

Application of Environment Capability Theory in Formulation of Qualitative Parameters in Designing Educational Spaces

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Abstract

This research identifies and classifies environment capabilities by reviewing environmental psychology as well as analyzing and defining environments based on different theories. Identifying and applying these capabilities in designing ideal and high quality educational environments in terms of structure leads to a deliberate and thoughtful architecture. To briefly explain the concept of capability, it can be said that environment capabilities are the physical configuration belongings of a behavioral object or place that makes it usable for certain activities. Some demands are met by an environment or object, live or cultural, easier than others; some activities which are formed in a specific configuration of environment meet some people needs and do not others. The important thing is that the capabilities of a physical environment, whether good or bad, is what the environment suggests with its configuration characteristics and materials it is made of. It seems that the quality of an object can be defined as "a set of specific characteristics or traits which distinguish one object from others and enable us to judge about superiority, similarity or inferiority of something in comparison to something else, and from esthetical aspect judge and give a verdict about being ugly or beautiful, good or bad, as well as its goodness or badness and efficiency or inefficiency with regard to functionality. In this article, by studying environment elements and capabilities and reviewing some qualitative elements and parameters in designing educational spaces and urban environments, we attained two generalized models for environmental capabilities and qualitative pa-

rameters in designing educational spaces. Finally, in the first model, two series of indicators were categorized in form of a single model including principal environment capabilities and environment physical capabilities. In the second model, qualitative parameters of environment design are divided into superficial, real and mental components and according to the obtained results, the environment receives mental qualities from environment only if the capacity components are considered in designing correctly and with high quality.

Keywords: environment, environment capabilities, educational spaces, qualitative parameters of design

Introduction

With regard to the country's population growth and growing student population, the construction of educational spaces is considered as one of the major and effective factors in education according to scientific criteria. Since the spatial and physical characteristics of the educational department are known as one of factors affecting the learning of students, formulation of scientific and technical principles, rules and criteria to build such spaces is necessary. Necessity of providing educational spaces required for this population in coming years is absolutely felt and some criteria should be established based on personal and social needs to educational spaces so that by applying them correctly the quality of students' education reach the levels desired and this reviles the necessity for deeper analysis of design of educational spaces (Ghazi Zadeh, 2007).

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The concept of school here means a conceptual space, beyond the concept of social institution. School is a conceptual field or space in which there are a set of perceptions, beliefs, values, and world-views and one of the effective factors in modern education is the construction of school space. Physical space of school is not considered as a dull and ineffective environment in education process, rather plays a role in educational activities of students as a live and dynamic factor (Shaterian, 2007). Environment affects individuals' growth in different ways. As we know, enough oxygen saving, water, temperature and other environmental factors affects individuals' growth. Type of habits and skills one acquires is related to environmental conditions and circumstances in which one lives. Social educational and living condition of an individual is dependent on the environment. Individual experience in life is the result and product of interaction between individual and environment. Thus, environment affects individuals' behavior by providing opportunities or stimulation and encouragement.

Statement of the problem

Environmental psychology is the complicated study of people and their environment. Environmental psychology is different from the main field of psychology because it is related to daily physical environment. This science provides a framework of viewpoints, researches and hypotheses that help us in a better understanding of interaction between people and their environment. By applying this science, evaluations can be done before design and construction which is considered the best design tool for professional designers. If we know what performed better in the past, we will be more prepared for better design in future. By using control theories, we can see that environment has the main role in forming feeling values and empowerment for people and different groups (Matlabi, 2000).

Nowadays designing different constructed forms of environments is more relied on knowledge and information rather than personal feelings and attitudes of designers. Designers' familiarity with sciences that help designing directly or indirectly makes it possible for them so that their given designs be more compatible with needs and culture of users more than ever and therefore the designed environment by them provides the necessary conditions for a human life. Familiarity with environ-

mental psychology besides other behavioral sciences can play main role in this regard.

