Original Research Article

Explaining the Creative Design Process of Urban Space

Hadi Sarvari*

Department of Urban Development, Mashhad Branch, Islamic Azad University, Mashhad, Iran.

Abstract

Problem statement: As a professional mix of Science and Art, Urban Design always needs skillful people in order to submit suitable results with artistic and functional values. For this purpose, specialists of urban design managed to develop different patterns about designing process. Creative Designing is one of the mentioned processes.

Research objectives: The real objective of this paper is to define a process of creative urban design in an urban scale. It may not only consider general steps of creativity but also respect the common process of urban space designing. For this purpose, the main question of this research is: "What are the various steps of creative designing of urban space?" This paper intends to examine the extant ideas in the field of creative process and also urban design process and compatibility of these two concepts.

Research method: Upon a comprehensive evaluation of current ideas about creative designing in different fields, in this study, the relevant process and upgrading techniques have been extracted with a qualitative method and analytical attitude. Then its compliance with the urban space designing process by the use of focus group was examined. Finally, the steps of the creative designing process of urban space were extracted accordingly.

Conclusion: Some of the major factors in the complexity of creativity in urban space designing are complexity and various dimensions of urban space, variety of stakeholder groups, a great number of visual elements and effects of other involved fields in the creation and upgrading the qualities of urban space. Creative designing of urban space is different from other creative designing methods and is applicable in five major steps including 1. Introduction; 2. Focus; 3. Incubation; 4. Illumination; 5. Assessment.

Keywords: *Creativity, Creative Process, Upgrading Techniques of Creativity, Urban Space Design Process.*

Introduction and statement of the problem

There are some problems in urban design for which the urban designers are obliged to find

suitable solutions. An urban designer should provide innovative solutions for functional and artistic problems, like a scientist and/ or an artist. There are two groups of theories in this regard. Based on the first group of theories, the process of

* +989151025247, sarvari_hadi@mshdiau.ac.ir

The Scientific Journal of NAZAR research center (Nrc) for Art, Architecture & Urbanism

creative design could not be completely regulated. In fact, it is a mental process (Groat & Wang, 2005). It is so complex that no more possibilities are available for the separation of various parts of the designing process and introducing them (Harrison & Cough, 1962). But some of the specialists believe that creative methods are purposeful with lots of self-conscious considerations such as the ideology of the designer, recognition of current situation and the real problem of designing. Although as a process, creativity is impossible to be learned inclusively through logical methods (Amabile, 1993, Onofrei, 2005, Sawyer, 2006), any benefiting from which as a form of designing methods needs a logical model. Accordingly, there are some studies in artistic fields such as graphic, painting and especially architecture for specifying the creative designing process (Archer, 1963; Duerk, 2019; Lawson, 2016; Pena & Parshal, 2012; Mahmoodi, 2005; Sharif & Nadimi, 2013; Islami & Shapoorian, 2014; Bastani & Mahmoodi, 2018; Hosseini, Falamaki & Hojjat, 2019). But creativity in urban design which is involved with the most complex operational and artistic issues from the aspects of criteria, audience and the content concept has no more specified process in compliance with urban design conditions.

It may cause all urban designers to be interested in applying mechanical methods for applying complex qualities of urban space. Meanwhile, some of the special aspects of urban design have some complexities which are not defined easily. Therefore, it is impossible to analyze them using scientific methods and in a real form such as conceptual and visual aspects. But they are understandable in both intuitive and mental forms (Bahraini, 2013). Therefore, considering to creative design in a pendulum motion has become a major concern in urban design debates (Golkar, 2011, 106).

Although the creative design method is one of the major urban design processes for specialists (Table 1), the theoretical gap is the lack of a specific

method and performing steps of creative design in various products of urban design including the urban space. The common process of urban space is based upon a strategic method for which the creative design has no room in its various steps. Therefore, this paper intends to answer this question that:" What are the various steps of the creative designing process in urban space?

The aim of this paper is to specify the creative urban design process in the urban space scale (Urban Design Master Plan). Therefore, the major process is based upon compliance of the general creative process with common process of urban space design. For this purpose, firstly the various elements and process of creativity have been specified and then relevant techniques of creativity upgrading have been discussed accordingly. Upon presenting the common process of urban space designing, the proposed creative designing has been submitted with an analytical viewpoint to a general process of creativity and effective techniques on it and also through presenting various terms in the common process of urban design in urban space scale.

Research background

Urban design means the art and technique of city design for the use of human beings. Like other arts, the result of urban design includes the artistic and aesthetic goals (Irouke & Ahianba, 2013). This point that urban design is an art has been included and is obvious in the literature of urban design (Biddulph, 2012). Applying this aspect of urban design needs a specific process. Therefore, the experts have introduced the creative urban design process as one of the major methods of urban design. But the proposed processes are in lack of required details and compliance with urban design products (Table 1). As a result, this form of design has been less considered among designers in urban space designing even with its effectiveness. A Complete definition of this item is the major point of the present paper.

Table 1. Components of creative urban design. Source: author.

Author	Components
Shirvani, 1985 (cited in Bahraini, 2013)	1. Formation of design in the mind of the designer 2. Systematic development of the plan in mind 3. Upgrade of the design with sketches.
Bahraini, 2013	1. Feeling and mental imagination of the plan 2. Prejudice and integration of elements 3. Innovation and creation of presentable design.
Pakzad, 2006	1. Originating the plan based on inner feelings 2. Sensory expression of the design 3. Presentation of unique products
Golkar, 2011 (Lawson's Process)	1. First insight 2. Preparation 3. Incubation 4. Illumination 5. Verification

"Creative designing is the major part of urban design and the result of urban design based upon ideas and imagination of designers and also creativity and innovation" (Joanne, Boyko & Cooper 2015, 31). Creativity includes a complex process of problem-solving along with wage items in goals and necessities. As a result, any understanding of this method is based upon good knowledge about the meaning, process and effective factors in creativity.

The concept and elements of creativity

Creativity from the viewpoint of Guilford (1968) is based upon the structure and function of reasoning and could be defined from viewpoint of function, content and product which including the cognition, memory, thinking, composition and implementation (Pirkhaefi, 2005). Gilford considered creativity as a new and useful product for a person and/or a group. According to this idea, he defined creativity in various fields of art, sciences, technology and psychology (Irouke & Ahinba, 2013, 79). Torrance (1993a) defined creativity as a method for sensitivity against problems, shortages and lost elements. According to Amabile (1993), creativity

refers to a process which may lead to new and useful ideas (cited in Mozaffar, Hosseini & Bisadi, 2013, 35). Creativity not only is an exclusive factor in creation, but also is useful for the consumer. Creation of a useful factor needs creativity which is available for successful performing of innovative ideas (Joanne, Boyko & Cooper, 2015, 33; Amireh 2013, 44). Finally, given the comprehensive review of current terms by Sarkar and Chakrabarti (2008), it is possible to present a complete definition of creativity. As a result, it is proposed that: "Creativity occurs in a process through which the person benefits from its own abilities for producing valuable ideas, solutions and/or products" (cited in Khakzand & Azimi, 2015, 68). There are several effective factors in compliance with the extent of creativity definition which are pointing out to a part of the complex concept of creativity (Table 2).

