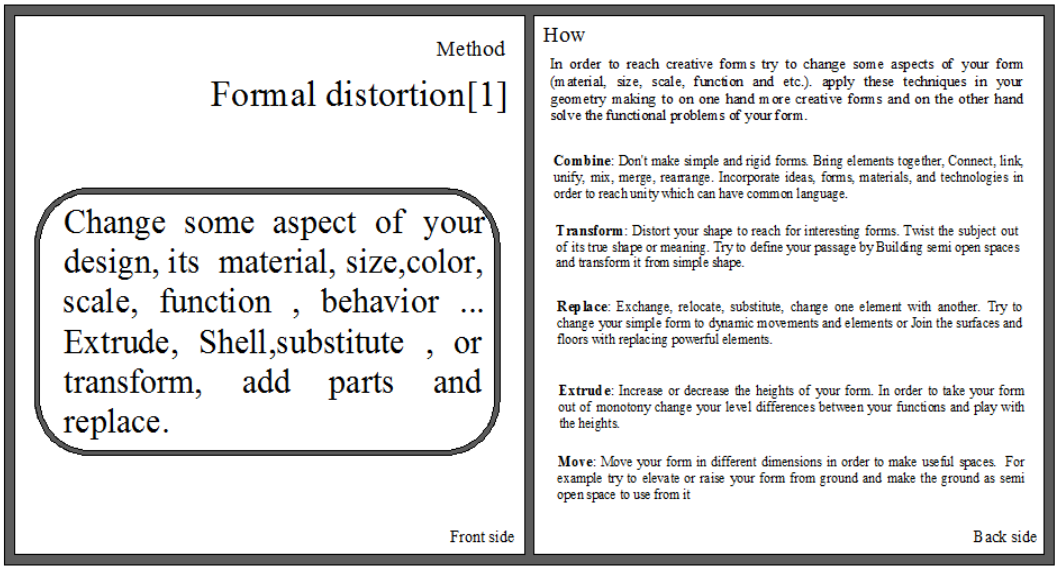


Figure 4. 19. Proposed Flash card for Formal Distortion [1]

In formal distortion [2] the other seven techniques that emphasized in critiques are mentioned. These techniques as it can be seen in Figure 4.20 are breaking apart adding parts, subtract parts, shell, and exaggerate.

Break apart is the other form making technique. This technique helps to break geometry to its smaller components and elements. It enables students to go to the root of form and aids to understand it and see the design problems which enable to make better forms. Adding part is the other technique in formal distortion [2]. In this technique students try to add new elements, materials, color and etc. to their form in order to have interesting and creative outcomes. The other technique which should be mentioned this card is subtract. This technique enable students to simplify, omit or remove elements. By this technique students can break the rules of rigid form and create new spaces which are useful in their design. Shell allows students to hollow their form out. This technique which called solid and void enables students to make skylights and greeneries in their forms. By exaggerate technique students can magnify their reference matter and change proportion and relative size. This technique helps students to imagine their form bigger, louder, or brighter. For example exaggerate give the ability to bold their entrance in order to define it strongly. The other techniques which can be mentioned in this flash card are bend and screw which allow the students to make better and creative forms.

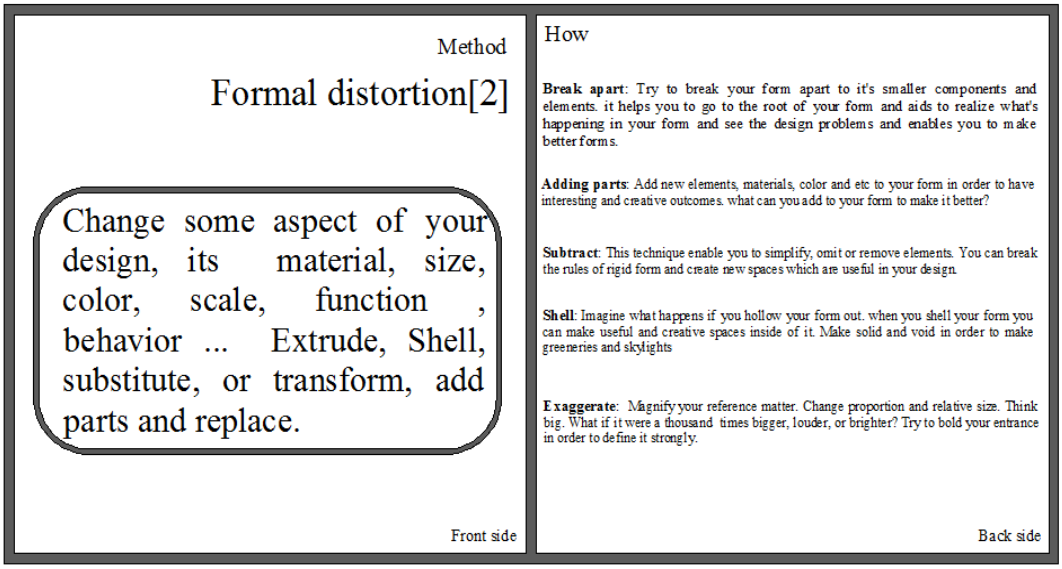


Figure 4. 20. Proposed Flash card for Formal Distortion [2]

The eight cards are signified in the way of post-it notes. This touchable form of representation is used for practical reasons. Like post-it notes, the cards can be attached to different surfaces, e.g. counters, PCs, fridge door, books, , and can be moved to several locations. In other words, the cards can be used as graphic reminders of the methods available to students whenever and wherever they want to use . This visual availability inspires regular use, incorporates the use of the cards in design processes, and offers exposure of the methods to other students.