This research tends to examine qualitative developments in design and construction of educational sciences and by examining the environment and acquiring the capabilities in environment and human impressionability and educational space architecture of these capabilities, provides the ground for achieving (desirable and modern schools) compatible with human goals of education more than ever.

Environment and its concept in psychological studies

Definition of environment

The word environment has different applications and meanings. "Spaces around us are environment" and this is the main and most preliminary definition given about environment. Spaces around includes everything. Live creatures, objects, climates generally include the world around us. Human environment not only includes natural factors such as trees, mountains and plains, but also human-made elements provide a large part of environment. Briefly, it can be said that any definition, description or explanation of the nature of environment function should be presented by regarding something in the environment. In any geographical area, living occurs in the way that different geographical-natural factors affect other factors and society and culture are under their influence.

Environmental psychology

Environmental psychology as an interdisciplinary specialization is the psychological study of behavior in daily physical environment through which one intends to:

1. Increase the analysis of complexities that designers are faced with in physical environment. Especially those parts which are effective in responding to psychological and esthetical perception of people.
2. Determining the role of behavioral science in formulating the theoretical basis of architecture which is derived from the weakness in the architecture of theoretical basis to prevent exercising unilateral preference, judgment and decisions of architects.
3. Determining and establishing a theoretical framework for the design and division in a con-

structured environment and designing architecture and evaluation of the constructed environment's function.

4. Expression of generalized capabilities of environment to design, i.e. the concepts related to design and behavioral science upon which the decision should be made about the design. In environmental psychology, human behavior is under the influence of factors such as environment physical factors, symbolic data, design data and environment spirit. Mutually, human affects environment by his behavior which is derived from cultural, financial, social and personality aspects.

It is impossible to define environment psychology without taking in to account the interaction between human and environment; therefore we examine the environment, human and their relationship.

Environment capabilities

Basic theories and environment capabilities

In this part, basic theories that are essential for presenting a theoretical framework are introduced. After familiarity with basic theories of research, environment capabilities are extracted and after summarizing, qualitative parameters of educational spaces (schools) design are represented.

James Gibson's theory of environmental capabilities

Capabilities of anything, either material or immaterial, are part of what makes it usable for a certain creature or member of species. Physical configuration properties of an object or a place are a behavior that makes it usable for a specific activity. These properties provide esthetic meaning and perceptions. Some commands are met easier by an object or environment, live or cultural; some activities are constructed in a specific configuration of environment, met some people's needs and do not others. The main point is that capabilities of a physical environment, either good or bad, are what that environment suggests with its configuration features and the materials it is made of. It suggests something according to its existence. Recognizing capabilities of an object is dependent on features, experiences and competencies and needs of the observer. Human learns the capabilities of objects, environments and the suitable time for using it (Gibson, 1979).

Lewin environmental capabilities

Lewin believed that the value of an object is determined by people's needs and the values they

give to them. Therefore value of an object changes with the change of needs. Although capabilities of an object does not replace, its profitability changes with individual needs and environment is full of opportunities and constraints because of its features (Lewin, 1926).

Lang theories of environment capabilities

The concept of capability, although simple, is tough and the basic concept of the theory of environment design. Different plans of constructed environment have different behavioral supply capabilities and different esthetic experiences. Thus, constructed environment capabilities, limits or expands behavioral and esthetic choices of individual depending on configuration of environment. People change natural and superficial environments to change capabilities and continue to change it (Lang, 2003).

Liton's theory of environment capability

Some writers believe that Liton's model is a "suitable instrument" to understand the nature of constructed environment, while respecting human (Alexander, 1969). He recognized the following needs: 1) physical security, (2) sexual orgasm (3) hostility, (4) Love (5) Maintaining personal interests, (6) identification, (7) the expression of spontaneity, (8) recognition of their status and that of others in the community, (9) maintenance of membership in a certain group, (10) belonging to a spiritual discipline. Some of these needs are related to the instrumental capabilities of environment (like, security and the expression of spontaneity), and others are discussed at the level of symbolic capabilities of environment (like membership and identification). These needs are complicated and do not have clear discipline and classification.