Cognitive psychology and the creative process

Cognitive psychology focuses on internal and mental processes that focus on problem-solving methods. Due to the inherent relationship between creativity and cognition, various cognitive approaches to creativity have been proposed: 1. Threshold theory: Intelligence and creativity are not completely independent and a minimum of intelligence is needed for creativity; 2. Association theory: Innovative ideas tend to go away and come after ordinary answers; 3. Deductive thinking: ideas are transferred from a previous situation to a new situation; based on similarities, links, metaphors and symbols (Casakin & Kreitler, 2011); 4. Problem-solving: Creativity is free of the formulas and can reach new and different solutions; 5. Gestalt psychology: Creativity is the process of destroying a Gestalt to achieve better Gestalt (Pirkhaefi, 2005); 6. Component theories: Identify the components that affect creativity; 7. Intuition: Unconsciously recording, relating, recognizing structure, or reconciling seemingly incompatible ideas; 8. Sensory transfer: An unintentional but cognitive

Table 2. Factors affecting creativity. Source: author.

Author	Creativity Factors
Rhodes (1961)	- Press of environment; the relationship between man and the environment - The product; Ideas translated into tangible forms - Process; elements of motivation, perception, learning, thinking and communication - Person; Personality Traits
Torrance (1993b)	- Expandability; Ability to pay attention to detail while performing an activity - Flexibility; the ability of different ways of thinking to solve a new problem - Originality; the ability to think in an unconventional way - Fluency; Establishing a meaningful relationship between ideas, a function of the number of ideas produced in a given time
Amabile (1983)	- Motivation; Strong desire for success and commitment to one's field of work - Special cognitive ability; No matter how talented one is, one will not be able to create creative works without sufficient expertise - Skill; Talent in a particular field that is somewhat inherent
Eysenck (1993)	- Personality traits; Self-confidence motivated initiative - Environmental variables; Social, cultural, political, religious and educational factors - Cognitive factors; intelligence and skills.

process in which information is transferred from one sense to another; 9. Inclusive thinking: open conceptual boundaries expand the range of choices (Vahedian, 2010).

Cognitive structures include the sensory system, working memory, long-term memory and the response system. Cognitive processes also include pattern recognition, attention, mindfulness, storage, retrieval, random learning and voluntary and automatic response. These processes allow the information in one structure to affect another structure. While using a cognitive system, working memory is the center of operations. Nervous systems provide working memory with information about the world around us. Some responses are consciously controlled by the operating system, while others are automatically and unconsciously activated by long-term memory. All kinds of knowledge are stored in the form of mental schemas in long-term memory (Sweller, Van Merrienboer & Paas 1998). The characteristic of creativity in problem-solving is also the answer to a question that has changed the mental schemas. Because it is the schemas that give meaning to raw information in the mind (Ghasemzadeh, 2006). The important point is that these schemas resist change and act as a conceptual inertia, but by changing the schemas, the mind goes beyond the existing habits and causes creativity (Parsi & Farmahini Farahani, 2017, 306-308). This cognitive model of creativity includes executive control, attention to environmental inputs, problem representation, current solution representation, knowledge storage and knowledge retrieval. Such an approach to creative activities focuses on the various factors that most influence the structure of creative ideas. Moreover, this approach can tell where the creative process is disrupted, such as focusing on the environment and focusing on ideas retrieved from information stored in long-term memory. Widespread distribution of attention and retrieval provides far-reaching combinations that are good sources for creative ideas. The mental process used

in problem solving and decision making is divided into two groups: divergent and convergent. One set of processes is one-dimensional and task-oriented and the other set tends towards a holistic approach that includes attributes such as intuitive perception, sham and visualization. This distinction follows the thinking of the left hemisphere of the brain (analytical, sequential, logical, objective) and right hemisphere thinking (general, parallel, emotional, mental) (Movahedi & Pourmohamadi, 2018).

Creativity is not just the result of one cognitive act but the result of a long period of several actions. Sternberg (1986) argued that the structure of human intelligence consists of three components: executive cognitive (metacognitive factors such as planning, monitoring and evaluation of cognitive function), functional (such as reasoning, analyzing, recall, coding and attention) and pervasive knowledge (such as selective combination, selective coding and selective comparison). Based on this model, creative performance arises from the interaction of these three basic aspects. In this model, creativity is assumed to be a part of the structure of intelligence (cited in Hoseinaee & Kasirloo, 2009, 621).

Creativity process

According to the old theories, creativity arises from the unconscious process and mainly out of the control of the thinker. In other words, the arises from creativity process occurs inside a black box. However in modern models, the arises from creativity process is occurring in a glass box and under the arises from direct control of an individual. Therefore, when specialists noticed that creativity is not just a gift of God, but it is possible to teach it, several studies were conducted about the arises from creativity process. As a result, Wallace (1926) started his researches in this regard and after that, some other scientists defined their own proposed models including major steps for submission a creative solution (Table 3).

Although the proposed processes are defined

in a linear way and with separated steps, it has been stated in most of these models that should be completed in a continuous and circular mode. It is possible to determine their common factors by concluding all proposed steps. According to cognitive psychology, the arises from total process of creative thinking is based upon two forms of characteristics. The first type is intuitive and uncontrolled, while the second type is passive and controlled thinking. "Therefore, the creativity process is a combination of divergent and convergent thoughts plus skills and enlightenment" (Doyle, 2017, 3). The preliminary steps of creativity intend to define the problem. The Designer must discover the problems prior to solving them in the relevant step of problem finding. Then upon analyzing the same, he/she should find a solution. "Creative people have great abilities in recognition of new problems without any needs to be dependent on others for finding any problems" (Craft, Jeffrey & Leibling, 2007, 4). Problem finding includes two separate parts such as problem generation and problem definition (Basadur, 1994). Problem-finding includes discovering a new problem which is reminded as an opportunistic supervision (Simon, 1997). Any partnership of more people in the creation of problems may cause finding creative solutions (Mumford, Baughman, Maher, Costanza & Supinski, 1997). Ideation is applied in the middle steps of the creative process. It is possible to make any relationship among the analyzed information at the idea assessment stage and create a new compound (Sawyer, 2006). More compounds may lead to the probable production of more creative solutions. The number of created compounds depends upon the rate of collected data. More relevant information about the problem may lead to higher chance of better compounds (Howard-Jones, Taylor & Sutton 2002).

Evaluation is made at final step. The base of value criteria is creative solutions based upon aesthetic, scientific, social and technological bases. Amabile (1993) considers the value criteria

Table 3. Creativity Process. Source: author.

