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Original Research Article

Hybrid Myths in Contemporary Politics: Mythological Analysis of Barak Obama Brand

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Abstract

Problem Statement: In globalization and post-colonialism literature, hybridity describes a process of composing elements from different cultures to reach a hybrid identity. This process is rooted in ancient mythology and dates back to Egypt and Mesopotamia. However, the confrontation between globalization and civilization has accelerated this process due to communication speed and information accumulation. In addition, myths continue to live in the contemporary world, and we can follow their trace in contemporary culture. Therefore, it is necessary for cultural studies to demythize contemporary myths.

Research Objective: Accordingly, we can claim that hybrid myth plays a significant role in contemporary socio-political sphere. The present study's objective was to analyze the mythological patterns in the present political sphere regarding one of the contemporary myths, brand of Barak Obama. This paper aimed to answer two questions: What semiological pattern under brand Obama makes it a hybrid myth? Which historical and political realities are distorted by this myth?

Research Method: The methodology of mythological analysis was derived from Roland Barthes's pattern of myth in the language system. Accordingly, the brand of Barack Obama in the 2008 presidential election campaign was analyzed based on Barthes's model.

Conclusion: The brand of Barak Obama is a hybrid myth constituted of various racial and cultural signs. From one hand, this hybrid sign deviates the history of slavery in the United States and on the other hand, by depicting America as a liberal country with a democratic government, this myth conceals global dissatisfactions with this country's belligerent policies.

Keywords: *Contemporary Myths, Hybrid Myths, Hybridity, Barak Obama brand, Diaspora, Political Branding.*

Introduction and Problem Statement

The reason, the origin and the function of the myth has always been considered a need. Accordingly, myth is constructed based on a need, and it continues to live as long as there is a need (Segal, 2010). Based on this fact, and along with theories of experts like Barthes (1980), as long as human-being needs myth, this linguistic structure continues to live, even as modern myths in

the contemporary world. According to Barthes (1980), myth is a depoliticized speech in this regard. Myth does not aim to deny reality but examines and reports it by purifying. Politics is the best arena of myth emersion and appearance. For instance, the image which is created from Stalin is not a historical or realistic character but an immortal existence that can be regarded as an obvious example of the depoliticizing process (Sattary, 1997).

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Therefore, mythologists must decipher myths, and that is why the bourgeoisie cannot tolerate their words (*ibid.*). Souvey (1966) interpreted myths as sins, guilt, or wretched phenomena and declared that myth is the manifestation of contrast between two images of one phenomenon before and after observing it scientifically. Thus, myth is the ruling sovereign in the political arena while authenticity criterion in politics is public subordination (Sauvey, 1966). As discussed, myth can mislead the middle class in the political arena; thus, the present study aims to demythize one of the political phenomena in the contemporary atmosphere. The brand of Barak Obama, which was launched in the 2008 presidential election, functioned as a myth. The main objective of this research is to analyze this brand and disclose its mythological layers. Accordingly, the central question of this study is that what semiological pattern under the Obama brand makes it a hybrid myth? Which realities in historical and political levels are distorted and deviated following the formation of this myth? Therefore, the hypothesis is that the Obama brand in the semiological level is a hybrid myth constituted from racial and cultural signs, which conceals many realities related to the history and politics of the United States. We can analyze the myth from various perspectives, including philosophy, anthropology, linguistics, and semiology, among which the present study selected Roland Barthes's semiological model.

Literature Review

We can categorize the literature of this field to some parts, from general to specialized. The first category includes studies that generally approach myth in the contemporary era. The first texts in this category are Cassirer's philosophical works, Levi-Strauss's anthropological studies, Campbell's mythology, and Barthes's semiology.

During the next years, researchers deciphered contemporary myths following these classics. Xianglin (2010) examined the aesthetic consciousness in contemporary myths in a rhetoric analysis. Implying hybrid characters in European myths, Hutnyk (2005, 87-91) surveyed the hybrid characters in present scientific space. Sattary (1997) decoded two dominant myths in contemporary Iran and indicated that identity confusion has resulted in the formation of these myths. The presence of mythical heroes in toys and

computer games characters were examined by Dadvar and Moghadam (2009). Chidester (2009) analyzed the role of sports myths in America social reconstruction after 9.11.

The second category encompasses studies in the field of branding which especially concentrate on mythology. Witkowski (2016) studied the conditions under which the Remington brand had a mythical behavior. König, Wiedmann, Hennigs & Haase (2016) researched lux brands through Barthes's method and presented a mythological analysis of these brands (König, Wiedmann, Hennigs, Hennigs & Haase, 2016). The most significant difference between this paper and the present study is that the concentration of the first one is on the consumer brands, while the second one focuses on a political brand. Consequently, the first paper surveyed individual values, whereas the second one emphasizes collective attitude and its deviance by myth.

Another category includes studies that explore the myth and its influence on the political domain. Dubin (2012) represented the dominant mythical thought among the Russian populace about development and the country's approach in its political relations. Pointing to the social role of myths from the structuralism perspective, Fakouhi (2000) analyzed "Vay" as a political myth. Gunes (2013) studied the role of myths in mobilizing political forces in Kurdistan. The other category of studies examines the influence of myth in the political sphere but a historical context. Lassikova (2010) studied the woven patterns of feminine textures in the Safavid Dynasty regarding the myth of presenting fire by Hushang, the Dragon Slayer, to ancient Iran. He clarified the effect of this myth on Iranian diplomacy in using firearms during the Safavid governance period.

The last group includes studies that analyze Barak Obama Brand. Redmond (2010) investigated the Obama brand as a hybrid image in Liquid Celebrity space in the United States. The difference between that paper and the present study is in the context; this research examined this hybrid sign as a myth in the political diaspora with a semiological approach while Redmond concentrated on pop culture. Siedman and Park (2010) analyzed the role of visual design, including posters, stickers, and web pages, on Obama's success in the election campaign in 2008. Likewise, Hartnell (2012) explained the rhetoric effect of Obama in the field

of social justice on rebranding America. This research is similar to the present study based on the effect of brand Obama on altering the image of America, but the difference is in the mythological perspective of the present study and disclosing hidden realities under the myth. On the other hand, Hartnell emphasized brand America while we focus on Obama and consider the myth of America as a result of this brand. Among papers on the brand of Obama, no one had a mythological approach. The present study analyzes the brand of “Barak Obama” as a hybrid myth in the contemporary political sphere by concentrating especially on contemporary myths and hybridity in diaspora space.

Theoretical Foundations

• Myth

Muthos, in its meaning of “myth,” describes a story about gods and superhuman beings. A myth functions as a model for human activity, society, wisdom, and knowledge (Bolle, 2005, 6359). In modern times, famous mythologists, anthropologists, and linguists have studied myth. Eliade considered cosmogony as being fundamental to myth (Eliade, 1963), while for Roland Barthes, myth is a part of a semiological system of communication, whereby an object is defined. It is a construct that attains significance through culture, and not due to the “nature” of things (Barthes, 1972). Levi-Straus analyzed myth from the structuralist point of view (Bolle, 2005), and Campbell studied myth’s psychological aspects versus metaphysical ones (Campbell, 1959). Regardless of our approach in defining the myth; the significant fact is that it influences on individual and collective behaviors (Bouchard, 2015).

• Hybridity

Hybridity is a fundamental concept in Homi Bhabha’s thought. He applies this concept to describe the emersion of the new cultural forms in a multicultural situation. In his eyes, fractures on the borders of adjacent cultures and subcultures make it possible for cultures to permeate in each other and form new cultures (Bhabha, 1994). He uses hybridity as an “in-between” phrase that refers to “third space.” In

Bhabha’s terms ‘hybridity is camouflage’ and, provocatively, he offers ‘hybridity as heresy’ (ibid.). Pointing to the dual process of migration and globalization, Papastergiadis


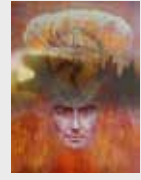


defines this phenomenon: hybridity appears as a convenient category at ‘the edge’ or contact point of the diaspora, describing cultural mixture where the diasporic community meets the host in the scene of migration. He then illustrates a process of development starting from simulation and integration of migrators with the host society and resulting in a more complex phenomenon in present metropolitan societies (Papastergiadis, 2000). Hybridity is a term that has been transferred from biology to cultural policy, and according to various definitions, it can be interpreted as integration in the moment of cultural exchange (Gilroy, 1993, 33). At the turn of the millennium, theorists have defined hybridity as an expression for implying a vast range of social and cultural phenomena, including “mixing,” which has become a key concept within cultural criticism and post-colonial theory (Brah & Coombs, 2000). Table 1 represents various examples of hybridity in different areas.

Hybridity has provided artists and owners of cultural industries with considerable potentials of creativity and creation. However, it has caused concerns for cultural critics so that Homi Bhabha defines it as a disruptive and productive category. It is ‘how newness enters the world’ (Bhabha, 1994), and it is bound up with a ‘process of translating and transvaluing cultural differences’ (ibid.). Chow suggests that the popularized concepts of hybridity, diversity, and pluralism may be grouped with others such as heteroglossia, dialogism, heterogeneity, multiplicity, and notions of the postcolonial and cosmopolitan. According to her, all of these concepts serve to ‘obliterate’ questions of politics and inequality history, and thereby occlude ‘the colonialism legacy from the viewpoint of the colonized.’ The enormous seductiveness of the postmodern hybridity’s discourse lies in its invitation to join the power of global capitalism by relinquishing past injustices that accept the extant relations of power and where “the recitation of past injustices seems tedious and unnecessary” (Chow, 1998).