Capabilities of the constructed environment

The form of constructed environment provides different things for potential users. The form of environment provides visual and tactile as well as acoustic and smelling stimulation. In addition to these stimulations, capability of the constructed environment supports some behaviors and limits others. These capabilities are almost limitless. Primary classification of constructed environment shows a range of its capabilities. In its simplest form, tough surfaces of environment, provides human movement and displacement. Some surfaces are more slippery than others and cause slipping.

With a combination of vertical, horizontal and inclined, constructed environment provides shelter for climate change, hiding, security, and gathering of people. These cases are the principal capabilities of environment. In addition, surface configuration can obviate the need to play toys and instruments, work tools and machines. These forms are indicators of associative meanings such as symbols and signs. Some of these capabilities are understandable only for the members of a specific culture and others are understandable for all people. Capabilities of some patterns specific to constructed environment derive from its design, its building material, and its attribution to a specific group of people. At the level of known meaning (including deep understanding), recognition of environment capabilities, seems as a function of biological properties of human beings; and at the level of symbolic meanings, these capabilities are a function of customs and social experience of people. At the level of symbolic meaning, capabilities are based on the social condition of individual in a specific culture. Since understanding the environment capabilities is much dependent on the human characteristics and motivations of individual and group, fundamental processes of human behavior requires a more detailed explanation. This detailed explanation, makes possible a better understanding of environment and its capabilities (Lang, 2003). Environment capabilities are divided into direct and indirect categories. Direct capabilities are the activities that can be done through environment, but indirect capabilities are those “including things such as symbolic meanings that depend on correlation of patterns with a reference and their profitability”.

Capabilities of space types

The environment surrounding us constitutes spaces that we take as shelter rather than the spaces we just pass through. These spaces constitute part of our daily social realities. Our spatial behavior that defines the environment around us and it is defined itself, plays a fundamental role in our social entity. Therefore, as we have a perception from our social life components, we have an understanding of space and spatial relations (Madanipour, 2007), (John Serl, 1995, as cited in Madanipour, 2007) believes that world’s reality can be divided into two categories. First category which he calls “validity realities” i.e. the phenomena that get their entity based on the agreement between members of human society, because we believe in the necessity of

their existence. The second category is “difficult realities”, i.e. realities that exist apart and independent of human organization. All discussions about the community in the present study refer to the generality of a location and distinguish generality of a location from the wider implications of society as follows: people can have psychological feelings of community regarding different concepts. They can have such feeling about a defined geographical territory like their neighbors or about a society with a wider scope.

School of the education and training places

Learning is the central part of everybody’s life. Learning is a central part of everybody’s life. Even when we do not think of its occurrence, with the understanding that the behavior does not occur in a vacuum, different ways of behavior is related to the physical environment. Learning environments consists of elements that will be meaningful together. Characteristics and qualities of each of these elements are effective in shaping different behaviors. Philosopher, Jean Piaget, highly emphasizes the child’s ability to understand the world actively and believes that children do not passively absorb information, rather what they see, hear and feel in the world around them and then chose and interpret. Architecture is an art that encompasses us and people are affected by space rather than affecting it.

Environment is a context to form most of behavioral features. In other words most of emotions, habits, tastes and even attitudes, sittings and standings are highly affected by environment. This is why many experts have called environment a university where each person according to their backgrounds and talents can learn from it and be exposed to its influences, a university where one never graduated from it. Therefore, paying attention to the environment and trying to know it, can provide ground for fundamental understanding of most of the behaviors and manners that shapes in a student community.