Author	Process	Source
Wallace (1926)	1- Preparation: Identification and definition of the problem 2- Incubation: Putting aside the problem 3- Insight: The moment of emergence of the answer 4- Proof: Suitability and practicality of the solution	(Howard, Culley & Dekoninck, 2008, 2)
Osborn (1953)	1- Orientation and preparation: Collaborate on brainstorming 2- Analysis and incubation 3- Ideation: Integrated thinking 4- Synthesis evaluation: Selection of ideas and evaluation	(Doak, Stacey, Jambura, Knittel & Rule, 2013, 594)
Osborn (1963)	1- Fact-Finding: Information gathering 2- Problem-Finding: Explicit expression of the problem 3- Ideation: Searching for idea 4- Solution: Selection of the best solutions 5- Acceptance: Final solutions for implementation	(Doak, Stacey, Jambura, Knittel & Rule, 2013, 594)
Stein (1974)	1- Goal-based hypothesis building 2- Testing the hypotheses 3-Transmitting results in the creative process to others	(Runco & Jaeger, 2012, 93)
Amabile (1993)	1- Presentation of the work or issue 2- Preparation to respond 3- Product novelty or response 4- Answer validation 5- Rotate the process to fit the result	(Amabile, 1993, 180)
Plsek (1997)	1- Preparation: Living, observing, analysis 2- Imagination: Analysis, production, repository of concepts 3- Development: Repository of concepts, reinforcement, evaluation 4- Action: Evaluation, implementation, Living	(Plsek, 1997, 170).
Lawson (2016)	1- First insight: Problem formulation 2- Preparation: A conscious effort to solve a problem 3- Incubation: No conscious effort 4- Illumination: The sudden emergence of an idea 5- Verification: Conscious development of ideas	(Lawson, 2016, 184)

as a combination of suitability, applicable and economic situations. This means that the output is valuable when it is in compliance with the goals and so much economic from economic viewpoint. But in more general terms, valuable criteria can be economic, feasibility, resource use and appropriateness (DeBono, 1995).

Techniques of creativity
According to the theories related to the creativity process in psychology, the creativity process means multiple steps in problem-solving. Therefore, any achieving the creativity is applicable through training of creative thinking along with applying all training methods as well (Islami & Shapoorian, 2014, 121). Torrance believes that all people have the talent of creativity which could be increased and/or destroyed by various methods. According to his researches, it is obvious that creativity does not increase on the linear or fixed condition and lots of factors may cause the change of its growth. Therefore in parallel with Gardner's classification

of intelligence, the ability to design can be called the Designing Intelligence (Cross, 1984).

The common methods in training and upgrading of creativity are based upon benefiting from divergence thinking. In such a method of thinking there are some exclusive theories that are unexpected. Of course, they would be reviewed and criticized with convergence thinking. As a result, when a person starts to find a new idea, it may judge it simultaneously unconsciously. Therefore, creative thinking is a form of involvement between divergence & convergence thinking which is defined as a repeating and regular process of convergence and divergence. Overtime reduction in the number of solutions (Howard-Jones et al., 2002; Pugh, 1991). Thus, formal methods of generating ideas can divide into two general groups of logical and intuitive. Intuitive methods

are working through irrigation of thinking process in the unconscious mind of the human being. The result of these processes is somehow un-estimated and may facilitate the process of finding a new solution. Intuitive methods are mostly relying upon divergence thinking and would be divided into five groups such as: Germinal, Transformational, Progressive, Organizational and Hybrid. Logical methods include systematic analysis of the problem. Scientific and engineering principles and/ or a collection of solutions would be used in the above-mentioned methods. Logical methods would be divided into two groups as History-based and Analytical (Shah, Hernandez & Smith, 2003, 112-113) (Table 4).

Creativity upgrading techniques play an important role in examining details through the creative design process and their relationships with each other.

Table 4. Methods for upgrading creativity. Source: author.

	Methods		Sample techniques	Source
Intuitive methods	Germinal	Methods that the designer starts with a white sheet, that is, when there is no solution beforehand.	Nominal group Brain storm (Potter & William Hamer, 2004)	Roth (1998) Landa (2014) Potter & William Hamer (2004)
	Transformational	Used to generate ideas by modifying existing ideas.	Check list PMI Method	Osborn (1953) Sharma & Saarsar (2017)
	Progressive	Ideas are created by repeating a series of steps over and over again.	5-3-6 Method Gallery Method	Liz (2001) Shah, Hernandez & Smith (2000)
	Organizational	There are methods that categorize the ideas produced in a meaningful way.	Fishbone	Haesen, Meskens, Luiten & Coninx (2010) Yazdani & Moghaddam (2012)
	Hybrid	Different techniques are combined to meet different needs.	Metaphoric thinking	Gordon (1961) Antoniades (2007)
Logical methods	History Based	Using past solutions	TRIZ	Jafari & Zarghami (2012)
	Analytical	Ideas are created from the ground up by systematically examining key relationships, common chains, and desirable / undesirable characteristics.	Steps forward	Shah, Hernandez & Smith (2003)

Therefore it is necessary to study any mutual effects of which on analysis of problems and submission of creative solutions in urban space designing.

Summary of the creative process

Total decisions of specialists about creativity process have been collected for summarizing of relevant ideas about creativity process and upgrading techniques of it. Regarding the newness and more compliance of Lawson's creativity model (See Table 3) in architecture with urban space designing, all steps of creativity have been defined in this model. As a result, partial & practical steps of each level of Lawson's creativity process have been written in accordance with the idea of specialists which are the base of the research continuation (Table 5).

The most important issue in various steps of creativity is to pay attention to mental processing systems and cognition procedures which should be based upon mental functions, finding out the problem, reasoning and analogy and reviewing all current mental plans for the designer. Then it is possible to have creativity plus problem-solving.

Urban space design process

Process refers to a collection of integrated and explicit activities for connecting the goal to the solution. In other words, process means a logical and targeted hierarchy of various activities. The most important reasons for process meaning in urban design are those cases that may facilitate having a more clear and complete definition of issues and considering various solutions (Bahraini, 2013). The important issue in the urban design process is to pay attention to the problem criteria and designing subject and/or type of product. The nature of designing processes is the subject of designing methodological studies. "According to the common methodologies in thinking paradigms, urban design processes include 1- Inductive Cartesian process; 2- The process of deductive hypothesis testing; 3- Process of decision-making, problem-solving; 4- Creative process; 5- Reasonable integrated process; 6- Applicable process; 7- The communicative process of urban design" (Golkar, 2008, 12). Also the following processes have been defined following procedural and content changes in urban design processes: "1- Urban design process based upon rational problem-solving approach; 2- Urban design process based upon applicable approach; 3- Urban design process based upon communicative approach" (Alikaei & Aminzadeh Goharrizi, 2019, 69-70).

Table 5. Minor steps of creativity stages. Source: author.

Stages	1: First Insight	2: Preparation	3: Incubation	4: Illumination	5: Verification
	Application of intuitive and logical techniques		Consistency with the vision of the plan and the executive criteria		
Steps	1. Problem-finding (Wallace, 1926; Osborn, 1963; Simon, 1997; Craft, 2001) 2. Formulation of the problem (Lawson, 2016; Cross, 1990; Basadur, 1994) 3. Creating personal motivation (Rhodes, 1961; Amabile, 1983; Eysenck, 1993)	1. Ideation (Osborn, 1963; Torrance, 1981; Shah, Hernandez & Smith, 2003) 2. Idea assessment (Osborn, 1953; Shah, Hernandez & Smith, 2003; Sawyer, 2006)	Putting aside the problem (Wallace, 1926; Lawson, 2016)	Emergence of ideas (Wallace, 1926; Lawson, 2016)	Assessment (Plsek, 1997; Lawson, 2016)

The design method in the above-mentioned processes is classifiable in three generations. The first generation of design methods was studied as a scientific issue. Regarding this viewpoint we may define designing processes as a separate collection and one-sidedly and continuously. Designing processes are defined as systematic models (Lang, 2004). This systematic designing attitude results from problem-solving techniques and is extracted from the results of executive researches (Cross, 1984) which is applicable as a public method for solving all designing problems (Harfield, 1999).