4.3.3 Instructors' and Students' View on Proposed Model

Totally five instructors attended in the interview in order to evaluate the proposed model and understand the reliability of flash cards. In the interviews, it was requested from instructors to take a look at the flash cards and respond their viewpoints about them and mention positive and negative comments. All responses were tape recorded and transcribed at a later day.

Moreover, questionnaires were distributed among different levels of architecture design students in fall 2014-2015. There were totally 31 questionnaires returned by students. The survey targets students who were familiar with stages of design process in design studio which specifically most of them were second and third year students. Figure 4.21 displays some of students who attended in this survey.

Figure 4. 21. Some of Students Who Attended in Survey

In this questionnaire the flash cards (according to the mentioned format) were given to the students and later on it was asked them to answer given questions in questionnaire. The questionnaire were include five questions in multiple choice and they were asked to pick on answer in any given question (Appendix F contains students' questionnaire). The outcomes of each question are going to be displayed and interpreted in charts and graph tables. The first question was asked "How much the flash cards were helpful?" The objective of this question was to find out the usefulness of the model. As Outcomes are presented in Figure 4.22, twelve students (38 %) mentioned that it was very much helpful, moreover 16 students (51 %) pointed out it was helpful, nine percent realized it was not that helpful and nobody understand the model as useless one.

Figure 4. 22. The Students' Response to the Question: How Helpful were the Flash Cards?

In the second question it was asked students "Was flash cards following design studio sessions at EMU?" as Figure 4.23 presents, ten students (29.03 %) realize it was quite the same, interestingly twenty one students (70.96 %) referred that the flash cards was following design studio sessions.

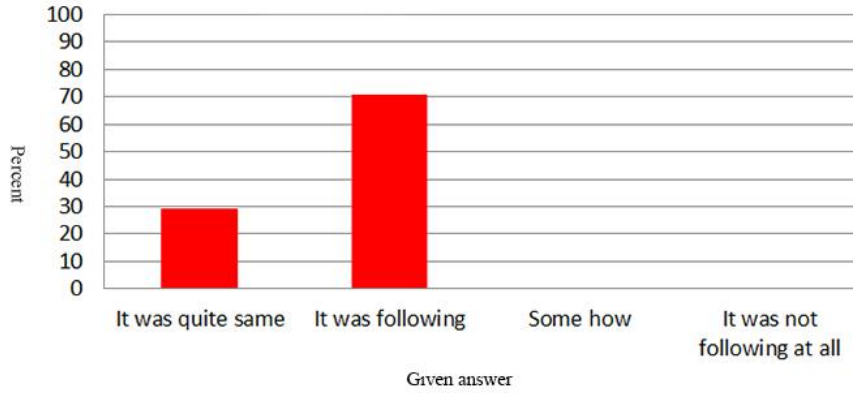


Figure 4. 23. The Students' Response to the Question: Was It Following Design Studio Sessions at EMU?

Students in response to the question how much difficulty you had while using flash cards as Figure 4.24 reveals, remarkably twenty six students (87.09 %) mentioned that the flash cards are user friendly while three students (9.67 %) referred that it was very primitive and one students about 3 % find out flash cards was complicated.

Figure 4. 24. The Students' Response to the Question: How Much Difficulty You Had While Using Flash Cards?

As Figure 4.25 Shows in response to the question how was the number of flash cards and guidelines in it, 27 students (87 %) of the students found the number of flash cards are enough and useful while 3 students (9.67 %) prefer to have more cards with

more detailed information and just one student (3.22 %) found the number of these flash cards too much and useless but none of them realize to have less cards with less information.

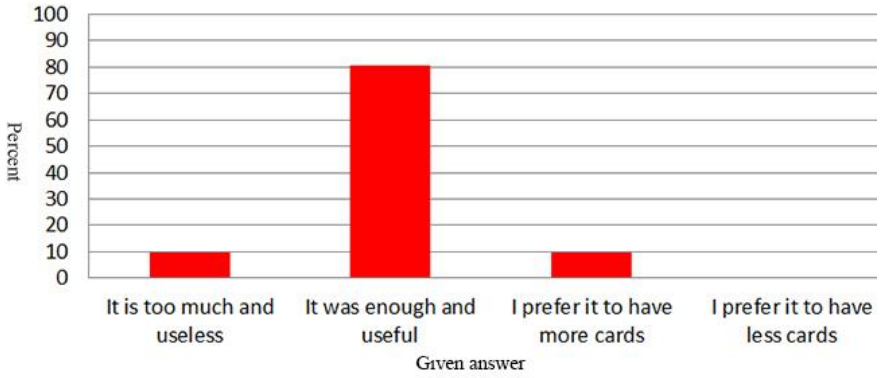


Figure 4. 25. The Students' Response to the Question: How was the Numbering of Flash Cards and Guidelines on Them?

In the last question according to figure 4.26 it was asked from the students "Do you prefer to use flash cards in new semester as well?" twenty eight students (90.32 %) prefer to use flash cards in new semester as well and three students (9.67 %) were not interested in using flashcards in the new semester at all.

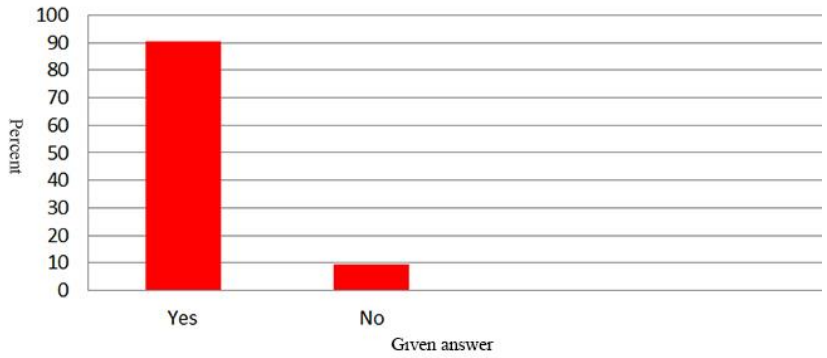


Figure 4. 26. The Students' Response to the Question: Would You Prefer to Use Flash Cards in new Semester?