We should pay attention that students are under the influence of formal and informal experiences and trainings of the environment around them and constantly acquire new behaviors some of which are desirable and others are undesirable from educational point of view. Here by environmental, we mean factors that affect student’s mind and shapes his behavior by creating space.

Theories of design quality components

Definition of 'quality'

Quality of an object is the degree and level of its superiority and its similarity or inferiority compared to other objects which are considered as a series of features of that object mentally and visually by human. The quality of an object is derived from two sources of "ego" of the person and "the object" itself which are called "value" and "measurement scale" respectively, are indicators of two groups "Quality of utility" and "quality of capacity" of objects (Billings, 1993). Quality of an object is derived from two sources:

1. The "mental" domain of a person
2. The "visual" domain of a person

According to this theory, qualities that are related to "mental domain" are qualities that live within one's "ego". Reciprocally, qualities associated with the "visual domain" are qualities belonging to objects that are exposed to mind as a "external entity" and deal with the realities of the outside world. "ego qualities" can be introduced as "values" that can be hardly quantitative and can be hardly measured. Qualities associated with the statement of desirable or undesirable or ugliness and beauty of objects are usually in this class. Unlike ego qualities, "true qualities" of objects can be introduced as qualities that have measurable natures and are related to measurable capacities such as weight, height and speed.

Mental-psychic values of an object which are called "quality of utility" (like beauty) are derived from the individual; although visual measuring scales of objects which are called "qualities of capacity" are derived from the object itself. Therefore,

regarding the quality of an object it can be said:

"Quality of an object is the degree and level of its superiority and its similarity or inferiority compared to other objects which is considered as a series of features of that object mentally and visually by human. The quality of an object is derived from two sources of "ego" of the person and "the object" itself which are called "value" and "measurement scale" respectively, are indicators of two groups "Quality of utility" and "quality of capacity" of objects (ibid).

Triad theories of existential status of environment design quality

Now, after presenting the above introductions, triad theories in the field of existential status of environment design quality can be described as follows:

A) Considering "environmental design quality" as the quality and attribution that is inherent of the physical environment and is independent of the observer.

B) Considering "environment design quality" as a totally subjective and mental issue which is made by observer and is not related to physical structure and features.

C) Considering "urban quality design" as "stable 2" or "Event3" which are formed through interaction between physical and tangible features on the one side and cultural patterns and secrets and observer's mental abilities on the other.

Quality of urban environment design as a concept is created through exposing tangible features to physical environment on the one side and making it understandable, identifying and evaluative by observer on the other (Golkar, 1999).

Table 1. The components of urban design quality based on "Appleyard" and "Lang" model

Qualities of interfering design	"Lang" model (human needs)	"Appleyard" model (human perception states)
"residence, comfort facilities, (temperature, sun, Stability and balance based on ecology Passages safety "control and care (safety) " (private domains) "Permeability and Flexibility"	Physiologic (food, shelter, hygiene) Security and safety Staying away from danger: pollution, Dependence	Operational perception
"Social facilities (local interaction) "spatial sense, identity, eligibility, visual fitness"	(Sense of belonging to group and gathering)	Inferential perception
"ownership , individuality, belonging to place and group"	Self-confidence and self-esteem (identification)	
For Customizing the space and taking part in	Self-realization (creativity)	
"possibility of cultural-recreational activities "urban and natural landscape"	Perceptive-esthetic (rational and emotional Stimulation)	Emotional-reactive perception

Model «Canter»: Components of «place»

According to this model, which is known as «place» model, urban environment is considered as three intertwined dimensions of «body», «activity», «imagination» (Canter, 1977). Since the quality of environment design of a place is inevitably responsible for responding to different dimensions of environment, it can be said that, urban design consists of resultant of three components each of which is responsible for providing one of three partite qualities of «physical», «activity» and «visual» (figure 2).