The models of the second generation of design process are recognized as participatory methods not scientific ones. In such an attitude all experimental methods have been applied for the definition of designing knowledge (Broadbent, 1984). Since design problems are not basically defined without any fixed formulation, therefore designing process is a dialectical process for problem-solving and redefinition of it (Cross, 1990) without any other way for determining the time of problem-solving (Rowe & Koetter, 1987). As a result, "the third approach is based upon mental schematics with further perceptual abilities and mental structure" (Kalami & Nadimi, 2014, 21).

The other effective part of any urban design process is its competency with urban design documents. "Official-professional notes of urban design include two types of document, location-oriented and subject-oriented ones. Location-oriented notes are supplied for a special place and subject- oriented notes are supplied about important issues and discussions of urban design. In order to prepare these two types of notes in the toolbox of urban design, we need various tools such as Urban design policy, Urban design strategy, Urban design brief, Urban design master plan, Urban design statement and Urban design guidance" (Golkar, 2008, 57; Abbaszadegan & Vahidiyan, 2009, 10). Some of the subject-oriented processes are urban design guidance (Behzadfar & Shakibamanesh, 2009, 5) and a sample of location-oriented designing process, urban design process from urban strategy up to urban design master plan (Zekavat, 2010).

The creative urban design process in this research is considered for preparing an Urban Design Master Plan at the scale of urban space. "The real goal of Urban Design Master Plan is not writing the principles of important issues and fixed recommendation of details for site designing. However, Urban Design Master Plan should illustrate how to perform these principles in details. It is possible through exemplary drawings. The Urban Design Master Plan is determined in urban space with short-term time table and operational programming" (Golkar, 2008, 58). The Urban Design Master Plan process includes the following steps: "1- Definition and determining the limitations of the study scope and writing the primary vision; 2- Measurement the situation in procedural and content dimension; 3- Measuring the situation and integrated analyzing the case by SWOT method; 4- Codification the vision, goals (strategies), design principles, 4- Codification of alternatives, evaluation of alternatives, compilation the final plan" (ibid., 63). Therefore, compliance with the urban design process has been applied with the creativity process in Urban Design Master Plan scale (Urban space).

Research method

The present study is conducted by the qualitative method and benefits from a focus group in which all people participate in a group discussion about a specific subject in order to find out their own concepts, ideas, beliefs and thoughts through a coordinated interview and exchange of ideas (Khosravi & Abed Saeedi, 2011, 20). The sampling of present persons in a focus group is based upon a goal through which those experienced people would be appointed as well. The time of sessions is up to the completion of information. As a result, about six specialists in the field of urban design and with

enough experiences would be selected on targeted sampling and by the Snowball method. Relevant open-ended and semi-structured interviews were conducted with urban design specialists.

Conceptual reliability was applied in order to determine the reliability of questions through which three specialists approved the questions. In order to maintain the validity, all focus group sessions held in three periods at various times. For compliance of data for further analysis of findings of discussions in focus group in two steps, we benefited from three consecutive coding method. In the first step, the protocol coding was applied. In this method "we have data collection and coding of quality data based upon pre-determined systems in order to be lead to knowledge development about a specific subject. In this method, researcher is supplied with a list of concepts and codes which are in fact a foundation for the promotion of new items" (Saldana, 2016, 233).

Lawson's creativity process steps have been specified prior in this research as the theoretical basics of findings in each step as a general code (See Table 5). The questions which have been inserted in process of interview and data collection are based upon the mentioned codes. Then in compliance with coding methods, questions include any information about specific methods of the creative design process of urban space in comparison with other fields and also questioning about why these methods and techniques are effective as well. The ideas of members in focus group have been inserted about the conditions of urban space design in each subject of the general process of creativity in the form of proposition (Table 6).

The second step allocates to proposition analysis by the use of causation coding method. This method is based upon reasons and causes. The real goals of this method is to determine, extract and understanding the reasonable beliefs of qualitative data (ibid., 2016). In this step, all propositions were decomposed into different statements for introducing those factors and/or conditions

pointing out special consequences in creative urban design. The mentioned statement would be decomposed into preliminary variables as the specific reason in the urban design and mediating variables for the results of the mentioned reasons in creativity. As a result, it is possible to specify real reasons for any differences in the urban design process and general creativity process. In second round of coding, it is necessary to classify and define prior and mediating variables according to their similarity to basic coding in greater concepts titled as consequences. Such classification would specify the content and arrangement of the creative process of urban space design.

Findings and discussion

All obtained data out of focus group discussions have been changed into statements according to the mentioned coding methods. The mentioned statements have been classified into five categories and eight codes out of the theoretical framework. Analysis of statements resulted from deep interviews in the form of prior variants for each statement was made in the first round along with analysis of mediating variants for each code. In the second round of coding, we made the final analysis in the form of 5 consequences by considering any similarities in prior and mediating variants (See Table 6).

We combined the obtained information out of the decoding of statements in each step and out of the general creativity process into specific and general groups namely the consequences. The consequences of special characteristics of creative urban design would be specified as follows:

- **Characteristics of creative urban design:** Urban space is considered as a complex phenomenon and including various layers and studying systems. This makes it difficult to make any urban space design along with more difficulties in finding any new ideas in compliance with spatial, functional, climatic, etc. elements and also in compliance with weak points and any opportunities in this regard.

Table 6. Data collected from categories affecting creative urban design. Source: author.

Protocol coding		Causation coding			Axial coding
Category	Code	Statement	Preliminary variables	Mediating variables	Consequences
1- First Insight	Problem finding	The presence of the designer in the urban space and gaining sensory experience of the problem in the stage of cognition, direct, and personal perception of the level of qualities of the urban space makes the problem clear.	Direct understanding of the quality level of urban space	- New definitions of complex problems - Discovering new issues from an expert point of view - A new angle to the existing issue from the perspective of a diverse audience	1- Introduction: - Awareness of the level of qualities and complex relationships between elements of urban space in various study systems - Explain the issue in a preliminary perspective with the participation of stakeholders and expert groups - Discover new issues and prioritize them - Motivate creativity tailored to the experience and interest of the designer - Moving from cognition to problem explanation and vice versa
		Increase information through interviews and conversations of the designer with various segments of users about urban space issues due to the lack of restrictions on urban space audiences	Expressing the issue from the audience's point of view		
		Recognize the relationships between the elements in the study systems, and prioritize them in the current role of urban space.	Relationships between important elements in the problem		
		Defining the problem from the point of view of other disciplines involved in urban space, according to the nature of its interdisciplinary, helps to explain the problems	Defining the problem from outside the urban design		
		A full explanation of the problem in the presence of weaknesses and threats and not using the opportunities and strengths in the study layers	Define the problem in terms of identified opportunities.		
	Problem formulation	Breaking the problem into simple components and its causes in study systems such as problems in urban design have a multidimensional nature	Break the problem	- Prioritize various issues - New categorization of existing complex issues - Define the problem faster - Limit the problem to urban design tools	
		Recognition of the causes affecting the formation and continuation of the problem outside the spatial and temporal domains of urban space with the help of multi-level studies from the strategic domain to the design domain.	Breaking the problem into spatial domains		
		Recognition of immutable limitations because in the short, medium and long term in urban space we have the change of people.	Limiting the scope of the problem		
		Comparing urban space with desirable examples helps to find the root of the problem.	Correlation of the problem with similar problems		
		Separation of the problem into functional and formal tools in urban design to be implemented.	Break the problem into the tool		
		Measuring the conditions of urban space with the criteria of ideal qualities in weaknesses and threats to prioritize issues	Separation of the problem into the qualities of urban space		
	Personal motivation	Prioritize of the problem of design based on the intellectual style (modernism, sustainable development, Islamic Iran Identity, etc.) of the designer himself to continue and pursue creative ideas	Clarity of the designer's intellectual style.	- Matching the designer's interests with the problem components - Matching the designer's abilities with the problem components	
		Discovering personal preferences in urban space topics that build confidence in a particular topic. Due to the complexity of design issues in urban space	Personal interests in design style.		
		Telling a story or drawing a picture of the problem of urban space based on the inner beliefs and values of the designer	Personalize the issue.		
		Fit to the designer's intellectual paradigm (critical, interpretive) helps to limit the complex problem of urban space design.	Clarity of the intellectual paradigm for the designer.		