4.3.5 Discussion on Findings

Obtained results from instructors revealed that the flash cards are useful and can be helpful for students to manage their own design process parallel with their critiques. Also they mentioned some suggestions and points about the flash cards (Table 4.6).

Table 4. 5. Instructors Opinion About The Proposed Model

Negative points	Positive points	suggestions	Descriptions
-Not any negative points.	-Helps to increase student's creativity.	-Add symbols and signs to make them more user-friendly.	-Based on the suggestion, the symbols were added.
	-It can help students to manage their own design process.	-Make a booklet to enable the students write and draw on that.	-booklet system is not compatible with flash card system. Flash card system is only a reminder and nothing more.
		-Add internal space organization step to the flash cards.	-This suggestion is out of the limitation of this research.

On the other hand, based on the above graphs, totally, thirty one students believe that these flash cards are following the process of their design studio and thirty of them found that number of the flash cards are enough and useful and even some of them prefer to have more cards with more detailed information. Also twenty six students found these flash cards user friendly and they were satisfied from using these auxiliary tools (flash cards). So among the students, twenty eight students prefer to use and test these flash cards next semester. Finally twenty eight students referred that the flash cards are helpful to use parallel with instructor's critiques in design studio.

According to the obtained results, it can be understood that the proposed tool (flash cards) is doing what the initial expectations was. It can help students manage their

design process and aid them to pass smooth transition from dependent to independent designers.

4.4 Summary of Chapter

In this chapter a model proposed to assist students in their management of design process parallel with critique sessions. To achieve this model, two phases considered. In the first phase, it was tried to realize what are the student's problematic stages in their design studio process? For this purpose, initially an interview conducted with design instructors to find out their experiences and perspectives about student's critical stages of design. Then according to interviews a questionnaire distributed among students to realize the stages that students have difficulties. In phase two, three well-known methods studied and introduced new rationale for design. At first Fakhra's method were considered to constitute a structure of the research and support to complete the creativity part of the research. Then alexander's method introduced to shape the rational part of the process and finally schon's method used in categorization of the process. By analyzing the strength and weaknesses of these methods it was tried to coincident the strengths with needs of case study. Then based on these two phases the educational auxiliary tool presented in flash card format. As final stage a questionnaire (Appendix F) distributed among the students and an interview conducted with five instructors. The obtained results presented in percentage tables and graphs.

Chapter 5

CONCLUSION AND FUTURE WORK

5.1 Conclusion

Architecture is a multidisciplinary field; therefore architecture education needs extra attention and consideration compare to conventional educations. Architecture education is known as a subject which plays as important role in quality of our surrounding environment. So in order to have good qualities and creating logical and suitable functions for the user, training of architects who are capable in dealing with architectural design is changed to one of the significant objective in architectural education. It can be mentioned that to develop our expectations for changing the education direction is a brilliant way." (Thronberg, 2006). In order to improve the essential skills which are creative, conceptual and practical abilities to recognize human requests and desires and to be able to meet or identify these in space and form, educating architects is an essential and vital task. Donald Schon emphasizes that students need be capable to 'think like an architect'. Students during design education learn to see unfamiliar design situations as familiar one and can transform their experience and ideas to the unique knowledge and concepts.

Design studios at school provide students chance to get design skills under the "supervision of studio master". The design studio provides student essential skill and knowledge to produce creativity and give them ability in solving design problems. In another words, the main goal of design studio is to cultivate students' imagination in

design and let them to create architectural designs that have balance between rational and creative thinking.

As Biggs (1999) mentioned, specific feature of the architectural design studio is its learning methods, which are embedded in experiential learning or learning by doing. In recent academic courses, design studio education is reflected in homework revision practice. Therefore it is important to improve student's self-criticizing skill in order to help them to manage their own projects which requires students learn not only how to judge their own design product though learning, but also how to evaluate and develop upon their own learning processes from one design project to the next. But the question is "which methods and help the students to manage their own design process parallel with instructor's critiques in design studio?"

This question was approached through the development of the user friendly auxiliary tool model (Flash card). This research developed in response to the need for an auxiliary tool which is presented as flash card set to help students reminding essential issues they have learned previously and enable them make more matured decisions and increase their creativity by providing variety of ideas. In this research a complete study done as literature about well-known theories on design process, problem solving, creativity and form making. In order to reach reliable auxiliary tool a multilayered methodology is organized and student's critical stages in their design process recognized through interview and questionnaires. Moreover, three well-known methods presented (Fakhra, Alexander, Schon). The study tried to get maximum benefit from strength points of them and cover the weaknesses and tried to coincident those strengths with needs and expectations of case study. In order to create the structure of the research and on the other hand help to complete the creativity part of the research Fakhra's method introduced. In this regard, because the

problem solving process is known as an integral part of designing, Alexander's logical method is added to reveals a rational structure of the process and Schon's method was surveyed to facilitate in reaching a reliable categorization of design process for designing an auxiliary tool. The positive features of this auxiliary tool model (flash card) in this study in comparison to discussed methods are as follow:

1. Categorization of the design process took place based on integration of EMU design schedule and other three named and discussed methods (Fakhra, Alexander, schon).
2. Unlike the other models, this study tries to cover all design stages and work as very user- friendly model.
3. This study tried to avoid student's explicit tendency to escape from necessary stages of design.
4. The design process in this model provides the chance to produce dozen of alternatives as well as backward steps.