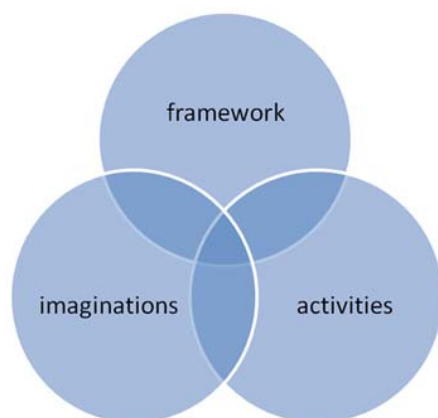


Figure 1. Model «place sense» (Putner, 1991)

Golkar model

Based on this model – which is based on Canter model- the quality of urban environment is the resultant of three components each of which is re-

sponsible for providing one of the four qualities of «physical», «activity», «imagination» and ecosystem» of the urban environment. This means that, three components of «function», «experimental-esthetic» and Environmental which are inferred as forces shaping the overall quality of the design of a place that each one contains a series of qualities are common in nature. (Golkar, 1999).

Conclusions

This research, by referring to theories of environment capabilities and interpretation and analysis of these capabilities, seeks to formulate qualitative parameters of educational space design . To achieve this goal, the subject of study in the form of related theoretic literature and discussion, finally achieved a conceptual model. This model in form of place (educational space) constitutes elements forming environmental capabilities that refer to needs and abilities of human and physical parameters of environment and behavioral and perceptual factors. Each of these variables have certain indicators which include: physical properties including natural elements (water, herbal covering, territorial conditions, etc), human needs in personal and social form (physiologic needs, conceptual, security, etc) human capabilities in personal and social form (social and cultural properties), behavioral factors (territory, personal space, etc) and perceptual factors (place identity, meaning, esthetic factors, etc).

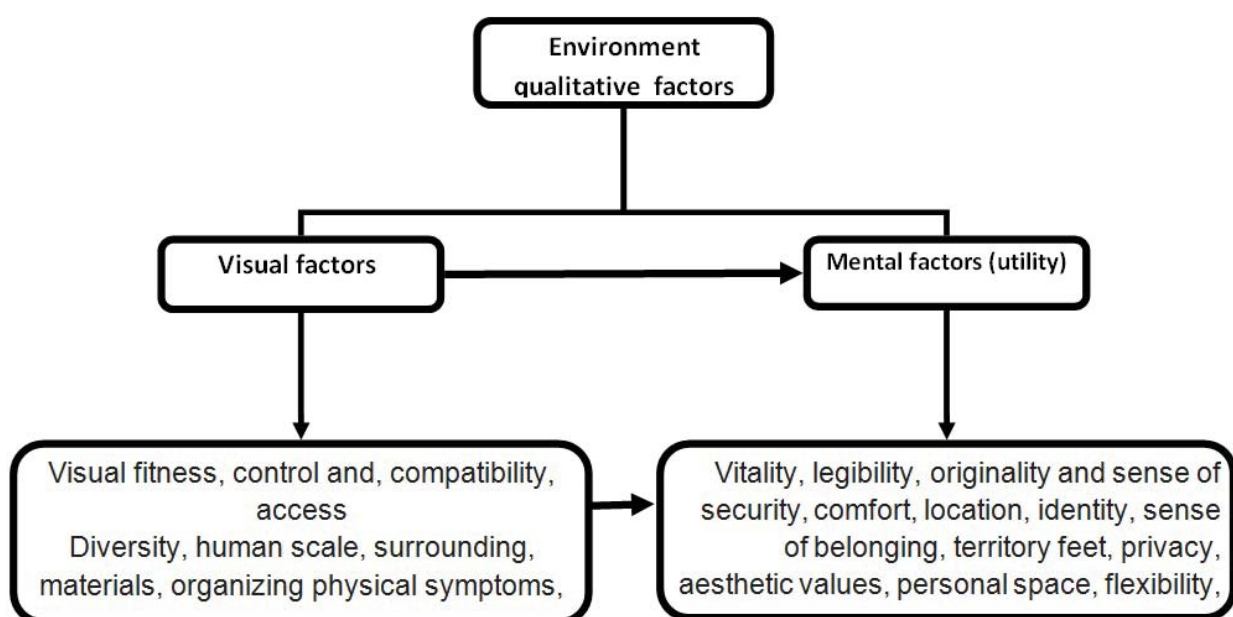


Figure 2. Model of qualitative parameters for the design of environment (Source: author)