Rest of Table 6.

		Description	Concept		Focus:
2- Preparation	**Ideation based on divergent thinking**	Develop a definite vision Otherwise the range of ideas is very scattered.	Limit the range of ideas	- Find new artistic initiatives - Make changes to existing solutions. - Limit ideas - A new combination of existing ideas Innovation in ideas	- Analysis of the current situation and simultaneously come up with ideas based on thought-provoking solutions - Defining the vision based on the analysis - Processing ideas according to vision and analysis - Prioritize ideas at landscape levels to options simultaneously - Rotation between ideas and analysis in rotation
		Recording the personal inspirations of the designer regardless of the limitations in the options such as the multiplicity of physical factors in the urban space.	Freedom of expression		
		Comparing the problem with similar cases and using existing experiences for new ideas in strategies to be effective in realizing the vision.	Examine similar strategies		
		Due to the lack of planning in urban space design and the use of the output of upstream designs, functional ideas should be limited in options.	Definition of urban space planning		
		Diverse and different use of new technologies and new materials in developing options	Examine other solutions		
		Doubt and question the rules and requirements of the upstream urban planning system that can be changed	Definition of urban space planning		
		Use of solutions outside the field of urban design and in other fields involved in functional issues, especially traffic and urban infrastructure	Examine other solutions		
		Critical use of similar urban design guides for localization of solutions due to the generality of urban space users	Examine similar solutions		
		The use of intuitive methods in the production of new forms due to the dispersion of visual elements in urban design compared to other arts and the use of architectural and graphic specialties	Imagination of ideas		
		Free ideas in activities that can be deployed in land use according to the requirements and common solutions in building architecture	Imagination and metaphorical ideas		
		If you do not adhere to the hierarchical method in submitting proposals, it is possible to change strategies based on ideas in options. It means going back from lower ideation stages to higher levels.	Using other suggestions in the design process		
		Free ideas concerning the prevailing behavioral patterns appropriate to the behavioral camps designed according to the solutions of the social sciences and environmental psychology disciplines	Imagination of ideas		
	Idea assessment based on convergent thinking	Matching personal inspirations and ideas with strengths, weaknesses, opportunities, and threats in the analysis	Adapting the idea to the conditions of the urban space	- Prioritize of ideas based on function - Determining the effectiveness of ideas in realizing the vision - Determining the originality and novelty of ideas	
		Determining that part of the design criteria that can not be changed by the designer's ideas leads to the implementation of the ideas.	Matching the idea with the criteria		
		The need for the possibility of moving ideas back and forth from the level of strategy to the level of options and vice versa	Differences in the method of submitting proposals		
		The consensus of different social groups in idea generation according to the generality of urban space and the diversity of needs and expectations	Compare ideas with other solutions		
		Collaboration with creative designers and experts in other related fields in urban space.	Compare ideas with previous solutions		
		Investigate the effectiveness of ideas in strategies to achieve goals	Compatibility of ideas with strategies		
		Examining the effectiveness of ideas in options in order to implement strategies.	Compatibility of ideas with options		
		Discovering the causes of success or failure of solutions to similar problems in each layer of study and its relationship with other layers	Examining similar ideas		
		Focus on processing ideas related to the most important qualities in the urban landscape	Faster realization of the vision		

Rest of Table 6.

3- Incubation	Trying without awareness	Going back and forth between ideas and existing situations	Subconscious processing of the problem	Continuation the work of brainstorming without conscious effort	Incubation
		Doing things unrelated to the design problem	Mental rest		
		Reset the problem	Subconscious processing of the problem		
		Redefine the problem based on the values and inner beliefs of the designer	Subconscious processing of the problem		
4- Illumination	Emergence of ideas	Ideas on the role and meaning of urban space in the axes of the landscape	Ideation from the axes of perspectives to the details of options	Submitting ideas	Illumination
		No obligation to take precedence in presenting ideas			
		New ideas in formal and functional dimensions in strategies and options			
5-Verification	Evaluate ideas based on criteria	Optimal use of facilities and resources available in solutions	- Appropriate solutions for the realization of the vision - Applicability of solution. - The rate of progress in solutions	Prioritize solutions	Assessment: Measuring the usefulness and originality of ideas in accordance with executive requirements
		Control the implementation of solutions in consultation with city managers			
		Adaptation of ideas to the criteria of the upstream system in urban planning and usability in the downstream architectural system			
		Economically viable ideas			
		Flexibility in the possibility of implementing ideas due to the long-term implementation of urban space and the unpredictability of needs			
		Categorize ideas based on form and functio			
		Prioritize ideas based on the impact on achieving goals or solving problems			

In parallel with the inherent complexities of urban space, there are many disciplines involved in creating and maintaining urban space. Observation of other fields makes it difficult to have any ideas in urban space design. Furthermore, finding any useful and reflective ideas in compliance with the expectations of stakeholder groups and also changes in urban space is really complex and hard. From the artistic aspect of urban design, diffusion of visual elements and wideness of urban space as an artistic work makes difficult the subject of creativities and artistic innovations in comparison with other arts. According to the characteristics of creative urban design, the followings are the relevant steps of this process along with its details which should be respected accordingly.