This model enhances students' transformation from very much dependency into independent designers very smoothly. On the other hand obtained results from students and instructors survey confirmed that the proposed method has met the expectations and reached to a suitable level of its user's satisfaction. Twenty eight students out of thirty one (90.32 %) were interested to continue using proposed flash cards in their next design studio and also twenty one students out of thirty one (67.7 %) Percent of students confirmed adaptation of proposed model with instructor's expectations which reveals the reliability of the proposed model.

5.2 Future Work

Objectives of this study were to document, study, explore and analyze different theoretical approaches, methods and practices of design process and form making methods, critically analyze the design procedure and "form making strategies" based on tutors and students experiences, comments and direct observations at department of architecture EMU, reconstruct the idea of "form making approach" based on three introduced (Schon, Alexander and Fakhra) model and develop, evaluate and analyze proposed flash card sets based on three introduced models (Schon, Alexander and Fakhra) and obtained results from case study (EMU department of architecture students) which all achieved in this study; but still it could be developed and re-evaluated in some aspects.

Form making was discussed in three main categories (geometry, internal space organization and structure) which internal space organization and structure considered as limitation of this study. These two categories could be new objectives for future works separately or together. Moreover structure of proposed flashcards could be developed to be more user-friendly in terms of colors, symbols and many more. Finally the proposed model could be tested in other schools and universities to deeply validate the proposed model.

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APPENDES

Appendix A: Questions Asked to the Instructors in Interviews.

No	Questions
1	What is your opinion about the education design process in EMU?
2	What are the student's critical stages in their design process?
3	What is your solution to solve the synthesis which is a big gap among the architecture students?
4	What are the most important form making principles that students need to mention in their form making process?
5	What is your opinion about the education design process in EMU?
6	Which principles and tools that you are teaching I basic design?

Appendix B: Transcription of Interviews

1. prof. Dr. Kokan Grcev

I am trying to explain to the students at the same beginning of 291 is the importance of the visual thinking. Because visual thinking is in on its way to develop any kind of design strategy of planning education which is about metaphor, model, mind map and manifest. So these are the four M's that in design all the student need to exactly know about them. Because to use metaphor, you know what does it means metaphor, everything is something else. Reminding you something else which is mapped to get something else but this is again returning to internal relationship in other things. Model focus on experiences bur experiences so far expected for 291 in 391, in 591 and in any design classes you're starting with metaphor, model, mind map (creating personal data of the students) and manifest. Experience in model means people, activities, context which is resulted in usable, functional, convenient and pleasurable and it is focused on tasks, objectives, quantifiable so this is very important metaphor, model, mind map and manifest. Mind map is something that like tools for example, case studies diagrams, visual thinking tools whatever, program types, how much, when , where, how you know mind map is creating and gathering data but setting it on the main stream of the design process and that's is how you are resetting your mind map. Going into the mind map is means is fulfilling the mind with data. Going into precise mind map is collecting data. So to expect that mind map to create model to create the mind map and to set that main stream of the mind map to get to latest point to plan to improvise the manifest your idea of the result of the process ad to stay in the middle planning and improvisation. Because this means improvisation and this is like music. You cannot improvise from anywhere. You start from the scale, tone scale but you have to start from somewhere and when you define

it, if it is B minor or whatever and when you start there the improvisation goes there. In this tone. That is the same. To improvise I should choose. Am I going to play jazz or classic or flamenco. The context should defining and how to define it with mind map based on previous experiences and prepare to create any kind of metaphor that present the general idea. It is very important for 291 because it is basic for student to think visually. When you are starting to design we should but give them the solutions but tools to force them to think visually because it is important that at first see it think it and then draw it. When you design you should have a picture of what you design. Without picture what are you expecting to design with empty background. If you have the plan and visual picture in your mind, now you have the experience and tools to design what you want. This problem of the student which is a gap between design and program. How they design and why design. And then the tools for the 4 M's are analyzed, sympathize, visualize, materialize, memorize. Very simple but very effective to get to result. The process of designing in this way is in four phase. Like writing it is including from introduction, literature, methodology, and conclusion. But using with different tools. You start from gaining data and experiences and then you know about the other methods and then you start to do it with your concept and method to support it with tools and the start to complete it and after that you are going to present it by sketches, presentations, computer aiding tools and so on. The process is the same. And the gap that students have many problems in that is between literature and methodology that we say synthesis. The best way to improve in the way of designing you are going to reuse, or remind the tools and the ways how to design. By understanding and reminding them regularly, then you are able to make creativity and adopt with the same principles. This is the way that in

design studios instructors are emphasizing on reminding the ways and tools every time.

2. Assoc. Prof.Dr. Mukaddes Faslı

So as you explain the main mistake that the students are doing, they are making analysis but they are not aware of what they are doing and why they are doing. And then they are not using the synthesis stage and directly pass through produce something on the site but they forgot the analysis and the synthesis part. So before starting to design analysis is very important and we have let's said six issues that we are analyzing and in design studio we are using these analysis. Town scape analysis, lynch analysis, solid void analysis, figure ground analysis, land use analysis and historical analysis. And all of them at the end are synthesized in SWOT. SWOT includes natural environment, man-made environment, and social environment and analyzes on the strength, weakness, opportunity and threats.