Brand as a Hybrid Myth from Roland Barthes’ Perspective

According to Barthes (1980), myth is a genre of speech. Everything can be a myth if a discourse transfers it. Myth is not determined and defined based on the subject of the message but by the method through which this message

Table 1. Hybridity in different spaces from science and technology to literature and pop culture. Source: Hutnyk, 2005, 87-91.

Case	Cultural Context	More Explanations	Pictures
Prosthesis	Science and Technology	Various prostheses from glasses to internet space, which is a global prosthesis, and a prosthesis called Oncomouse which is designed especially for cancer tests.	
Sinister linkage between fiction and armory science in destruction program for confrontation with Japan	Economy and Politics	Colonial conquest of the west has been continued in nuclear physics today as well as space explorations and armory programs, all of which have applied for imperialism objectives and result in stabilization of United States economic hegemony.	
Benetton Advertisement	Advertisement – Pop Culture	Benetton endeavors to diminish racial, cultural, religious, or political differences by putting them aside in advertisements called “United Colors of Benetton.”	
Alien Series Heroes	Series -Pop Culture	“Aliens” is the name of a series that was produced thematically, fearing from conquest on the world. An alien hero intends to live at the price of its host. According to Gibson, in encountering aliens, the difference between human races appears entirely inconspicuous.	

is indicated. From his viewpoint, everything can pass from a close and silent condition to obviousness so that society catches it. For Barthes, a photo is a type of speech as much as a newspaper article. On the other hand, brands constitute a considerable part of pop culture and can be created in a hybrid method. As can be observed in [table 1](#), an advertising campaign called “United Colors of Benetton” has been designed to transmit a humanitarian message based on conciliation among races, religions, and even political approaches. Thus, in the semiological level, the signifier of the sign is a hybrid of other signifiers. According to Barthes, these hybrid signs (constituted of signifier and signified), like any other semiological elements, in the condition of the mixture with a social meaning can become a myth and be counted as a hybrid myth ([Hutnyk, 2005](#)). Barthes admits that myth is message and message is not limited to speech but entails a wide variety from cinema and photography to sports reports and advertisement ([Barthes, 1980, 86](#)), and as it was discussed, a brand advertisement or the brand itself can be created in a hybrid method and become a myth.

Research Method

• Analyzing Myth Based on Roland Barthes’ Method

Semiologically speaking, a sign is constituted from three

elements; the signifier, the signified, and the sign, which is the association of signified in mind by encountering the signifier. In this sense, myth is a unique system constructed from a semiological continuum that has already existed: myth is a second-order semiological system i.e., the sign in the first system becomes a signifier in the next system. Mythical speech materials (language, photo, painting, poster, rituals etc.), although different at first glance, are reduced to mere signifier function as soon as being caught by myth. Myth considers them as primary materials, and their unity is due to their reduction to pure linguistic dignity. Encountering whether alphabetic or visual text, myth intends to observe just a collection of signs, a global sign, and the final term of the first semiological chain. The first term becomes a larger system which constructs it as precisely as the final term, and the first term is merely part of this larger system. All these occur somehow when the myth bypasses the formal system of primary significations. Barthes presents this lateral alteration as a table since he considers it necessary for imposing the myth and implies that upper and lower concepts in this model are entirely metaphorical ([Barthes, 1980, 92](#)). [Fig. 1](#) illustrates the Roland bathes’ model of the myth semiological system.

Barthes clarifies that we can concentrate on form,

or meaning, or both for deciphering the myth and, accordingly, examining the myth in three levels. In the first level, he focuses on the empty signifier where signification becomes literal again. Generally, myth producers, who commence their work with a concept and quest a form for its indication, encounter with myth in this method. In the second level, he concentrates on the full signifier in which we clearly distinguish the meaning and the form, and consequently, the distortion which the one imposes on the other. This signifier is constituted from signifier and signified (the sign) in the first level, and itself becomes a signifier for another signified. In this level, we decipher the signification of the myth. In the last level, focusing on mythical signifier as an inextricable whole made of meaning and form, we receive an ambiguous signification. At this level, we respond to the constituting mechanism of myth, to its dynamics, and to become a reader of myth. Barthes considers merely the third level as a dynamic focus, which consumes the myth based on the objectives of its construction (Barthes, 1980, 104). Thus, in this paper, the brand of Barak Obama in the 2008 election campaign, going to be examined based on Barthes' analytical method from myth and its underneath layers, will be explored.

Discussion and Conclusion

One of the most influential brands (images) in the contemporary political sphere is Brand of Barak Obama, president of the United States. Using political marketing by presidents is not unprecedented, but Obama, especially in the United States, had the most effective tactics (Seidman & Park, 2010). In this part, according to Barthes' semiological analysis model and based on the Obama brand in the 2008 election campaign, we decipher this myth.

Experts believe that converting the president to a brand requires three strategies: commoditizing the individual

and diplomacy apparatus, person marketing instead of platform-based marketing, and simulation of the president (Kotler, 1975). In the present study, person marketing and simulation of the president are analyzed. Person marketing relies on the individual and his/her characteristics as principal components of the brand. In the president simulation, we concentrate on the visual strategy, which converts his image in the audience's mind to the president. Therefore, analyzing president simulation, we examine two posters of his election campaign. Following that in-person marketing, the personal characteristics of this brand are discussed so that the hybridity of the sign in both fields is proved. In the next step, this hybrid sign is surveyed based on Barthes' mythological-semiological model for its mythical aspects to be discovered.

• Hybridity in Simulation of the President in Visual Design of the Campaign

The common aspect of all advertising posters in this campaign is a dark-skin candidate as an empty signifier who promises hope and change. Fig. 2 is a sample of numerous images that were created in this domain. However, the audience of the campaign were from various races and cultures, and the transmitted message had to address all of them. Hence, hybridity was the most effective strategy in designing this brand. Fig 3 and 4 are examples which clearly illustrate how Latin American migrants in America were addressed in this campaign.

Fig. 3 is a silkscreen poster designed by Ray Noland and illustrates the candidate floated in the light staring at the distance with sun rays behind. This poster is a hybrid of religious iconography derived from saints' illustrations and the candidate's face in the middle of the frame in the guise of South American peasants with the empty gaze of a rural man. The harmony of sun rays with rustic textures, the combination of yellow and brown tonalities,

Language	Signifier	Signified
	Sign	
Myth	SIGNIFIER	SIGNIFIED
	SIGN	

Fig. 1. Myth in Language System. Source: Barthes, 1980, 92.

and the slogan, I DREAM, which reminds American black champion, Martin Luther King, below the poster, strengthens the composition. Furthermore, Fig. 4 is a hybrid of modern candidate image with semiological layers of South American culture including blue tonalities in the face and red, yellow, brown and orange in the background, with corrugated frame reminiscent of Latin American revolutionaries' paintings and the text NUESTRAS VOS, meaning our voice in Spanish, which addresses voters from Latin America. In the center of the poster, the candidate's face has occupied the whole frame and has a manful and steep gaze to distance. Sun rays in background and a slight frown on the forehead, indicating his strong determination, give revolutionary iconography to this poster. The contrast between blue and yellow and the closed frame around the image and orientation of the candidate's gaze out of the frame make his image more distinguished. Analysis of these posters indicates how hybridity in visual semiology has served the brand to communicate with the racial minority in the United States.

• **Hybridity in Person Marketing in Election Campaign**

In addition to these visual strategies, the fact utilized by advertising consultants of Obama smartly was his social status as a minority. Although this fact could

be a weakness at first glance, considering various racial minorities as the audience of the campaign altered it to the strength. This brand was a hybrid of semiological elements which are even observable in his characteristics. His name (Barak Hussein Obama) is constituted from English and Arabic names, racially he is a black-American hybrid, and religiously he was born from a Muslim mother and non-Muslim father. All these cultural, religious, and racial signifiers (Barak- Hussein- Obama- Muslim- non-Muslim- Black- American) beside each other created a hybrid signifier in linguistic level which can succeed in the diaspora space of the United States with the high ethnic, racial, lingual, and cultural multiplicity.

• **Hybrid Sign as a Myth**

The concentration of this paper is on the mythological level of this hybrid sign. Answering the first question of the research, we must assert that constituting signifiers of this sign, such as Muslim or black, address the minority population in the United States. Therefore, focusing on full signifier (in the mythological level), we comprehend that the position of this person as the presidential candidate highlights that everybody can achieve any social status in America due to his/her capabilities. This concept can be considered as the signifier in mythological level, which implies “respect

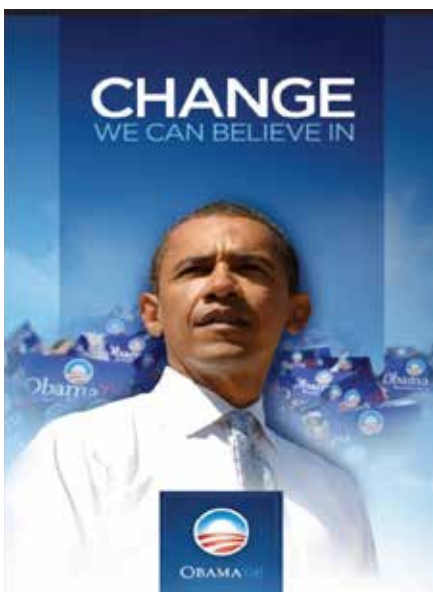


Fig 2. Obama for Change we can Believe in America (2008), A Case of Adverting Posters of Presidency Candidate. Source: Sideman & Park, 2010, 1.