• **Creative urban designing steps**

1. Introduction stage: This stage is equivalent to the First Insight stage in the general process of creativity. At this stage, in addition to doing the usual things of recognizing urban space at different levels, it is necessary for the designer to formulate the problem in the urban space and especially to motivate himself. According to the primary vision, a part of the analysis would be made in this step and the designer may understand the strength &

weak points and any opportunities and threats in the study. Intuitive techniques are effective in this step;

2. Focus stage: This level is equal to the analysis step and it is a part of writing the proposals in the general process of Urban Design Master Plan. It is similar to supplying step in general process of creativity. This step is in fact the start of a conscious effort for finding new ideas. It is necessary to specify the final vision in this step and make other procedures of designing as well. In addition, we should specify those aspects of designing with problem-solving mode and under the control of rules and regulations and also would not change under supervision of designer. There is a review/making relationship between ideas and analysis for finding further ideas. In lack of enough motivation and tolerance of wage items, it is possible to fail a creative design. Personal inspirations of designer besides complete analysis of conditions are so much important. There is not any time priority and linear relationship in the definition of ideas. Ideas are applicable in all levels of visioning, strategies and alternatives. Intuitive and logical techniques are usable for finding new ideas and finalizing them;

3. Incubation stage: This level is available in the general creativity process and is made in the creative design of urban space without any conscious efforts. It is really important to relax the mind and regulate the problem again in this step;

4. Illumination stage: It is equal to the illumination step in the general creative process and also similar to submission of proposals in vision, strategies and alternatives in the Urban Design Master Plan process. We have sudden emergence of the idea in this step. Creative ideas may be available at the level of vision and /or strategies with formal aspects, operational and/or meaningful of proposed alternatives. In the emergence part, there is not a linear model between proposed levels but in a circular mode, the proposed ideas are moving among various levels;

5. Assessment stage: This level is titled Verification in the creativity process. After the emergence of idea in any previous steps, it is necessary to judge them accordingly. Logical techniques would be useful for idea evaluation. Measurement of competency and newness of solutions and their prioritization are performed in this step (Fig. 1).

Conclusion

In response to the research question, the proposed creative urban space design process is a balanced combination of logical thinking and divergent thinking based on flexibility. It refers to a process that is useful in the submission of urban design solutions and also includes various steps of creativity. This process has the minimum obstacles against recognition, analysis and ideation. Also, it may cause a suitable idea processing with considering of critical thinking. The proposed process may explain in detail all urban space design and/or the same Urban Design Master Plan with an applicable view and include all its steps. The study implications include discovering the important parts of the design process, making new ways for it and adding various steps to reach the creative design. The proposed process is applicable for urban designers for upgrading the proposed designs for making and/or betterment of urban spaces. Performing the required steps has a circular mode up to finding the best solution. Shafei Pouryordshahi, Tebbi Masrour, Mahfouziyan & Sharifi (2016) could find various results out of general compliance of applying creative methods. Of course, this research focused on creativity of citizens in creative urban space and does not evaluate the urban space creative designing directly. In a study by Alimardani, Razaghi Asl, Ketabolahi & Miri (2017), it seeks a creative urban design method using a common model in landscape architecture, but does not refer to the type of urban design product.

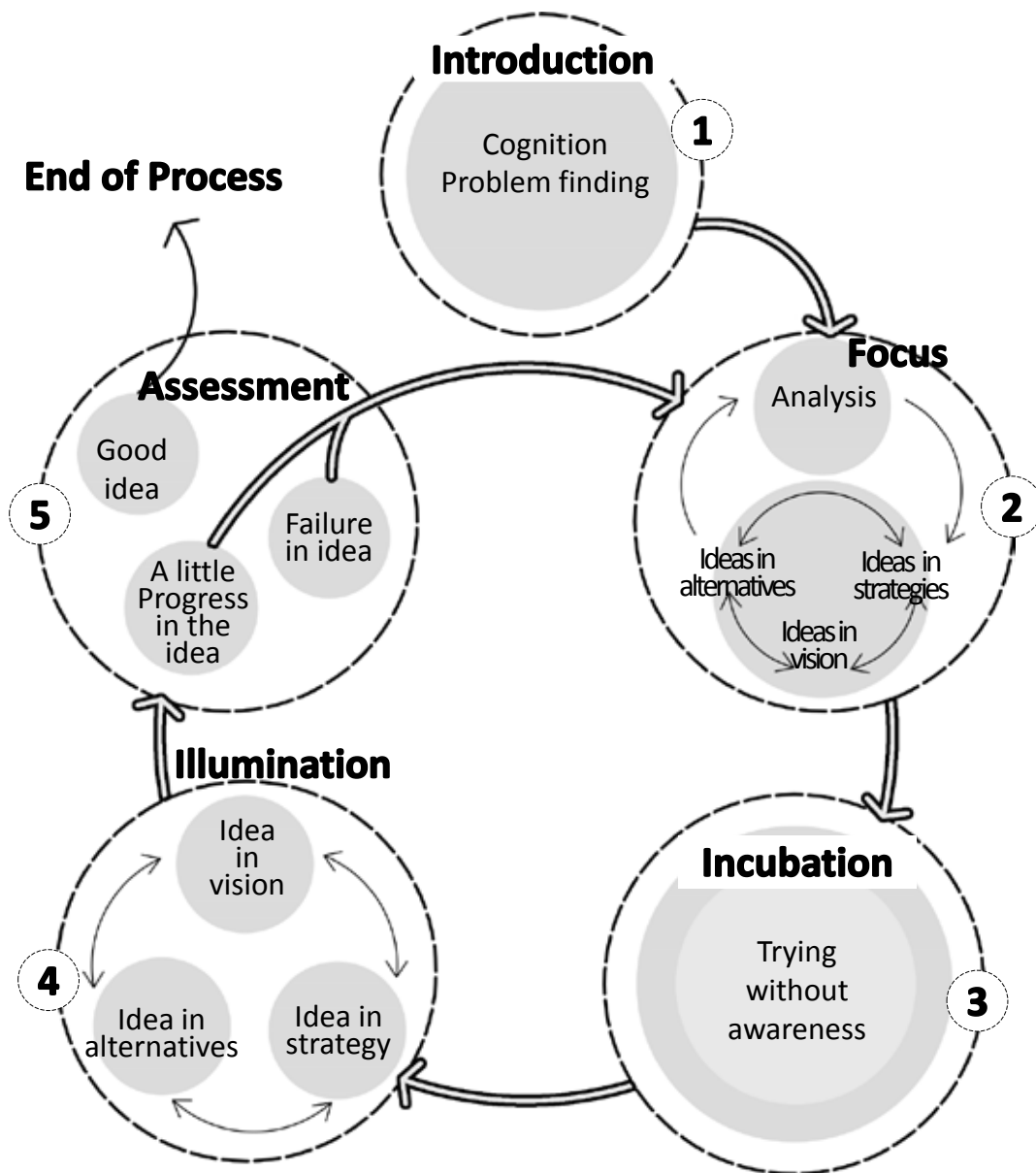According to the results, the most important difference between the creative urban design

Fig.1. Creative urban design process of urban space (Urban Design Master Plan). Source: author.

process and the general creativity process is Focus & Assessment stages. Such a difference is because of characteristics of urban space that are effective in creative designing. It includes the complexity of urban space, different functions in it, various stakeholder groups and its wideness as an artistic work. The mentioned characteristic of creativity in urban space makes it harder and of course more valuable as well. The results also show that as much as creative power is important in creating new and symbolic forms in the aesthetic aspect of urban space, creativity in defining new functions and new meanings is also important in its creative design. It is proposed to benefit from upgraded creative techniques for finding the suitable result out of the creative design process rather than any motivation and experiences in designer. In addition, it is proposed to evaluate all details of each step of creative urban design process in the format of quantitative studies as well.

Reference list

• Abbaszadegan, M. & Vahidiyan, R. (2009). A strategy of product and process-oriented design of urban environment qualities. *Bagh-e Nazar*, 6(12), 3-16.