So we are expecting students to evaluate what we have done and then produce let's say if they are facing some building to sun direction because of the climatic condition or because of the wind, because of the main pedestrian access and we want the students to think about these. But they are not and I don't know how to teach. Let's say last year we are expecting from students to make their synthesis by themselves and submitted and we are judging and grading them. But this semester we plan to do. We tell them to do your SWOT bring to the class but no matter you make a mistake. Most probably all of them wrong. But what we will do in the class, we will put a LCD and we will asked the students and to the groups, telling their proposed SWOT means synthesis and put the synthesis in the board, so everybody will be aware of it. This is the summary of their analysis. Otherwise, maybe as they don't know the importance of synthesis and the SWOT maybe they are giving

responsibility to them and because of that they do the SWOT. But they do not know what is SWOT and why they are making SWOT. Because what is very important not in architecture, in other disciplines, SWOT is used for before strategic planning, in economy, in management, in business and type of the things in GIS system. All the big companies are making SWOT in order to improve. So, today we are planning to do the SWOT together to be aware of the synthesis. So they will be concentrating on what they are doing and they will learn something. I believe this. I have written a paper related with the partly students forgot to make synthesis in the proposal part so they forgot all their analysis part and they are unsuccessful and they required things from the teacher to tell them you have to turn and transform from this way because people are coming this way or there is a good view, open access from this way or make your higher block because of this and of that. so they want teacher to tell them about the potential of the site but why they are doing analysis to learn the potential. I don't know how to teach the student to be aware more about this. This is the method that we in this semester we are changing. In land scape analysis we do this also. In one session we are making the synthesizes together and then we are putting the information in one sheet. And we are making the analysis together. We asking that there re shrub trees there. Are you agree on this or if there is more please come and put in my sheet. So they are coming and collecting all the information in one sheet and at the end we are obtaining one sheet.

Then includes all information because the analysis stage student might have wrong or incomplete issues. So I don't know how to make them more aware about the potential of the site. This semester we are trying this in comparison with the pervious semester. We let them responsibility of the analysis and everything but at the end analysis is very important in 391 studio we are giving more time about three weeks

for analysis to be more concentrate or at the end we are seeing them when they are giving them too much time nothing changes. So we try to limit the analysis part and living more time to synthesis and the proposal starting stages.

In 391 studios we are respecting from students to design defined public spaces. Main square, sub square. I mean we are not expecting from the students to build one tower let's say. In this level we desire them to build a complex. Complex means more function with more form integrate together to create space. Because in order to create space it needs more than one block.in the studio that is the way for subdividing the main spaces to outdoor spaces because our studio that urban design education studied in architectural design project. This is the level that why we required complex form or integrated geometries. The easiest way to help them to integrate the geometries is to make model. They are cutting the pieces and try to create some spaces with the model pieces. So by this way they are trying to create main squares, secondary squares, and they are tried to fit the function in the site. We have to make them some models, I am cutting on the table in the first year and put the things together and telling that you see this is more dominant spaces, the main space and this is the secondary space this is the main plaza. So we are trying to explain these issues to the students by models and sketches. First of all they should do the models and sketches together. Architecture should be started with some drawing.

3. Asst. Prof. Dr. Nevter Zafer Cömert

We are using the ching which are including hierarchy, balance, unity and etc. so in our course according to all of them we start to in first semester we start from two dimensional form and try to teach them the relation of the forms to the real space I mean composition to the 3D model. The in 3D model we are judging how the spaces are coming together and what are the organizations would be. Then we teach them

hierarchy, balance between each other, unity, and these issues in 3D space. First we start with 2D and then we transform into pure form. in second semester what we are going to do is we give them one site and we give them some problems to solve them and then we force the students to make the forms based on constraints that they confronted in their site. I mean how to put them in order. The problem of students in form making is they can't match the building with their site because they can't make a good relationship between design principles. This first problem they met. We give them a program which is designing a living space for an artist. So students have some traditions in their mind and they want to force them in their design for example the want to just build walls and put the windows in the middle of them, they cannot accept to compose the masses together. We force them to make a scenario in their design and we start to ask them if it is working space if it is good to have just one or you should subdivide them into some. But for my opinion if you want to follow these critiques you can come to the mid-term juries. Because their we are going to criticize them honestly that in I think you can gather good information about them.

4. Asst. Prof. Dr. Guita Farivarsadri

First of all The criticizing to design process is not a linear one and most of the researchers mention that at first starting from data analysis in not suitable. Designing is good to start from concept development and parallel with that the data analysis is adding. For example after concept making students start test it by sun direction and prevailing wind in order to find the best direction of the form. The process of research and analyze is a process that you should have it regularly through your designing beside the concept development. When the student start designing with a linear process, he / she does know where to stop and where to go which Ledewig emphasize on the cyclical process of designing instead of linear.

Schon mentions the process as reflection in action. Every design has its own features and every design should design particularly based on its own data and site conditions. The work that you are doing is like the work that we are doing in basic design classes. Among the critique that is given to the students we give them some solutions. At first we talk about what is design. Them after discussing about these theories, discussion is summarized and concluded that at first you should have the main idea at first. Then you should give order which can gather your design elements. Then specify your design principle which comes from the site analysis.

Then students start to work on proportions and then the transformation requested from them. Then students try to give the form a common language or unity. It means that do the elements of the form speak in one purpose or not? Then parallel with each other form is coming up. Then we provide them design tools and principles which are harmony, dominance, hierarchy, contrast, rhythm. These are the tools for students to designing. Then the other discussion relates to the organization tools duch as grid, radial, linear, central, cluster

Then we are going to discuss about the relation of the form between each other with each other and they should realize the relation of two forms with each other. Student are going to be learn tools such as H to H, face to face, pull up, tension, near to each other, far from each other and the power of the form with each other.

Emphasizes on the definition of the space is the other factor that we teach them in the studios. Giving to form more power or making it weaker. Making the forms to be taller or shorter. Considering the relation of the form with inside and outside. Creating cantilever in the forms. Extracting the form from ground and empty the

ground floor. When the students are able to define and somehow create their form it is time to refer to the spatial quality of the form such as color, light, view (related with the context).