Fig 3. Ray Noland, The Dream, The hybrid of candidate image with elements of rural life in Latin America and religious iconography through sun rays in background. source: Sideman & Park, 2010, 18.

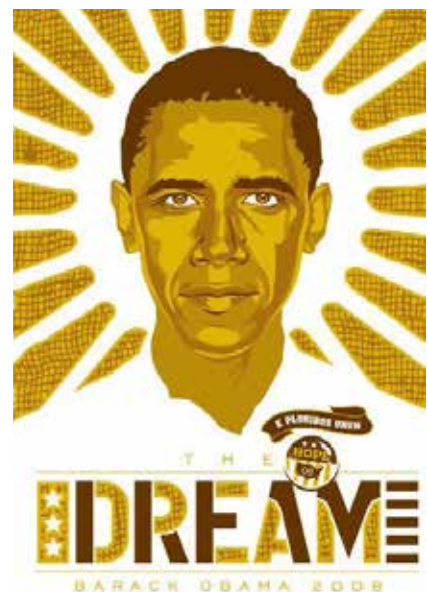


Fig 4. Rafael López, Nuestra Voz (2008), The hybrid of presidency candidate with revolutionary elements of South America. Source: Sideman & Park, 2010.

to freedom and individual abilities in this country,” as signified. The signifier and signified in this level result in the myth “America, the origin of freedom and respect to individual capabilities.” Fig. 5 demonstrates the mythological analysis of the research in Barthes’ model. According to Barthes, myth does not conceal the reality but distorts and deviates it. Therefore, the second question of the research comes to mind: What aspects of reality are distorted through highlighting this myth? The statistics of BBC census in 2007 among 26000 people in 25 countries indicate that three out of four people disagreed with America’s policies toward Iraq, Guantanamo, Iran, North Korea, and Global Warming (McGirt, 2008). In this condition, the Obama brand functioned as a hybrid myth and created a new image of America in the Bourgeoisie’s mind; an entirely democratic government in which a citizen from the minority can achieve the highest social status. The Obama image created in 2008 and launched to the world as president of the United States, functions as a myth which distorts the reality of dissatisfaction among 75 percent of people with America’s policies and illustrates this country as the land of equal opportunities with a liberal government. The other fact in Barthes’s eyes is the eternal companionship of myth and history, and what brand Obama accomplished properly is to conceal the history of slavery and black exploitation in America. Theorists believe that hybridity functions as a cultural phenomenon in the present time to unify cultural variety, ignore differences, and even neglect colonialism. However, others appreciate it due to its potentials of creativity for the cultural industry. However, according

to the bourgeois myth’s deceptive logic, we can consider hybridity as a bourgeois myth and find lots of these cases in the contemporary political sphere. In this paper, the Barak Obama brand in the 2008 election campaign was analyzed as one of these myths, and its mythological levels were distinguished. The present study aims to demythize a hybrid myth; therefore, it is significant from two perspectives: 1. Mythologically reading one of the contemporary cultural-political products, the brand of Barak Obama, and 2. examining the phenomenon of hybridity through semiological analysis of this myth. Mythological reading of this brand indicates that both the aforementioned approaches to hybridity can be authentic. On one hand, the combination of signifiers, whether in visual signs in the design of posters and advertisements or individual characteristics, proves how hybridity serves as a productive element and creative factor to address the variety of audience and result in the success of the campaign. On the other hand, regarding the second question of the research about the distortion of reality by myth, we observe how hybrid myth functions in distorting slavery history in America, conceals belligerent policies of the United States and ignores the colonial perspective of the West. This reading of the myth proves the hypothesis of the research.

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Language	signifier: Black (minority) Presidency Candidate	signified: racial, religious and cultural minorities can achieve the highest status in America	
Myth	SIGN: America, the origin of freedom and respect to individual capabilities		SIGNIFIED: respect to freedom and individual abilities in this culture

Fig. 5. Mythological Analysis of Research Body in Barthes’ Model. Source: Authors.

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Original Research Article

Revisiting Nature-inspired Thinking Process in Architectural Designs Using Zaltman's Metaphor Method (ZMET)

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Abstract

Statement of the problem: Understanding how mental maps are used by new learners of architecture can help us gain familiarity with their mental thinking and externalize their mental knowledge. This ultimately paves the way for structuring and organizing the ideas of new learners.

Research Objective: The purpose of this study is to raise awareness about the mental representations of new learners of architecture during nature-inspired design processes and to develop a consensus map of mental models and to improve the design thinking of new learners.

Research method: This field study is qualitative in nature, and with respect to its purpose, it is applied. In this study, first, the documents and opinions of experts were scrutinized then architecture learners' mental maps were elicited using the ZMET technique (Zaltman's proposed technique to get to the unconscious structure of individuals).

Conclusion: Analyzing the mental maps of new learners shows that nature has been able to influence their architectural design process. The results revealed that learners were inspired by nature in their architectural designs, 26% used it for semantic analysis. The results of interviews with the new learners showed that 21% of them mostly used nature in structural and geometric patterns. The patterns were used by 36% for finding and creating ideas, which account for a big share of the design process. These results highlight the necessity of promoting nature-inspired design in architectural studios and future studies.

Keywords: *Mind Map, New Learners of Architecture, Architectural Design, Nature, ZMET.*

Introduction

Man has long been in a friendly relationship with nature. To live in nature, humans have used architectural tools (Khakzand & Ahmadi, 2007).

Nature¹ as the source of significant metaphors² can prevent learners from thinking in a superficial way (Antoniades, 2017). Metaphors, which play a key role in developing thinking and

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knowledge, shape human thoughts. Man uses an average of approximately six metaphors in each minute of talking, the more metaphors he uses, and more accurate information can be gained about his thoughts and feelings (Zaltman, 1996). Since mental images are the result of human evaluation of the environment (Nazif & Motalebi, 2019), understanding the designer’s mental image³ of a particular pattern of nature (in fact, the pattern refers to the perceptions of new learners about nature) can explain how nature influences the minds of designers (Zaltman, 1997). This highlights the necessity of searching for a method that is able to understand the mind of new designers, their mental images, and nature-inspired ideas sparked in the minds.

The designer’s mental image is obtained in the form of structures and their relationships in the

mental map. Studying the mental map (drawing a set of concepts and relationships between them and eliciting the learner’s mental knowledge) can be very useful in understanding the learners’ minds. Figure 1 shows the research procedure of the study. The current study attempts to gain an accurate understanding of the impact of nature-driven patterns on the minds of new designers through the ZMET⁴ method. This method was used for eliciting the mental patterns of learners of architecture and understanding their thoughts in response to nature-inspired patterns.

1. What is the mental map of a new designer of architecture like in response to the patterns in nature?
2. At what stages of the design process can architecture learners reap much more benefits from the diverse aspects of nature’s patterns?