• Alikaei, S. & Aminzadeh Goharrizi, B. (2019). An analysis of substantial and procedural evolutions of urban design process and its application in Iranian urban design projects. *HONAR-HA-YE-ZIBA MEMARY-VA-SHAHRSAZI*, 23(4), 67-80.

• Alimardani, M., Razaghi Asl, S., Ketabolahi, K. & Miri, M. (2017). Model-e R.S.V.P., farayand-e khalagh-e sanjesh ta amal dar tarrahi-ye shahri [R.S.V.P Model: The creative process of measuring up action in urban design]. *Memari-ye Sabz,* 3(7), 35-46.

• Amabile, T. M. (1983). The social psychology of creativity: A componential conceptualization. *Journal of Personality and Social Psychology*, 45(2), 357-376.

• Amabile, T. M. (1993). What does a theory of creativity require? *Psychological Inquiry*, (4), 179-181.

• Amireh, O. M. (2013). An introduction to creative thinking in architectural design. *International Journal of Engineering & Technology*, 13(5), 44-49.

• Antoniades, A. C. (2007). *Poetics of Architecture: Theory of Design* (A. Ay, Trans.). Tehran: Sorush.

• Archer, B. L. (1963). *A systematic method for designers.* London: Council of Industrial Design.

• Bahraini, H. (2013). *Urban Design Process.* Tehran: University of Tehran.

• Basadur, M. (1994). *Managing the creative process in organizations.* In M. A. Runco (Ed.), *Creativity Research, Problem Finding, Problem Solving and Creativity* (pp. 237-268). Norwwod: Ablex Publishing.

• Bastani, M. & Mahmoodi, S. A. S. (2018). Conceptualization Methods in the Design Process of Architecture. *HONAR-HA-YE-ZIBA MEMARY-VA-SHAHRSAZI*, 23(1), 8-18.

• Behzadfar, M. & Shakibamanesh, A. (2009). The location of design guidelines in urban design process and their role in promoting urban spaces quality. *ARMANSHAHR* , 1(1), 1-16.

• Broadbent, G. (1984). The development of design methods. in Nigel Cross (Ed.), *Developments in Design Methodology* (pp. 337-346). Chichester: Wiley.

• Biddulph, M. (2012). The problem with thinking about or for urban design. *Journal of Urban Design*, 17(1), 1-20.

• Casakin, H. & Keitler, Sh. (2011). The cognitive profile of creativity in design. *Thinking Skills and Creativity,* (6), 159-168.

• Craft, A. (2001). *An Analysis of Research and Literature on Creativity in Education* (Report prepared for the Qualifications and Curriculum Authority).

• Craft, A. Jeffrey, B. & Leibling, M. (2007). *Creativity in Education.* New York: Continuum Publication.

• Cross, N. (1984). *Developments in Design Methodology.* Chichester: Wiley Press.

• Cross, N. (1990). The Nature and Nurture of Design Ability. *Design Studies*, 11(3), 127-140.

• DeBono, E. (1995). *Sirius Creativity: Using the Power of Lateral Thinking to Create New Ideas.* New York: Harper Collins Publisher.

• Doak, C. K., Stacey, M., Jambura, S. M., Knittel, J. A. & Rule, A. C. (2013). Analyzing the creative problem-solving process: inventing a product from a given recyclable item. *Creative Education*, 9(4), 592-604.

• Doyle, L. Ch. (2017). Creative flow as a unique cognitive process. *Frontiers in Psychology*, (8), 1-4.

• Duerk, D. P. (2019). *Architectural Programming. Information Management for Design* (S. A. M. Mahmoodi, Trans.). Tehran: University of Tehran.

• Eysenck, H. J. (1993). Creativity and Personality: Suggestions for a Theory. *Psychological Inquiry*, 3(4), 147-178.

• Ghasemzadeh, H. (2006). Mental Schema, Culture and Change. *Journal of Baztab-e-Danesh*, 1(1), 57-68.

• Golkar, K. (2008). Design-Oriented urban design; policy-orinted urban design: model terms of references for guiding instruments in Iran. *Soffeh*, 17(46), 51-66.

• Golkar, K. (2011). Urban Design, Process or Processes? *Soffeh*, 21(1), 99-131.

• Gordon, W. J. J. (1961). *Synthetics: The Development of Creative Capacity.* New York: Harper Collins.

• Groat, L. N. & Wang, D. (2005). *Architectural Research Methods* (A. Einifar, Trans.).Tehran: Tehran University Press and Publishing Institute.

• Guilford, J. P. (1968). *Intelligence, Creativity and Their Educational Implications.* San Diego: Robert R. Knapp.

• Haesen, M., Meskens, J., Luiten, K. & Coninx, K. (2010). Draw me a storyboard: incorporating principles and techniques of comics. *Proceedings of the 24th BCS Interaction Specialist Group Conference* (pp. 133-142). Swindon: BCS Learning & Development Ltd.

• Harfield, S. (1999). The lure of the sirens' song, part 1: first thoughts on process. *Journal of Architectural Education*, 52(3), 174-188.

• Harrison, E. G. & Cough, G. (1962). *Imagination-Undeveloped Resource.* NewYork: Charles Scribner's Sons Publisher.

• Hoseinaee, A & Kasirloo, Y. (2009). Mabani-ye asabShenakhti-ye khalaghiat, Aya nahiye-ye khasi az maghz khalaghiat ra be vojoud mi'avarad? [Neurological foundations of creativity: Does a specific area of the brain create creativity?]. Paper presented at *Conference on Neuropsychology Symposium*, Jahad-e Daneshgahi-ye Tarbiyat-e Mo'allem, Karaj.

• Hosseini, E. S., Falamaki, M. M. & Hojjat, I. (2019). The role of creative thinking and learning styles in the education of architectural design. *Architectural Thouth*, 3(5), 125-140.

• Howard, T. J., Culley, S, J. & Dekoninck, E. (2008). Describing the creative design process by the integration of engineering design and cognitive psychology literature. *Design Studies*, 29(2), 160-180.

• Howard-Jones, P. A., Taylor, J. R. & Sutton, L. (2002). The effect of play on the creativity of young children during subsequent activity. *Early Child Development and Care*, 172(4), 323-328.

• Irouke, V. M. & Ahianba, J. E. (2013). Advancement of Creativity in Architectural Design Education. *Journal of Environmental Studies*, 1(1), 78-82.

• Islami, Gh. & Shapoorian, F. (2014). The Theories And Methods Of Teaching Creativity In Contemporary Western Psychology. *Motale'at-e Tatbighi-ye Honar*, 6(3), 113-124.

• Joanne, M., Boyko, C. T. & Cooper, R. (2015). Do sustainability measures constrain urban design creativity? *Urban Design and Planning*, (168), 30-42.

• Jafari, M. & Zarghami, H. R. (2012). Developing inventive problem solving capabilities and accelerating effective research and development using TRIZ. *Roshd-e Fanavari*, 8(29), 16-26.

• Kalami, M. & Nadimi, H. (2014). Tacit knowing and primary generators reflections on the role of tacit knowing in formation of primary design generators. *Soffeh*, 24(64), 19-32.