The importance of these tools is not in basic designing classes. While in higher design classes when the function is defined and on the other hand the site analysis is going to be given to the students, these tools are going to be play an important role. Unfortunately when the students are going to higher level they forgot these tools and the way of using them. The other tools such as subtractive, additive forms which are making relation between forms with site ad outside. When you have these tools then you should select which one of them you need and based on your needs and site analysis you are going to make choice.

The discussion about form follows function is the other debates that should be considered. We are not always talk about the function itself in building. For example the Guggenheim museum itself design to dominant the in the area. This is a function for the building. Normally we will not talk about the exhibition that is holding inside it but we talk about the museum itself.

Appendix C: Instructors' CV Who Attended in Interviews

1. prof. Dr. Kokan Grcev

Name Surname: Kokan Grcev

Nationality: Macedonia

Date of Birth: 16. 08. 1963

Email address: grchevkokan@gmail.com

Education:

Degree	Field of study	University	Year
B.A	Architectural Engineer	University of Skopje-Faculty of Architecture	**1987/88**
M. Arch	history of art and architecture	Sts Ciryl and Methodius University,	**1996/97**
Ph. D	history of art and architecture	Sts Ciryl and Methodius University	**2000/2001**

RESEARCH AREA

- Architecture Design
- Theory of Architecture and Art
- History of Architecture and Art
- Cultural heritage
- Revitalization and Conservation,
- Theory of Culture
- Macedonian Architecture
- Visual Arts/ Visual Arts Theory

Publications:

- Modernity re-discovered: towards new identities in Art and Architecture, Skopje, 2008,
- Aspects of Cultural traditions-The Architecture between Traditions and Modernity, Skopje, 2006
- Vladimir Georgievski: In captivity of creative freedom, Skopje, 2005
- From Origins to Style, Skopje, 2005
- Architectural styles in Macedonian architecture at the end of 19th and the beginning of 20th Century, Skopje, 2004
- Style ergonomics, Skopje, 2000
- Church construction in Macedonia between the two World Wars 1918-1940, Skopje,1998

Other articles (Selected list of published articles)

- Some aspects and problems of architectural continuities regarding style development in Macedonian architecture: Period of the 19th century and the beginning of the 20th century, str. 43-59, ISSN 2303-5404A&S, Journal Vol1. No1 2014 , Architecture & Science Journal,
- Code “Metrum” – Macedonian theatre building , ORIS No. 52, Zagreb, 2008
- Europeanization of the Macedonian culture and art- subversive epistemology or historical re-defining of values?, 2007
- The "First National Style" in Turkish architecture in relation to the appearance of "National styles" in the architecture of Macedonia and different European countries, 2005
- The "folklorism" and the architecture of the new age, 2001

- Tradition-folklore-modernism: about some specifics and relations in Macedonian architecture, 2000
- Primal architectonic objects: transformations, meanings, specifics, 2000
- About the "National style" in the Macedonian architecture in 19-th and 20-th Century, 2000
- Transformation of the folkloric architectural elements in the context of the architectural development in Macedonia, 1999
- Traditional architecture and settlements: experiences for the future, 1999
- Specifics of the folkloric architecture in Kumanovo region, 1999
- Historical and architectural specifics in the church constructing of Andrea Damjanov, 1998
- Mediterranean influences in the work of Dame Andreev, builder from the 19-th Century, 1998

2. Assoc. Prof.Dr. Mukaddes Faslı

Name Surname: Mukaddes Faslı

Nationality: Cyprus

Date of Birth: 09. 02. 1972

Email address: mukaddes.fasli@emu.edu.tr

Education:

Degree	Field of study	University	Year
B.A	Architecture	EMU, Faculty of Architecture Department of architecture	1990-1995
M. Arch	Urban Design	EMU, Faculty of Architecture Department of architecture	1995-1997
Ph. D	Architecture and urban Design	EMU, Faculty of Architecture Department of architecture	1997-2004

RESEARCH AREA

- Urban Design
- City Identity
- Residential exterior spaces
- Public Spaces
- Landscape
- Interior Landscaping

Publications:

- "Fasli, M. ve Pakdel, F., "Assessing Laguna District"s Spatial Qualities in Gazimagusa", Open House International, Vol. 35, No1, March 2010, pp 74-82
- "Revitalizing A Declining Historic Urban Quarter - The Walled City of Famagusta, North Cyprus" Journal of Architecture and Planning Research, Vol. 24, No 1, 2007, pp65-88 (with Doratlı, N., Önal Hoşkara, Ş., Oktay B.).
- "An Analytical Methodology for Revitalization Strategies in Historic Urban Quarters: A Case Study of the Walled City of Nicosia, North Cyprus", Cities, Vol. 21, No. 4, 2004, p.329-348. (with Doratlı, N., Önal Hoşkara, Ş.).
- "Restoration of the Great Inn for Touristic purpose in the Walled City of Nicosia, Northern Cyprus", SB10MAD Sustainable Building Conference, 28-30 April 2010, Madrid, Spain.
- "Revitalization of Traditional Rural Settlements: A Model Proposal",International Symposium on 'Revitalizing Built Environments: Re-Qualifying Old Places For New Uses', IAPS-CSBE „Culture & Space in the Built Environment Network" and the IAPS - HOUSING Network 12-16 October 2009, Istanbul, Turkey (with Önal Hoşkara, Ş., Doratlı, N.,Alpar, R., Oktay, M.).
- "An assessment of the Kyrenia Sea Front (Kordonboyu) Identity, North Cyprus", 4. International Urban Design Cogress, Mimar Sinan Üniversity, İstanbul 27-28 May, (with Güvenbaş, G., Doratlı, N.)
- "Significance of Site Analysis, Synthesis & Site Planning / Design Stages in Architectural Design Studios", Architectural Education Forum 4: Flexibility in Architectural Education, 22-26 May, 2009, Kayseri. (with Önal Hoşkara, Ş., Doratlı, N., Oktay B.).