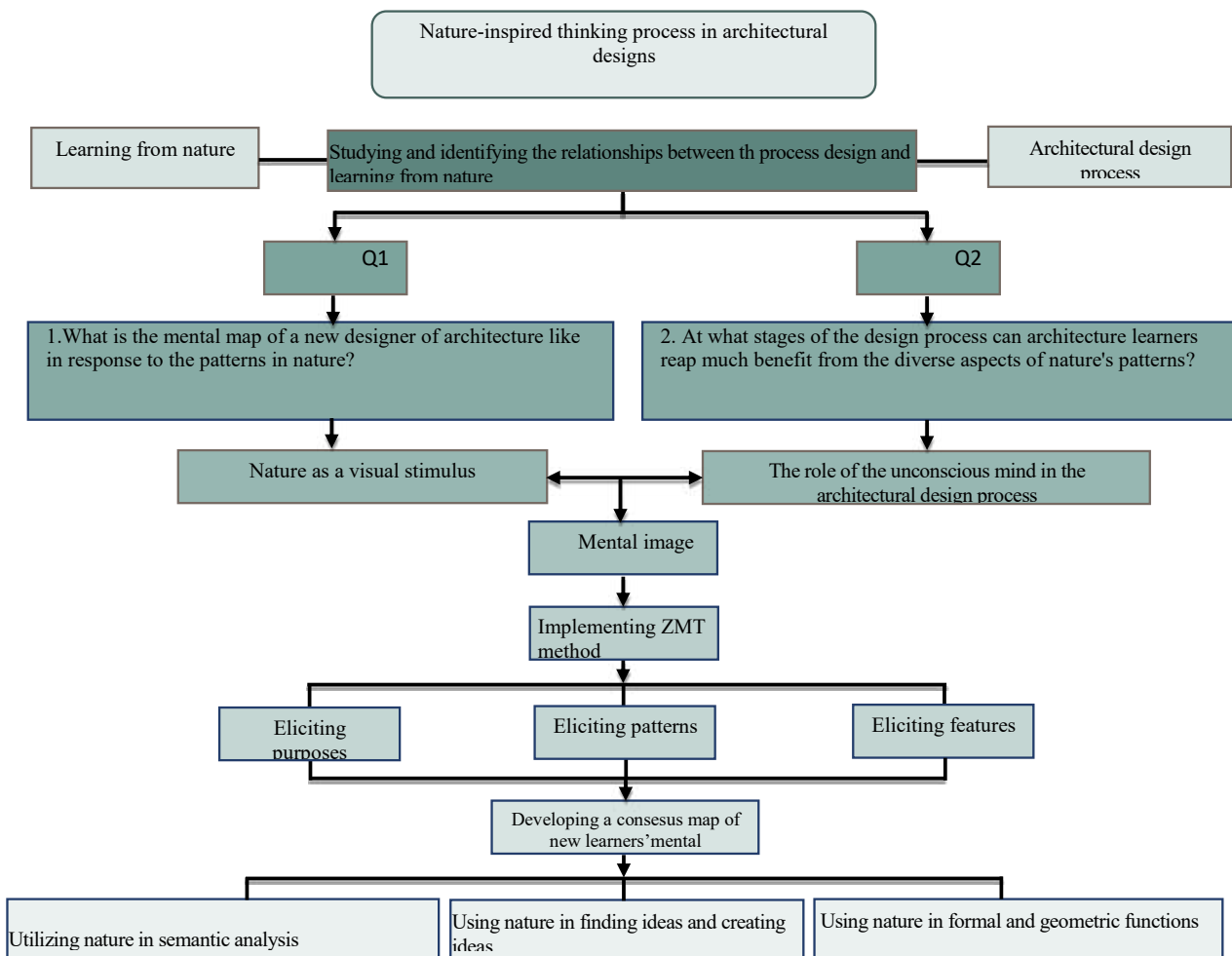


Fig. 1. Research procedure. Source: Authors.

Theoretical framework and literature review

• Nature as a visual stimulus

Given its many capabilities, nature is a great resource for learning and serves as a model for developing creative patterns, and discovering new ways for solving design problems. In addition, the various aspects of nature can serve as resourceful tools in the process of creating design solutions. Research has shown that nature is one of the sources of ideas in architectural design and some scholars have used the term bionic to learn more about nature and reap its benefits (Falihat & Shahidi, 2010; Faizi, Alipour & Mohammad Moradi, 2017; Chiu & Chiou, 2011; Araghizadeh, 2014; Fu, Moreno, Yang, & Wood, 2014; Sadri, Kavandi, Jozepiri, Teimouri & Abbasi, 2014; Gruber & Imhof, 2017; Sugár & Leczovics, 2017; Yeler & Yeler, 2017; Fayemi, Gilles, & Gazo, 2018). The results of Faizi and Alipour's (2014) research also show that architectural learners use nature more than any other source for inspiration. This research introduces nature as a visual stimulus that can serve as a model for learners and facilitate the architectural design process.

• Nature as a pattern language

The components of the universe are received in the form of pattern language, and man consciously or unconsciously receives patterns from the environment and nature. Just as language allows a person to make a variety of sentences using words, a pattern enables a person to create unique structures, and like grammar, patterns share a similar general structure (Alexander, 2002) despite their small differences). The pattern is the basic method of understanding, thinking, and evaluating a subject that represented in the form of a real image in the mind (Sharif & Mohammad Ali Nejad, 2011). Patterns are acceptable examples of practical exercises in which there are laws, theories, applications, and tools (Barker, 2003). Patterns are an abstract interpretation of common concepts and perceptions of individuals that are represented with the help of symbols, needs, and norms (Habibi, 2003). Pattern language enables the user to create a coherent spatial combination and is a productive system that teaches the person the

rules of combination and shows him how to create them (Sameh, 2015). Alexander believes that "mental patterns are nature-driven and are elicited through thinking" (Salingaros, 2004). He considers patterns as a very powerful tool for controlling complex processes, including the process of architectural design and achieving structural and functional coherence (Mohajeri & Ghomi, 2008). Wright also believes that nature is the best source for studying architecture and is the latest model for all designs (Antoniades, 2017). Due to the visual features of designs, nature as a visual stimulus can be inspiring to new learners and serve as a model for their mental imagery. During visual reasoning, mapping takes place in the unconscious mind.

The role of the unconscious mind in the design process

Nature transfers the appropriate instructions to the individual's unconscious mind where past experiences exist. The unconscious mind provides man with the power to manipulate the instructions and make choices. Koestler believes that unconscious thinking is reflected by images (Dandis, 2012), no designers deny the role of the unconscious mind and its effect on the design process (Amini, Flamaki & Keramati, 2019). Mental imagery also originates from the human's subconscious mind and his imaginary power.

• Mental image

New learners of architecture often begin to generate new ideas based on their mental images. After reviewing those images, they start manipulating, changing, and combining their components to create an image that is more compatible with the design problem. The human mind stores images in the deepest parts of the psyche; these images are structures and models that have been acquired during the developmental process (Jung as cited in Eftekhazadeh, 2013). Brief information that human beings create in their minds and use to understand and observe the phenomena of the real world is called mental image (Ghoraba & Tabibian, 2017).

Different methods of creativity teach us how different

interpretations can turn ordinary mental images into architectural ideas (Eftekharzadeh, 2013). Through this reflection and interpretation, creativity evoked by mental images allows one to manipulate the images (Kosslyn & Osherson, 1995) and process the initial idea of the design, which will ultimately shape the main schema of the designers. Since the architectural design is a recurring process, the designer is required to develop the initial idea at each stage and scrutinize the outcome of each stage based on his or her own evaluation and analysis (Schon & Wiggins, 1992), the depiction of mental imagery (mental map) learners at this stage leads to organization and structuring of ideas.

• Mental map

In 1943, Craik coined the term “mental map” for the first time. According to researchers, mental maps are images that affect the way humans perceive the world around them. Spicer (1998) refers to mental maps as images that influence human actions and shape his perceptions. Mental maps are basically based on past information and experiences, which are registered in the individual’s unconscious mind, and allow him to use previous mental models when confronted with a new problem (Mortazavi & Sheikhi-Nejad, 2017). According to available studies, human mental knowledge is often unconscious, and 95% of his choices occur in the unconscious mind (Zaltman & Coulter, 1995), to which accessing is difficult. This highlights the necessity of using a method that can interpret mental knowledge and transform it into a schema (Christensen & Olson, 2002). Using mind maps, we can be familiar with the mental thoughts of individuals (learners of architecture). Such knowledge can be useful to both new learners and teachers because the mental knowledge of new students can be externalized and reveal it objectively. In so doing, teachers can help learners come up with new options in the design process.

Research methodology

This research is applied in terms of purpose, and terms of nature and data collection, it is exploratory, descriptive and it is field research. Given the

data type, it is qualitative. With reference to the qualitative nature of data, predetermined hypotheses limit the discovery of research because unlike physical phenomena, human behaviors cannot be analyzed without discovering their hidden meanings. Therefore, in this research, no hypothesis was formulated. This study attempted to present a consensus map that architecture learners develop in the nature-inspired design process. To this purpose, in-depth personal interviews were carried out and accurate information of each person was collected.

Research Variables

The research variables and their relationships are also shown in Figure 2. The mediating variable of the mental image is an independent endogenous variable and serves as a dependent variable for nature as a visual stimulus (the independent variable) and in relationship with the mental map (the dependent variable) is an independent variable.

Zaltman’s metaphor elicitation technique and its history

ZMET technique was first proposed by Zaltman in 1994. This technique assumes that 95% of thoughts occur in the unconscious mind and traditional research methods fail to reflect them (Zaltman, 1996). This technique is based on images and has been designed to elicit people’s mental patterns. ZMET is more reliable than other methods and it has shown good validity in eliciting and interpreting people’s mental knowledge (Zaltman & Coulter, 1995; Chen, 2006). In this method, following the interviews, the mental map of each new student is drawn and then the maps are combined, a consensus map of their mental models is elicited (Coulter, Zaltman & Coulter, 2001). The visual nature of the ZMET method helps to understand the visual and spatial relationships in architecture (Luoma, 2003). For this reason, this method has received special attention in architecture. Lincourt selected nine architecture students and asked them to explain their preferences about gardens and landscapes. Data