In what follows, first four cases of different models which are suggested by «Donald Appleyard», «John Lang», «David Canter» and «Korush Golkar» and usability were analyzed as a theoretical framework to explain the components of quality, then by applying strengths of the above model, suggestions such as «quality parameters of educational space design» are presented as a suitable theoretical framework to recognize and interpret constructive elements of educational space design.

- 1) Theories of environment capability
- 2) Theories of qualitative components of environmental design

By connecting these theories, theoretical framework finally attains two general models through which in the first one, it leads to two series of indicators in the form of a model that elements of environment capabilities are extracted from mentioned

theories and are examined and based on these capabilities which are categorized as follows:

1. Capabilities of the human environment.
2. Properties of Physical Environment

In what follows, under the influence of learning environment capabilities and theories of qualitative elements of designing environment and models of Lang, Appleyard, models of spatial elements of Canter and constructive elements of urban design quality of Golkar, these parameters are categorized as follows (figure 2). As it can be seen in this model, qualitative parameters of environment design are divided into superficial and real elements as well as mental elements, and according to the results obtained if the capacity elements are considered in designing in a correct and high-quality way, the environment receive mental qualities from environment.

Table 2. The quality of urban environment based on Golkar model (1999)

Performance component	Quality of behavioral stations (activity adaptation, place, space) The quality of adaptation of urban form with applications, network, walker, rider, information network, etc The quality of environment safety for activities The quality of environment security for activities
Esthetic- experimental components	Quality of physical-spatial environment " (visual environment) including spatial skeleton, physical organization, Permutation, mass-space, Noli Map, materials, etc Quality of "perceptual-mental environment" (perceptual environment) including quality of mental vision (Spatiotemporal) evaluative mental vision, Concrete meanings and Vitality, etc
Environmental components	Quality of Micro-climates (climate comfort) including: sun-oriented, shadow-making, wind, humidity, etc Quality of sounds, smell, and environment scents Stable quality of urban design Efficiency of using natural resources (energy, earth, etc) Ecosystem balance Reducing pollutions (weather, earth, water)

References

- Alexander, Christopher. (1964). Notes on the Synthesis of Form, Cambridge, Mass.: Harvard University Press.
- Billings, K. (1993). Quality in Design, Department of Architecture, The University of Sydney.
- Canter, D. (1997). The Psychology of Place, London: Architectural Press.
- Ghazi Zadeh, B. (2006). Principles and standards of educational spaces, the renovation and equipping schools.
- Gibson, J. J. (1979). An Ecological Approach to Visual Perception, Boston: Houghton Mifflin
- Golkar, Cyrus. (1999). «Constructive elements of urban design quality», scientific- research Journal, No. 32, pp. 38-65.
- Lang, J. (2001). Emergence of Architectural Theory: The Role of the Behavioral Sciences in Environment Design, A. Eyni Far (2004), Institute of Publishing and Printing, University of Tehran, Spring.
- Lewin, Kurt. (1936). Principles of Topological Psychology, New York: McGraw-Hill.
- Madani, A. (2007) Public and private spaces of city, doctor F. Norian, Tehran: urban processing and planning Enterprise.
- Matlabi, G. (2000). Environmental psychology: Serving Urban architecture and design, Fine Arts, No. 10, Winter.
- Shaterian, R. (2007). Design and Architecture of educational spaces, Tehran December, Simaye Danesh.