- “Design Language of Squares in the Walled City of Nicosia, North Cyprus”, 5 th International Symposium on Sinan, 2-3 April 2009.
- "The Influence of Social Challenges on Environmental Identity of Nicosia‟s Walled City", abstract published in XI EURA 2008 Conference, October 9-11, 2008, Milan (completed paper published as web page).
- "Identity Lost at Suburbs of Nicosia, Northern Cyprus", Shirinking Cities, Sprawling Suburbs, Changing Country sides, ENHR 2008 International Conference, Dublin, Ireland July 6-9 July 2008. Abstract published in the Conference proceeding p.191. (complete paper published as web page).
- "Meaning of the Architectural Characteristics on Housing Identity, Case Study: The City of Nicosia in Northern Cyprus", Living in Between, 1st. International Semiotics Congress 25-27 April, 2008, Kyrenia. Abstract published in the Conference proceeding p.22 (Complete paper is in the process of Publication).
- “Analysis of the Laguna Sea Front in Gazimagusa in terms of Exterior Space Qualities and Uses", 2. International Gazimagusa Symposium 2007, 8-10 October, Famagusta (with Pakdel, F.).
- " An Assessment of Quality of Life in the Residential Environments: Case of Selimiye Quarter in the Walled City of Nicosia, North Cyprus ", The Vital City European Urban Research Association (EURA) 12-14 September 2007. Abstract published in the Conference proceeding p.70, Complete paper published as web page. (with Paşaoğulları, N. and Oktay, B.).
- "Effect of Cultural Diversity on Domestic Architecture of North Cyprus" , VI. International Congress on Cyprus Studies abstract book, 24-26 October 2007,

Famagusta, p.26. (with Paşaoğulları, N. and Oktay, B.) (Proceeding is in the process of publication).

- "Mimarın Gözüyle Kıbrıslı Kimliği", V. Uluslararası Kıbrıs Araştırmaları Kongresi Kitapcığı- 14-15 Nisan 2005-DAÜ, ss.1-34. (with Dagli, U., Hoşkara, S., Paşaoğulları, N., Oktay, B. and Zafer, N.).
- "An Assessment of the Exterior Space Qualities in Mass Housing Areas" paper published in proceedings of the 4th international Congress of Kıbrıs Araştırmaları, 27-30 Kasım 2002, Doğu Akdeniz Universitesi (with Paşaoğulları, N.).
- "Comparative Analysis of Squares in Traditional and Contemporary Environments with Special Emphasis to Nicosia, Cyprus". Public Spaces and Quality of Life in Cities-EURA 2004 Conference Proceeding Brno Checzch Republic-23-24 Sept. 2004- Published in July 2005 (with Paşaoğulları, N. and Oktay, B.).
- "Physical Analysis Techniques for Identification of Cultural Heritage in the Built Environment", (XXth International Symposium of CIPA 2005- International Cooperation to Save the Worlds Cultural Heritage- 27 Sept.- 1 Oct.-Torino-Italy, pp. 1106-1109. (with Paşaoğullari, N. and Oktay,B.).
- "Sustaining the Urban Identity of the Walled City of Nicosia", paper published in", (electronic proceeding) in UIA 2005 XXII World Congress of Architecture, 3-7 July 2005 , İstanbul (with Hoşkara, S., and Dağlı, U.).
- "Strategies to Enhance the Qualities of Two Traditional Quarters in Kyrenia-Limanarkası, Türk Mahallesi", International Symposium of Gazimagusa 2004, Doğu Akdeniz Üniversitesi, 12-16 April, Gazimagusa, pp. 449-453. (with Paşaogulları, N.).

- “Revitalisation of A Street in a Historic Urban Quarter: Case Study: Girne Liman Arkası”, XIX th International Symposium CIPA 2003, 30 September-04 October 2003, Antalya, pp. 771-774 (with Oktay, B., Paşaogullari, N.).

3. Asst. Prof. Dr. Nevter Zafer Cömert

Name Surname: Nevter Zafer Cömert

Nationality: Cyprus

Date of Birth: 22.06.1973

Email address: nzafer@gmail.com

Education:

Degree	Field of study	University	Year
B.A	Landscape Architecture and Urban Design	Bilkent University	1998
M. Arch	Urban Design	Eastern Mediterranean University	2001
Ph. D	Urban Design	Eastern Mediterranean University	2013

RESEARCH AREA

- **Urban Morphology**
- **Urban Design**
- **Urban Landscape**
- **Urban Gentrification**

Publications

Articles published in peer reviewed international journals (SCI & SSCI & Arts and Humanities)

- Cömert N.Z,Hoşkara S.O, 2013, A Typomorphological study: The CMC mass housing district Lefke,Northern Cyprus, Open House International, V:38 No: 7.1.1. Published Book Reviews in arbitrated magazines
- Book review of Unknown City in Open House International, Vol 27 no:2., 2002, emu press 7.2 Presented Proceeding in International Scientific meetings
- Oniz.H.,Zafer.N.,2007, North Cyprus Peninsula Underwater Survey of Kaleburnu/Kral Tepesi Coast, Proceedings of the International Symposium on Underwater Research, 24- 27 March, EMU, North Cyprus
- Dağlı.U., Faslı.M, Hoşkara.Ş.,Vehbi.B.,Şahin.N.,Zafer.,2005, Mimarın gözüyle Kıbrıs Kimliği Propceddings on the Fifth International Congress on Cyprus Studies, - V II Ed. Ülker Osam Vancı, Famagusta North Cyprus 14-15 April, 2005 pp:1-34
- Zafer. N.,2004, Conzen approach in urban morphology: as a case Famagusta Walled City-Cyprus, EAAE Conference The European City – Architectural interventions and Urban Transformations, 26-30 October pp:380-386,Delft,Netherland,