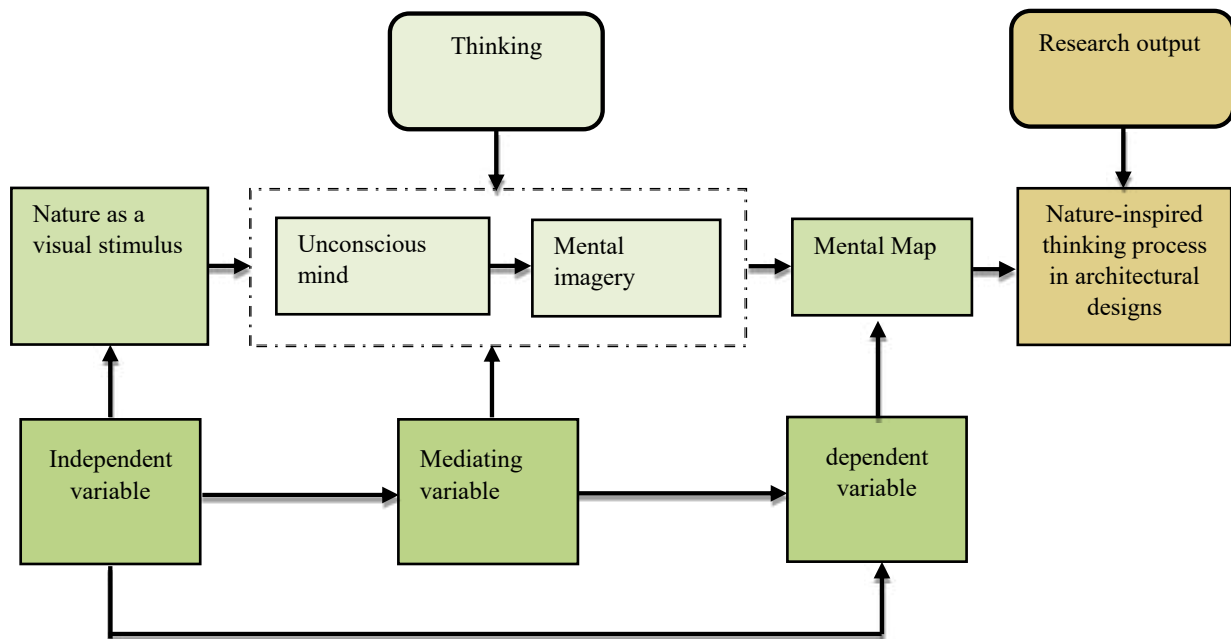


Fig. 2. Research variables and the relationship. Source: authors.

were collected through interviews and photo voices and elicited using ZMET method. The aim of this study was to improve the communication between landscape architects and community members and create better data for research and design projects through metaphors and their relationships. Lincourt (2011) concluded that ZMET has potential applications in landscape architecture research and education. Astorino Architecture Company also used the ZMET method in its designs for the Pittsburgh Children’s Hospital, an apartment complex, a residential house, and an urban park. To determine and address the needs of patients, families, and staff, the company used the ZMET method. To this purpose, participants were asked to search for images that reflect their deepest thoughts and feelings about children’s health care. In so doing, the key metaphors were identified and this led to a revolution in the design of a distinct health center (Conley, 2005). In another study carried out nine graduate students of architecture by Chiu & Chiou (2011), the impact of nature on learners’ creativity was investigated with the help of the ZMET method. To this purpose images and a video clip containing seven types of crabs were used as a source of design

inspiration. The results of this study showed a strong and stable relationship between architectural design and nature. This reinforced the designers’ belief that nature can help designers to develop design ideas. In general, the ZMET method consists of three main steps: before the interview, during the interview, and after the interview. These steps are as follows (fig. 3).

Sample and sample size

In this study, the new students of the 3rd Architecture Project (Continuous undergraduate course) at Islamic Azad University, Rasht Branch, were recruited as the sample of this study in two consecutive semesters in February 1997 and October 1998, and 15 of them were selected as the sample. (The sample size in the ZMET method is small. Validation studies show that in this method four to five in-depth interviews transmit more than 90% of the information. In slightly larger samples, the interviews can vary from 8 to 16). The sampling method was non-probabilistic and purposive. The sample size was determined theoretically based on the researchers’ judgment and the experience of the students’ visits to the museum. Because

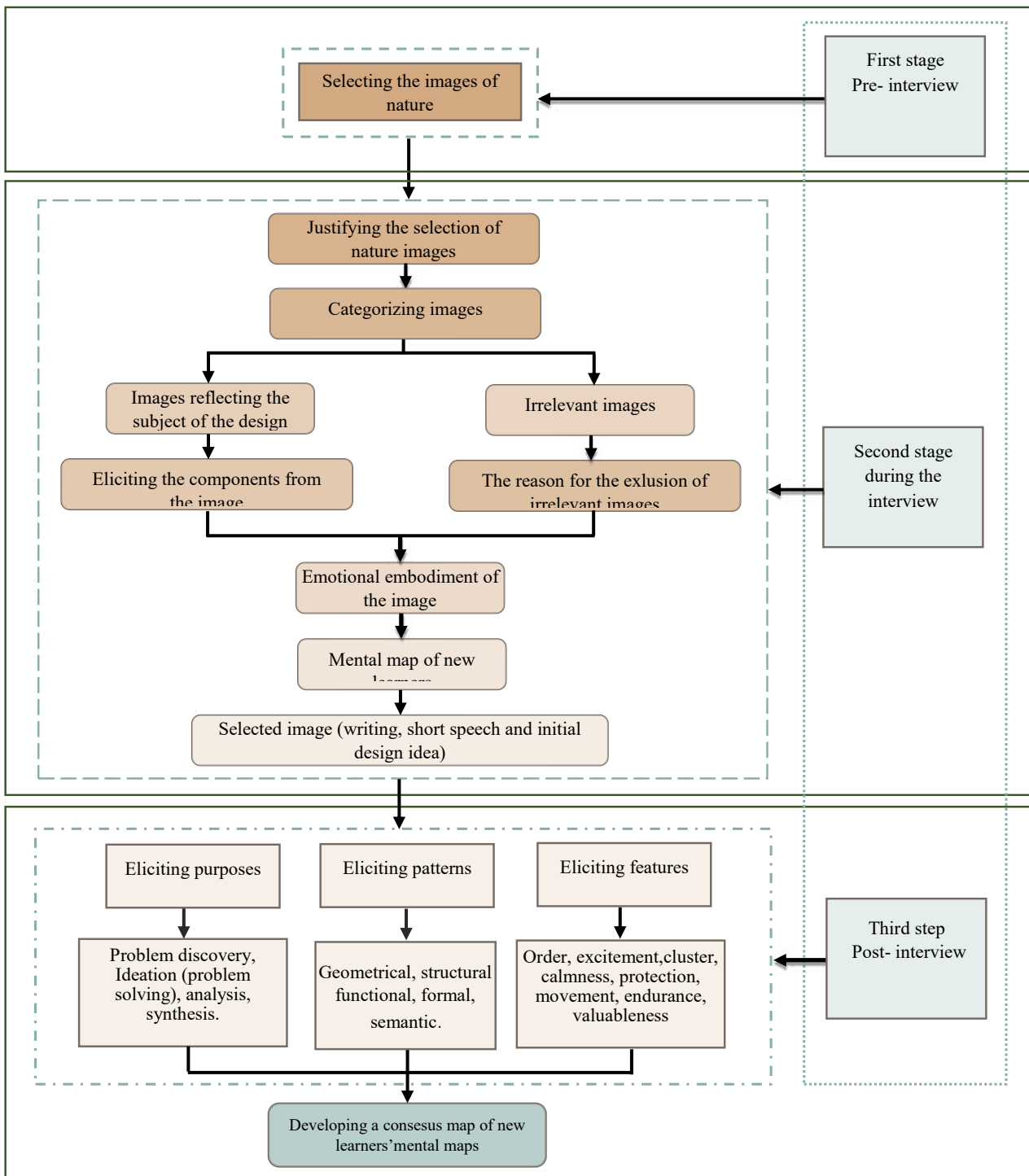


Fig. 3. Stages of evaluating new learners during the architectural design process. Source: authors. (*Raw mental images originated in nature and the new learners’)

in qualitative methods and research, theoretical saturation determines the sample size, the sampling process continued until new codes emerge and the collected data are saturated. Table 1 shows the analytical choices made by new learners along with the nature-inspired examples evoked in the minds

(Column 2 of Table 1) based on their experience of attending museums (Column 4 of Table 1).

The research procedure was as follows:

1. Announcing the “Rasht Museum of Visual Arts” as the subject of the project.
2. Using nature as an approach to the design process.

3. Using the ZMET technique to infer and elicit the nature-driven process of design thinking.

At the beginning, the new learners were asked to analyze the characteristics of the visited museums based on their experience (column 4 of Table 1) and to select their desired metaphors of nature (inanimate, vegetal, animal, human) from what they searched, collect, and present the images of nature that reflect their attitude toward the subject of the design (museum) (pre-interview stage) (columns 2 and 5 of Table 4). For example, the P¹ learner searched and presented 12 images of nature. The images indicated his mental pattern of the subject of the design (Column 3 of Tables 2 and 3), and then the interview was carried out with each participant. Tables 2 and 3 present new learners' examples of metaphors that were elicited through the interviews with the learners using the content analysis .

Research implementation steps

1. Justifying the selection of the images of nature: At this stage, during the interview, new learners reported the major changes in their thinking and explained the reason why they selected some images of nature and how the selected image was related to the subject of the design. What features in the museum encouraged them to choose the current images from the ones they searched for.
2. Categorizing images: In this stage, the new learners were asked to describe his / her mentality and categorize the images to come up with new codes and components.
3. Identifying irrelevant images: Students were asked to identify the images that were in sharp contrast to or rarely associated with the subject of the design and then set out their reasons.

Table 1. Features of nature-driven patterns and the authors' analysis of new learners' architecture. Source: authors.