• Khakzand, M. & Azimi, M. (2015). Metaphor: a creative aid in architectural design process. *International Journal of Architectural Engineering and Urban Planning,* 25(2), 67-75.

• Khosravi, Sh. & Abed Saeedi, Zh. (2011). Focus group, a data gathering method. *Iran Journal of Nursing*, 23(68), 19-30.

• Landa, R. (2014). *The Creative Process in Advertising Design*. New Jersey: Kean University, Clark Baxter Publisher.

• Lang, J. (2004). *Creating Architectural Theory: The Role of the Behavioral Sciences in Environmental Design* (A. Einifar, Trans.). Tehran: University of Tehran.

• Lawson, B. (2016). *How Designers Think* (H. Nadimi, Trans.). Tehran: Shahid Beheshti University.

• Liz, M. (2001). *ALL THESES: A Study of Gallery Method to Increase Idea Quality in Conceptual Design*. Clemson: Clemson University.

• Mahmoodi, A. S. (2005). Design thinking the interactive model of thinking and design. *HONAR-HA-YE-ZIBA MEMARY-VA-SHAHRSAZI*, (20), 27-36.

• Movahedi, Y. & Pourmohamadi, M. (2018). Cognitive activity analysis of the brain in creative design thinking. *Cognitive Psychology,* 6(2), 1-10.

• Mozaffar, F., Hosseini, S. B. & Bisadi, M. (2013). The

impact of office spatial aspects on creativity and innovation of architecture and urban design researchers. *International Journal of Architectural Engineering and Urban Planning*, 2(23), 34-40.

• Mumford, M. D., Baughman, W. A., Maher, M. A., Costanza, D. P. & Supinski, E. P. (1997). Process base measures of creative problem-solving skills. *Creativity Research Journal*, 10(1), 59-71.

• Onofrei, V. (2005). The theory of architecture: applications and connections. *Bulletin of the Polytechnic Institute of Jassy, Constructions, Architecture Section*, LI (3-4), 115-124.

• Osborn, A. F. (1953). *Applied Imagination*. New York: Charles Scribner's Sons.

• Osborn, A. F. (1963). *Applied Imagination: Principles and Procedures of Creative Problem Solving*. New York: Charles Scribner.

• Pakzad, J. (2006). *Mabani-ye Nazari va Farayand-e Tarrahi-ye Shahri* [Theoretical Bases and Process of Urban Design]. Tehran: Shahidi.

• Parsi, H. R. & Farmahini Farahani, B. (2017). Mental schema, urban space, creativity. *ARMANSHAHR*, 9(17), 303-315.

• Pena, W. M. & Parshall, .S. A. (2012). *Problem Seeking: An Architectural Programming Primer* (A. Ahmadinezhad, Trans.). Isfahan: Nashr-e-Khak.

• Pirkhaefi, A. R. (2005). *Khalaghiyat (Mabani va Ravesh-ha-ye Parvaresh)* [Creativity (Principles and Methods of Training)]. Tehran: Hezare-ye Ghoghnus.

• Plsek, P. E. (1997). *Creativity, Innovation and Quality*. Milwaukee: ASQC Quality Press.

• Potter, M. & William Hamer, P. (2004). The nominal group technique: a useful consensus methodology in physiotherapy research. *Journal of Physiotherapy*, 32(2), 126-130.

• Pugh, S. (1991). *Total Design: Integrated Methods for Successful Product Engineering*. London: Addison-Wesley Publishers.

• Rhodes, M. (1961). An analysis of creativity. *Phi Delta Kappan*, (42), 305-310.

• Roth, W. (1998). *Quality Improvement: A Systems Perspective*. New York: CRC Press.

• Rowe, C. & Koetter, F. (1987). *Collage City*. Cambridge: MIT Press.

• Runco, M. A. & Jaeger, G. J. (2012). The standard definition of creativity. *Creativity Research Journal*, 24(1), 92-96.

• Saldana, J. (2016). *The Coding Manual for Qualitative Researchers* (A. Givian, Trans.). Tehran: Elmi va Farhangi.

• Sarkar, P. & Chakrabarti, A. (2008). The effect of representation of triggers on design outcomes. Artificial Intelligence for Engineering Design. *Analysis and Manufacturing*, 22(2), 101-116.

• Sawyer, R. K. (2006). *Explaining Creativity, the Science of Human Innovation*. Oxford: Oxford University Press.

• Shafei Pouryordshahi, P., Tebbi Masrour, H. R., Mahfouziyan,

M. & Sharifi, sh. (2016). Meta explain the theory, models, methods and techniques of creativity in architecture and design creative cities. *Urban Management*, 15(44), 321-350.

• Shah, J. J., Hernandez, N. V. & Smith, S. M. (2000). Evaluation of idea generation methods for conceptual design: Effectiveness metrics and design of experiments. *Journal of Mechanical Design*, 122(4), 377-384.

• Shah, J. J., Hernandez, N. V. & Smith, S. M. (2003). Metrics for measuring ideation effectiveness. *Design Studies*, 24(2), 111-134.

• Sharif, H. R. & Nadimi, H. (2013). Ideation versus idea processing in architectural design thinking. *Soffeh*, 23(62), 19-26.

• Sharma, H. L. & Saarsar, P. (2017). PMI (Plus-Minus-Interesting): A creative thinking strategy to foster critical thinking. *International Journal of Academic Research and Development*, 6(2), 974-977.

• Shirvani, H. (1985). *The Urban Design Process*. New York: Van Nostrad Reinhold Company.

• Simon, H. A. (1997). *The New Science of Management Decisions*. New Jersey: prentice-Hall.

• Stein, M. I. (1974). *Stimulating Creativity, Individual Procedures*. New York: Academic Press.

• Sternberg, R. J. (1986). Toward a unified theory of human reasoning. *Intelligence*, (10), 281-314.

• Sweller, J., Van Merrienboer, J. & Paas, F. (1998). Cognitive architecture and instructional design. *Educational Psychology Review*, 10(3), 251-296.

• Torrance, E. P. (1981). *Thinking Creatively in Action and Movement*. Bensenville: Scholastic Testing Service.

• Torrance, E. P. (1993a). *The Search for Satori* (H. Ghasemzade, Trans.). Tehran: Donya-ye No.

• Torrance, E. P. (1993b). The beyonder in thirty-year longitudinal study. *Roeper Review*, (15), 131-135.

• Vahedian, M. (2010). Morouri bar nazariye-ha-ye ravanshenasi-ye khallaghiyat [A Review of theories of cognitive psychology of creativity]. Paper presented at *Second National Conference on Creativit*, Tehran.

• Wallace, H.A. (1926). Comparative farm-land values in Iowa. *The Journal of Land & Public Utility Economics*, 2(4), 185-392.

• Yazdani, A. A. & Moghaddam, R. (2012). Integration of the fish bone diagram, brainstorming and AHP method for problem solving and decision making. *International Journal of Advanced Manufacturing Technology*, 63(5-8), 651-657.

• Zekavat, K. (2010). Jaygah *va Mohtava-ye Asnad-e Tarrahi-ye Shahri dar Nezam-e Barnamerizi-ye Fazayi* [Place and Content of the Urban Design Documents in Spatial Planning].Tehran: Azarakhsh.