4. Asst. Prof. Dr. Guita Farivarsadri

Name Surname: Guita Farivarsadri

Nationality: Iran

Date of Birth: 07. 24. 1963

Email address: guita.farivar@emu.edu.tr

Education:

Degree	Field of study	University	Year
B.A	Industrial Design	Middle East Technical University	1989
M. Arch	Interior Architecture & Environmental Design	Bilkent University	1992
Ph. D	Art, Design & Architecture	Bilkent University	1997

RESEARCH AREA

- **Architectural Design Education**
- **Human Behavior in Interior space**
- **Interior Design**

Appendix D: Questionnaire Distributed Among Students in First Phase

This questionaire is created to recognize the architecture students difficulties in form generating procedure durig the semester.

<table>
<tr><td colspan="3">Please rate your level of capability with the following statements. <u>One</u> answer for each line</td></tr>
<tr><td>NO</td><td>QUESTIONS</td><td>VERY MUCH VERY BAD GOOD MEDIUM BAD</td></tr>
<tr><td>1</td><td>How do you feel succesful in data gathering or site analysis?</td><td>  </td></tr>
<tr><td>2</td><td>How do you feel succesful in synthesizing the data?</td><td>  </td></tr>
<tr><td>3</td><td>How do you succesful in converting synthesized data into form making?</td><td>  </td></tr>
<tr><td>4</td><td>How do you feel successful in generating logical creative ideas in form making?</td><td>  </td></tr>
<tr><td colspan="3">please mark the bellow steps as much as you wish. (it can be <u>more than one</u>)</td></tr>
<tr><td>5</td><td>Which part of design process is difficult for you in your designing?</td><td>Data Analysis
Synthesis
Synthesize To Initial Idea
Idea Development
Form Making
Form Devalpment</td></tr>
</table>

Appendix E: Essential Physical Factors Used in Site Analysis.

Physical Factors of Site Evaluation (Zimmermann, 2000)

NO	Physical Factors	Components of physical factors
1	Climate	Prevailing wind: Direction Sun path Humidity: Range of variations, Maximum and Minimums
2	Topography	Topographic maps and aerial photos Visual characteristics Existing access and circulation: vehicular, pedestrian Vegetation Existing water bodies
3	Immediate surroundings	Neighborhood structures; buildings Noise from streets, emergency services Views and vistas
4	Cultural Factors	Former site uses: Old functions History of existing structures: Historic worth, Location, condition
5	Land use, ownership, and control	Zoning of site and adjacent property Adjacent (Surrounding) land uses Location, type and size of pertinent community services: School and churches, shopping centers, parks, Municipal services, Recreational facilities, banks, food services, Health services, Access to highways and public transportation
6	Economic values	A. Future potential
7	Regulatory factors	A. Off- street parking requirements B. Landscaping requirements C. Lot coverage: Floor area ratio, Percentage of coverage, open space requirements

Appendix F: A Sample of Students Questionnaire in Second Phase

Please Mark On Answer in Any Question

How do you feel about Flash cards	
How much it was helpful???	1. It was very much helpful 2. It was helpful 3. It was not that helpful 4. It was not working
Was it following design studio sessions at EMU?	1. It was quite same 2. It was following 3. Some how 4. It was not following at all
How much difficulty you had while using flash cards?	1. It was very complicated 2. It was complicated 3. It was user friendly 4. It was very primitive
How was the number of flash cards and guidelines in it?	1. It was too much and useless 2. It was enough and useful 3. I prefer it to have more cards with more detailed information 4. I prefer it to have less cards with less information
Do you prefer to use flash cards in new semester as well?	1. Yes 2. No

Appendix G: Common Given Critiques by EMU Instructors at Jury Sessions

In order to understand the main principles and techniques that can be useful for mentioning in flash cards to help the students, it was participated in jury sessions at fall 2014-2015 and takes note from the instructor's critiques that students have main problems on them. These critiques can be seen as bellow:

- Make relationship between topography and mass
- Try to create level differences between your functions and play with the heights
- Try to bold your entrance in order to define it strongly
- Identify the shapes: use semi open areas to create inviting spaces
- Make repetitions in order to reach for continuity and dynamism.
- Try to put shading elements to create shading in order to make interesting spaces
- Make nice voids in order to make greeneries and skylights
- Don't block the links and accessibilities with mass instead open them to useful functions.
- Try to show the semi opens with hidden lines
- Don't overlap the surfaces and floors to each other, structurally it is difficult to build
- Join the surfaces and floors with nice and powerful elements
- Don't make simple forms, it is boring and rigid and because people want luxury spaces
- Build passage with semi open spaces

- Don’t put your forms too near to the site lines it blocks the view. Try to use from the spaces which are near to lines
- Try to elevate or raise your form ground and make the ground as semi open space to use from it
- Try to make dynamism in your form by dynamic movements and elements
- Try to emphasize on one color, shape, form, element or special structure to make dominant form.
- Try to distort your shape. Twist the subject out of its true shape or meaning. You can misshape it, make it fatter or wider.
- Subtract the forms and elements. Simplify, omit or remove elements. You can break the rules of rigid form and break it into small parts or other forms.
- Repeat a color, form, shape, idea. Restate, echo, duplicate in some way
- Why you make simple and rigid forms. Bring things together, Connect, link, unify, mix, merge, rearrange. Combine ideas, materials, and technologies.