New learners' code	Selection of examples from nature	Gender	Museum visited by the new learners
P1	Shell	M	Museum of Sacred Defense (Tehran), Museum of Anthropology (Ardabil), Mirza Kuchak Museum (Rasht), Armitage Museum (St. Petersburg)
P2	Sansevieria	M	Museum of Contemporary Art (Tehran), Museum of Glassware (Tehran)
P3	Dinosaur	M	Louvre Museum (Paris), Hagia Sophia Museum (Istanbul), Miniature Museum Garden (Tehran)
P4	Cactus	F	Museum of Contemporary Art (Tehran), Museum of Nature and Wildlife (Tehran)
P5	Eye	F	National History Museum (Baku), Haidar Aliaf Museum (Baku), Mirza Kuchak Museum (Rasht), Hegmataneh Museum (Hamedan)
P6	Swallow	M	Falak Al-Aflak Museum (Khorramabad), Qajar Museum (Tabriz), Sultan Ahmad Museum (Istanbul), Niavaran Museum (Tehran)
P7	Hive	M	Glassware Museum (Tehran), Haidar Aliaf Museum (Baku)
P8	Frog	F	Mirza Kuchak Museum (Rasht), Qaz Qala Museum (Baku), Bu Ali Sina Museum Hamadan
P9	Spinal cord	F	Money Museum (Tehran), Peace Museum (Tehran), Museum of Nature and Wildlife (Tehran)
P10	Shell	F	Anthropology Museum (Isfahan), Vanak Church Museum (Isfahan), Mirza Kuchak Museum (Rasht)
P11	Peacock	M	Rasht Museum (Rasht), Rural Heritage Museum (Rasht), Golestan Palace (Tehran)
P12	Sea wave	F	Mirza Kuchak Museum (Rasht), Rasht Museum (Rasht)
P13	Walnut shell	M	Museum of Contemporary Art (Tehran), Vanak Church Museum Isfahan), Museum of Nature and Wildlife (Tehran)
P14	Spider's web	M	Mirza Kuchak Museum (Rasht), Haidar Aliaf Museum (Baku)
P15	Snail	M	

Table 2. The desired patterns and metaphors selected by P1 from nature. Source: authors. (Note: ✓ shows the final selection of P1)

Description	Nature	Features	Pattern of nature	Metaphor
Inanimate		Stability	Stone	
		Attraction	Soil	Fossils show years of preservance and immortality.
		Memory	Fossil	
vegetal		Protection	Cactus	
		Endurance	✓ Sansevieria	Sansevieria represents endurance, perseverance and long-term hard work.
		Stability and sturdiness	Palm	
Animal		Protection	Spider's web	
		Power	Tiger	The spider's web is a symbol of protection.
		Constant effort	Badger	
Human		Heart	Emotion	
		Human skeleton	Durability	Human memories are recorded in his mind.
		Brain	Recording memory	

Table 3. The desired patterns and metaphors selected by P2 from nature. Source: authors. (Note: ✓ shows the final selection of P2)

Description	Nature	Features	Pattern of nature	Metaphor
Inanimate		Valuableness	Diamonds	
		Protection	Cave	Structure and materials used in diamond convey a sense of value to humans.
		Memory	Fossil	
vegetal		Preservation	Stem	
		Attraction	Flower	Flowers creates a sense of attraction because of the colors and patterns
		Stability and sturdiness	Palm	
Animal		Calmness	Fish	
		Valuableness	Shell✓	The role of oysters in the preservation of valuable substances (pearls) is inspiring.
		social interaction	Bee	
Human		Sentiment	Heart	
		Stability	Tooth	Human heart is full of emotions.
		Unity	Foot movement	

4. Justifying the exclusion of some images: During the interview, the new learners explained the reasons for excluding other selected images, their views or mentality they had from the selected image, that they

have now seen them as irrelevant or unrelated to the subject matter.

5. Selecting images reflecting the subject: Among the images presented by the new learners, each student chose one of the most efficient images that in his or her opinion was strongly associated with the subject of the design. In the design process, he observed its features and analyzed its information and then used it

6. Eliciting the components from the images: Analyzing the mental structures of the new learners in response to the selected images led to identifying the components they were looking for in the selected images. The components were specific to those images and were the main reasons why the learners had chosen the image. These components led to the understanding of patterns reflecting the new learners' conscious selections of the images. Eventually, these patterns helped in fulfilling the main objectives based on which the learners had chosen their patterns.

7. Practicing embodiment of emotion: At this stage, learners were asked to use their five senses to describe their chosen images and explain their experience about nature-driven ideas through these senses in comparison to the subject of the design.

8. Drawing a mental map: In this step, each of the new learners was asked to draw their own sketch using the components extracted from the previous steps.

9. Conveying the thought process based on the selected image: New learners were asked to summarize their thinking process separately in three ways: writing, short speech, and initial idea design.

10. Developing a consensus map of mental models: After compiling the maps, a consensus map of mental models was developed based on the common ideas to show nature-driven design.

A total of 180 images of nature were searched and selected by new learners (columns 2 and 5 of Table 4) which were mainly used for eliciting their mental information about the museum (columns 3 and 6 of Table 4) and in the first seven stages of research. Table 4 shows some of the images received from new learners.



















Discussion

After data collection, we combined the mental maps of the new students to develop a consensus map. At this stage, we replaced the stated associations and features with close and similar meanings reflecting a common concept. This helped us to develop a more readable centralized consensus map to elicit the mental knowledge of new learners. For example, the concepts of memory, history, and movement (A journey from the past to the present), expressed by three different learners were all coded as a movement. In the ZMET method, the components need to be mentioned at least by one-third of the sample size, and one-fourth need to indicate the communication codes (inter-component relationships) (Zaltman, 1997) to be included in the consensus map. Therefore, to enhance the accuracy of data analysis, in general, we selected the components and relationships with the frequency of 4 and incorporated them into the consensus map, and we discarded the items whose frequency was less than 4. In the following section, three general categories of components (features, function, and purpose) are described in detail.

Features of the subject of designs

Features include concepts and mental associations of the new learners about the museum (the subject of the design). Each participant explained the characteristics of the museums based on his or her views, definitions, previous experience, and attitudes towards the places he had visited. The most important features of the museums from the new learners' point of view are presented in Table 5 (first column of Table 5). Protection and movement with 8 frequencies emerged as the most important features of the museum. This means that, according to the new learners, the museum is a place where valuable artifacts are preserved and displayed and is a journey from the past to present, and for them, these concepts, more than any other features were inspiring in designing museums. Other features and frequencies of their use by the participants can be seen in the table

Table 4. Images received from new learners. Source:authors.

No.	Image	Metaphor used by new learners	No.	Image	Metaphor used by new learners
1		Stability and sturdiness	12		Endurance
2		Movement and motion in a fixed place	13		Stability and antiquity
3		Stability and movement	14		Security and social interaction
4		Sentiment	15		Light and sight
5		Thinking and recording events	16		Stability and resistance
6		Protection and strength	17		Security
7		Protection	18		Strength
8		Protection	19		Antiquity
9		Historical value	20		Valuableness and protection
10		Resistance and durability	21		Beauty
11		Protection and endurance	22		Calmness

• **Patterns in nature**

Each of the features described by the new learners about the museum (Table 5) contributes to the objectivity of mental concepts. It also reflects mental dimensions and shows how the geometry of a building, the activity contributing to a readable function, the created structure, the attractive shape, the composition of a building, and color can make the designs vivid. It is noteworthy that the features refer to the feelings and mind-set of the designers about the subject of the design (museum) which they encountered or not encountered, and it is not clear how these features or characteristics enter the design process.

Each learner consciously chose patterns from nature in the design process based on the characteristics of the museum described and their selected image. The patterns refer to the perceptions that learners had about their selected images (examples in nature) based on the characteristics of the museum and used in the design process (see Table 6 for classification). As mentioned

earlier, components with a frequency of fewer than 4 times were excluded from this category. Meanwhile, semantic, structural, and geometric patterns with 12 and 10 times were the most prominent, and a large number of learners benefited from them. For example, relying on the valuableness, movement, calmness, and excitement of the museum and being inspired by nature, P 5 used formal, functional, and geometric patterns in the design of the museum and the results of the interview highlight these features. These patterns are shown in Table 6.

• **Purposes**

Finally, the emerging patterns from the features of the selected images were used in the design processes by new learners. Thus, after conducting interviews with them and reviewing their design processes, we determined at what stages of each design process each new learner used these patterns. Table 7 shows at which stage, these patterns helped each new learner, and at what stage they

Table 5. Features of the museums chosen by the new learners. Source: authors.

Features	Definitions and examples derived from the quotes of new learners in the interview	Frequency
Protection	. The purpose of museums is to preserve objects of high value	8
Movement	A museum is a place where people experience going through history and displaying the history	8
Valuableness	A museum is a place where valuable historical and artistic artifacts are displayed	7
Calmness	A museum is a resting place for relieving human stress.	7
Collection	A museum is a place where beautiful, precious, rare objects are collected and people of the same tastes gather together	6
Endurance	A museum is a lifelong and enduring place in the preservation of human remains.	6
Excitement	A museum is an attractive space where a sense of excitement and fun is created for the audience.	5
Order	Arrangement and classification can be seen in the works in the museums.	4
Peace	One of the missions of museums is to promote a culture of peace by reflecting the dire consequences of war and violence.	3
Evolution	In the museum, one can see the process of human evolution.	2
Thinking	A museum is a place for thinking and arguing	2

Explanation: features including protection (8 times), movement (8 times), valuableness (7 times), calmness (7 times), cluster (6 times), endurance (6 times), excitement (5 times) and order (4 times) were selected by the new learners and to enhance the accuracy of data analysis, the feature with the frequency less than 4 were removed from the analysis process.

Table 6. Nature-inspired patterns selected by the new learners. Source: authors.

Pattern	Definition	Examples of students' quotation	Frequency
Semantic	A sense of security and, tranquility excitement, endurance, movement	Value of works, a sense of security and tranquility, excitement, endurance, movement	12
Structural	It represents the mental dimension and is the tool that an architect uses to create what he or she wants.	Valuableness. I feel like I'm moving into a history museum. A museum is a place where old objects are protected A museum is a calming place. I feel excited and happy in the museum	10
Geometric	The basis of architectural work is a construction which requires a precise geometry and order.	Order, endurance, valuableness, movement, protection, calmness, excitement.	10
Functional	It includes activities or sets of responses that lead to effective outcomes in the environment.	The value of the works in the museum, the sense of endurance in the museum, the protective role, the feeling of peace and comfort, the collection of important works, exploration of history and the past, feeling of excitement in the museum, and the order of things.	9
Formal	It is a man-made structure that includes components with complex relationships.	Protection, endurance, cluster	5
Motivic	It presents a new attractive shape and composition in the building.	Calmness, excitement, order	1
Colorful	Color can change moods, spaces, and improve a person's mood.	Calmness, excitement	2
Textural	It makes the structures in architecture look more vivid	Excitement	1

Explanation: Patterns, semantic (12 times), formal (10 times), geometric (10 times), functional (9 times) and structural (5 times) were selected by the new learners and to enhance the accuracy of data analysis, the feature with the frequency less than 4 were removed from the analysis process.

unconsciously used the design process. According to experts, what is similar in most architectural design processes is the existence of five stages of problem discovery, problem-solving (ideation),

analysis, synthesis, and evaluation (Mahmoodi, 2001; Dubberly, 2004; Lawson, 2005; Mozaffar & Khakzand, 2008; Bagheri & Mardomi, 2011; Lillian, Abedi, Baghaei & Bahrami, 2017; Jabal Ameli, Mozaffar, Karimi & Ghasemi, 2018). Therefore, the same steps were selected as the target components and were used to elicit the designs, in which step the selected models of the learners were involved and affected. According to Table 7, learners used patterns in the stages of ideation, problem discovery, and synthesis, respectively, by selecting 12, 9, and 8 times more than other steps in the design process, respectively.

Finally, by aggregating the three tables, we elicited major components from the mental maps of the new learners.

• Relationship of the components

Features, patterns, and purposes are the metaphorical or conceptual components of research that are related

to each other. A consensus map was developed by eliciting these connections through interviews with new learners. What helps to clarify the process of pattern-based design thinking from nature is the creation of a consensus map as the final step in the ZMET method, which was the result of the mental maps of each student and was drawn according to Figure 4. The numbers in this chart are extracted from Table 8, which shows the relationship between the components. For example, in Table 8 and Figure 4, the relationship between the calmness and the formal pattern and the relationship between the formal pattern and the discovery of the problem are highlighted for a better understanding of the subject. In the consensus image, arrows show the relationship between components while numbers depict the frequency of the set of connections between components. Figure 4 shows components at three levels of features, patterns, and purposes.

Table 7. The purposes of using patterns by new learners. Source: authors.

Purposes	Definition	Examples derived from the quotes of new learners in the interview	Frequency
Problem-solving (ideation)	Outlining the main concerns that require to be addressed by reference to basic concepts. This will facilitate the process of the problem-solving	Design problem: transparency and readability in the direction have been the main idea. -The grandeur of the museum building as the main idea can lead to the concept.	12
Problem Discovery	Finding the right questions that are worth answering.	The main idea in the design of the museum is displaying values over time. -The issues of stability and sustainability in the museum are important. -Moving from old to new can be valuable issues in museum design	9
Synthesis	Establishing the connection between the elements and understanding their role in general and putting all the elements together to form a new format.	- Linking and combine the analyzed components of the selected image to solve the problem. -Connecting the elements of the selected pattern of nature and creating a new concept.	8
Analysis	Separating and selecting of components and elements.	Identifying and analyzing the elements of the selected image for synthesis Analyzing the components of the selected nature to arrange them in a new format	4
Evaluation of Initial Ideas	Determining the applicability of the initial idea.	Paying attention to the function, stability and form of the initial idea in relation to the design idea. Investigating the readability of the relationships of the combined spaces in the new format in response to the needs of the design.	3

Explanation: Ideation (12 times), problem discovery (9 times), synthesis (8 times) and analysis (4 times) were selected by the new learners and to enhance the accuracy of data analysis, the feature with the frequency less than 4 were removed from the analysis process.

Table 8. Components elicited from the mental maps of the new learners. Source: authors.

Objective examples	New learners' code	Features							Patterns					Purposes				
		Valuableness	Endurance	Movement	Protection	Calmness	Cluster	Excitement	Order	Semantic	Formal	Functional	Structural	Geometric	Identification of problem	Problem solving (ideation)	Analysis	Synthesis
Shell	P1	✓		✓	✓		✓		✓		✓		✓	✓	✓		✓	
Sansevieria	P2	✓	✓			✓			✓		✓	✓			✓		✓	
Dinosaur	P3	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓		✓	
Cactus	P4		✓		✓	✓			✓	✓	✓			✓			✓	
Eye	P5	✓		✓		✓		✓		✓	✓		✓	✓	✓	✓	✓	
Swallow	P6			✓		✓	✓		✓	✓				✓	✓			
Hive	P7	✓			✓		✓	✓		✓	✓	✓	✓			✓	✓	
Frog	P8				✓	✓					✓				✓		✓	
Spinal Cord	P9		✓		✓		✓	✓	✓	✓		✓	✓	✓	✓		✓	
Turtle	P10			✓	✓					✓		✓		✓	✓		✓	
Peacock	P11	✓		✓		✓	✓		✓	✓	✓		✓	✓	✓		✓	
Sea Wave	P12			✓				✓		✓	✓		✓	✓			✓	
Walnut Shell	P13	✓	✓		✓					✓	✓		✓		✓	✓	✓	
Spider's Web	P14		✓		✓		✓		✓	✓	✓		✓		✓		✓	
Snail	P15			✓		✓					✓		✓		✓	✓	✓	
Total		7	6	8	8	7	6	5	4	12	10	9	5	10	9	12	4	8
Ratio		13/0	11/0	15/0	15/0	13/0	11/0	09/0	07/0	26/0	21/0	19/0	10/0	21/0	27/0	36/0	12/0	24/0

Explanation: For example, the ratio of the semantic patterns used by the new learners for the subject of the design is 26%. This percentage was obtained by dividing 12 (the number of the semantic patterns selected by the new learners) by the total number of components chosen at the pattern level (12 + 10 + 9 + 5 + 10).

As can be seen, some components have more connections. From 17 elicited subcategories, 13 subcategories including valuableness, endurance, movement, protection, calmness, excitement, form, meaning, geometry, performance, problem discovery, problem-solving, and synthesis shape a strong network called the nature-inspired central network of architectural design. For example, the “protection” feature with 5 outputs, the “semantic”

pattern with 8 inputs and 3 outputs, the “geometric” pattern with 7 inputs and 4 outputs, and the “formal” pattern with 6 inputs and 4 outputs have the most relationships with the other components. The purpose of “problem-solving (ideation)” with 5 inputs, “problem discovery” and “synthesis” with 4 more inputs have been mostly used by the new learners, and others such as “cluster” and “order” at the level of features, “structure” at the level of

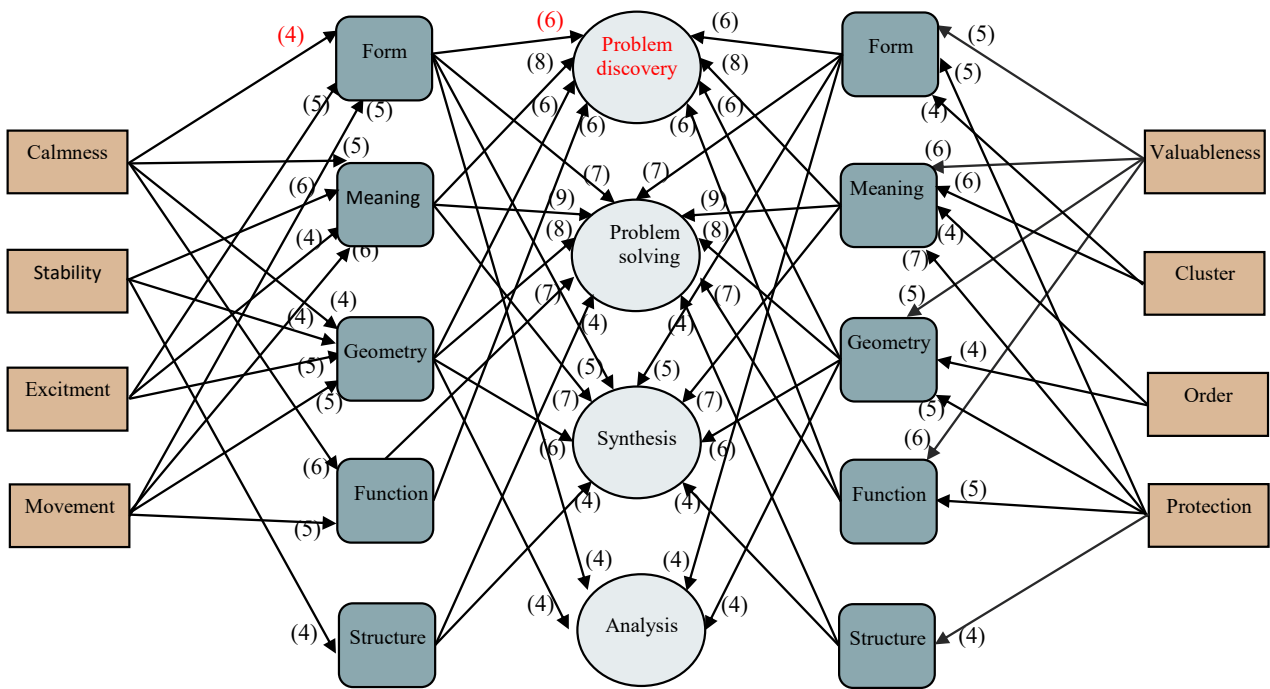


Fig. 4. A Consensus map of the new learners in designing museum inspired by the patterns in nature. Source: Authors. (Rectangle: Feature-Square: Pattern-Circle: Purpose)

patterns and “analysis” at the level of purpose have been rarely used in the network. Probably future studies can examine their relationship with the main network. Figure 5 presents the samples of the designs prepared by the new students, and Figure 6 shows the application of the ZMET methodology in the architectural studio and different stages of its implementation in the design studios

Result & Conclusion

The impetus behind this study was to access the mental representation of learners to understand how learners used nature in the architectural design process. This study was an attempt to determine the mental map during nature-inspired design and to understand at which stages of the architectural design process, it can be more helpful. Using the results, learners can be effectively guided and helped in the design thinking process.

New learners and designers have less access to the right mental imagery than their experienced counterparts since they are not experienced enough in architectural design. Therefore, introducing appropriate visual images as visual stimuli can be

effectively used in the design process. Nature can be used for visual stimulation of design learners, and given its capabilities, it can be a case to discover similarities, associate meanings, and interpret them from the perspective of design, experience, and learning. The results of the present study echo the results of previous research (Lincourt, 2011; Conley, 2005) and indicate that employing metaphors in nature and the discovering relationships between them indicates the depth of thoughts and feelings of the viewers and, Chiu & Chiou (2011) indicated a stable relationship between architectural design and nature. But what has been overlooked in previous research is the role of nature and its contribution to learning in the stages of the architectural design process, as well as its impact on the mental map of new learners. According to the results of research and analysis, the process of architectural design, new learners have mostly benefited from nature at the stage of ideation.

The obtained consensus map also suggests that nature has inspired learners in their architectural designs, 26% used it for semantic analysis of the characteristics of the design project. 21% of them





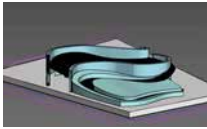



New learners' code	Pattern		Final Project	N	Pattern		
P1	Shell	Semantic Functional Geometric		P5	Eye	Formal Functional Geometric	
P2	Sansevieria	Semantic Functional Structural		P10	Turtle	Semantic Functional	
P3	Dinosaur	Semantic Formal Functional Structural Geometric		P14	Spider's Web	Semantic Formal Geometric	
P4	Cactus	Semantic Formal Functional					

Fig. 5. Sample of designs prepared by the new learners. Source: authors.

mostly used nature in the formal and geometric patterns and 36% used it for finding and creating ideas, which account for a big share of the design process. The results highlight the necessity of promoting nature-inspired design in architectural studios and future studies.

The main of this study is to raise awareness of the mental associations of learners in response to the patterns in nature to improve the architectural design

thinking of learners. As a result of the authors' theoretical findings from other previous research, it became clear that a mind map is a creative approach that subconsciously leads learners to deep imagination and visualization on the subject of design and shapes and creates diverse ideas in their minds. The design of initial ideas and interviews with learners are used as resources to understand the impact of patterns in nature on the design process

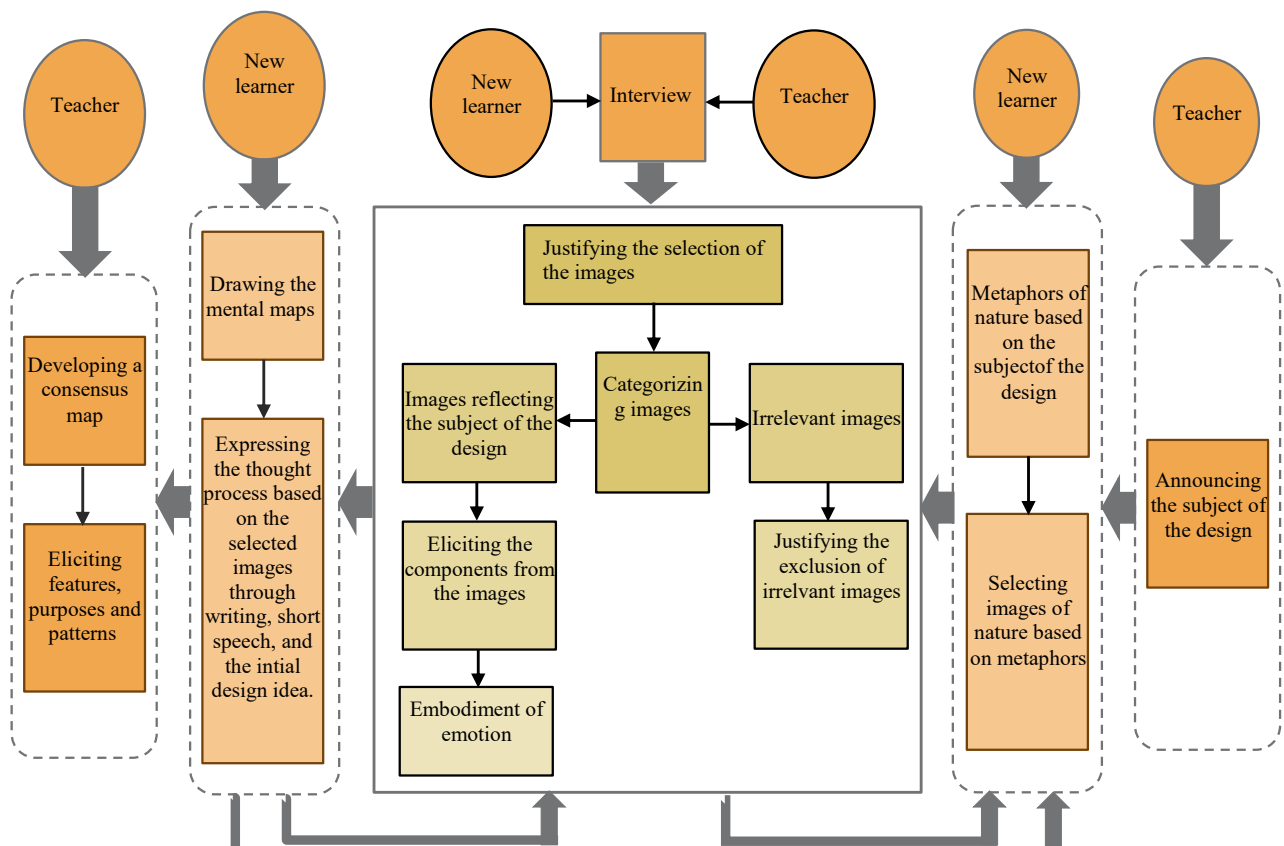


Fig. 6. Implementation of the ZMET methodology in the architectural studio. Source: authors.

As a result, given the process mentioned in the preparation of the mind map, learners can think about the subject of design in different centralized ways (writing, short speech, and initial idea design). This process will enhance their creativity. Future studies can examine the method and results of this research by focusing on the other functions (except museums and formal uses). It is hoped that the proposed concepts of this research and the mental maps of new learners in the nature-inspired thinking process in architectural designs serve as a springboard for future studies and training in studios. It is suggested that quantitative research should be carried out to focus on the creativity indicators of the designs obtained from this method in architectural studios for new learners. Design thinking as an introspective behavior is influenced by factors such as place, time, gender, and individual factors. Therefore, results and analysis may vary if different factors are included. All of the factors can be explored in future studies

Endnote

1. Nature refers to its examples driven from inanimate, human, animal, and vegetal patterns. The different meanings of nature can be described under three general categories of the perceptible world, essence, and origin of the world and have two tangible and intangible aspects. This study has focused on its tangible aspect.
2. The term metaphor means borrowing or using a word to refer to something which is not literally relevant but there is a similarity between their meanings or they share a commonality in a single adjective.
3. Mental image is the active part of our mind that makes us act and shape ourselves. These mental images affect our view of the world and, accordingly, affect our choice (Shepard, 1978).
4. Zaltman Metaphor Elicitation Technique (ZMET) is a technique for eliciting people’s unconscious mental structures.
5. Bionic is derived from the Greek words “bios” (nature and life) and English “technics” (technique). Bionic architecture, which can be considered as a nature-inspired architecture in general, can play an important role in the ideation and creativity. Nowadays, this field is very popular with designers, especially architects. The goal of bionic design is to apply knowledge of nature innovatively and is never considered an independent profession. Bionics is the extraction of natural biological knowledge that can be used as the basis, model, and source of inspiration and creativity for architectural designs.
6. Reasoning involves the two processes of “image perception” and “interpretation of image content” that interact with each other (Goldschmidt, 2013).

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