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Determining Mental Driving involved in Designing Confined Space in the Educational Complex for Talented Students with the Approach of Creativity Promotion in Adolescents

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ABSTRACT

Paying attention to develop creativity in talented children and adolescents makes community development. On the other side, since students spend most of their time in educational environment, such environments play an undeniable role in nurturing aptitudes and creativity. Improperly designs in Iranian contemporary educational spaces can be clearly seen in the various levels. This paper aims to determine proper patterns for creativity development in adolescents and to determine how to implement these patterns in architecture of educational environments, to achieve proper patterns of designing an educational complex for talented students with the approach of creativity promotion. For this purpose, survey method was used based on integrating theories related to the research subject and at the first stage, three factors of motivation, curiosity and innovation were selected in the form of hypothesis as the main factors effecting on the creativity. According to the results, architectural measures have been inferred for designing educational space in order to enhancing the creativity of talented students. The population includes all the gifted students of secondary and high school boys in district 2 of Shiraz at academic year of 2014-2015. Cluster sampling method was used and the sample size was 257 students. Research-made questionnaire has been used for collecting data. After classifying the obtained data, they were analyzed by using SPSS software, based on the variable type and their relation with each other. The results such as mental driving, which is affecting on promoting the creativity of students at confined educational space, is presented in a conclusion form.

Keywords: *architecture, educational space, promoting creativity, designing educational complex.*

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INTRODUCTION

Secondary education system is one of the important component of the country's education system; the main operator of training skilled and semi-skilled force at pre-university level (Tilak, 2002). The environment of an educational system should be adjusted with the natural environment so that intensify students' creativity by providing many facilities for changing the performances by the students themselves and forcing them to a correct searching for finding the used solutions (Harandi&Akrami, 1998: 30). We see several schools has been constructed and exploited every day. With a quick look at the design of these
schools, we find that most of planners, designer and those involved see the school just in the classroom and sometimes add
limited land-use to them by changing the aspects of spaces (Sami'azar, 2000).

The desired quality of education can be fulfilled by combining all of these factors. When we talk about the architecture characteristics of an educational space, we should focus on education itself i.e. the space that transfer the knowledge from the science source to one who is interested in acquiring the science in the most desirable form. One of the research field on the development of a country is to study the state of its educational buildings (ImamiZadeh, 1998). Educational spaces have an essential role in the social and cultural structure of a society. Education system and contents on one hand, and the architecture of educational spaces on the other hand is considered as two important factors in developing and promoting the creativity of children and adolescents (Mahmoud and Nikqadam, 2012). If the education environment tend to be an effective context for the future generation, its buildings should be creative not imitative- a stimulating environment for free thought and creative expression. In modern education system, the physical and educational space of the school is not only a dry and lifeless

environment with no impact on the learning process, but also act as a vital factor in the quality of educational activities of students and has a great impact on their personality development (Hojjat, 2003). There is various opinions in defining the creativity and its prerequisites. According to Gilford, creativity is a kind of intellectual ability in which past information begin to join together and creates a new product (Armand, 1994: 100-103).

Creativity is one of the top human features. There is no doubt that the most important role of education is to develop and promoting the creativity in students (Qolipour&Azarnava, 2012), which finally, this creativity help human to be productive (AmabilT 1979; Nasiri, 2005). On the other side, talented students are those who are mentally at a higher level in the society that can be a leader in the field of advancing creativity and creative view (Ejei, 2007). The present research's design tries to plan and develop a modern method of designing educational environment for talented students developed in a coherent and relevant set for adolescent boys in Shiraz by categorizing the space (educational - cultural, residential, public spaces, recreational). This method is in line with their effect on creativity, which will include the level of creativity (innovation, motivation and curiosity) for which 3 environmental features can be achieved and at the end, it can initially improve the creativity of these students and consequently cause to promote their creative view. In general, the educational space of schools is divided into two groups of roofed or confined spaces and open spaces (Farzin, 2008). To achieve the goals of ideal learning in roofed or confined spaces, certainly, we should have appropriate and functional spaces. Since most of the activities and requests occur in the class, it is necessary to pay special attention to the classroom and its functional features. In many researches by environmental psychologists, the effect of changing different components of the classroom is studied. Robert Gilford referred to the examples of these changes in the environmental psychology: changing the furniture cause to changes in creativity, innovation and the skills of children in the class. In another research, it was found that having a carpet in the class cause to spending more time in the classroom as well as increasing the direct interaction (Kamelnia, 2001: 96). Shiraz is selected for this project because there is no architectural homogeneity with individual characteristics of the users and also there is no architectural coordination in order to promoting the creativity in such collections for this category of students in Shiraz, which have an essential role in educating and attracting gifted students. The schools that currently are operating in the country as gifted and talented students' school only consider the theoretical aspects of education, while they have ignored the environment as an educational context effecting on the creativity (Milanifar, 2011). Given to that these categories of students have a special talent and ability; therefore they require an architectural space with driving forces in accordance with their intellectual ability. With a quick look at educational space in Iran, it suggests that these spaces are very primitive and mostly lack of educational use, which are not fitted to their intellectual strength. Although wide variety of researches about promoting creativity have been conducted, with a little care, we notice nearly all of these studies are about childhood (especially primary school) and less research is devoted to the adolescents and its absence is quite evident for secondary level (Golchin et. al., 2001: 297-299). All of these shortcomings are of the factors that increasingly emphasize on the necessity of research in this field to be able to increase the field of incidence of creativity in this category of students by providing an educational complex especially for talented students with the approach of creativity promotion. This research, generally, aims to design and discover an educational environment landscape for talented students to promote the creativity of these students, to discover the environmental factors effecting on designing educational space for talented students. It rends to identify the architectural factors effecting on promoting the creativity of talented adolescents, to investigate the relation of the architectural qualities with factors effecting on promoting the creativity towards giving value to the presence of talented adolescents.

METHODOLOGY

The method used in this study has been quantitative method and this is a descriptive-analytical research conducted by survey. The population includes 767 of all the boy students of secondary talented students' schools in district 2 of Shiraz and the sample size (n) estimated 257 students by Cochran formula. The proper sampling method in this research is cluster-sampling method. The methods and instruments for collecting data includes using various questionnaires as the questionnaire of evaluating school building involving the factors of ground (6 questions), mass (6 questions), the spaces in between (6 questions), routing (5 questions), social spaces (5 questions), and comfortability (3 questions), outdoor space (5 questions), learning environments (13 questions) and the health and security level (5 questions). Furthermore, the creativity questionnaire of Torrance was used. For designing the confined space, the content of questionnaire in the field of diversity, flexibility, diversity of forms, outdoor and indoor connection in the educational spaces was set on three elements of motivation, innovation and curiosity to assess the attitude of students. The reliability of test was determined by Cronbach's alpha and by using SPSS software. The Cronbach's alpha indicates the acceptability of research variables and the high level of internal coherence of items. In addition, the attitude of students towards the confined space of school building was evaluated by using the questions of the role of school building place, the exterior cladding of the building (mass), the space in between, routing, social spaces, comfortability and the outdoor space. The validity f the questionnaires has been confirmed by Supervisors and advisors and professors of architecture and Head of Research department in General Directorate of Education in Fars province as well as Secondary Education deputy in General Directorate of Education of the province and director of Exceptional Talents Development and young scholars in Fars province. They confirmed the validity of questionnaire. The data was analyzed by statistical tests including descriptive analysis such as determining the frequency and percentage and inferred analysis including Chi square test, Pearson test, one-way variance analysis, multi-variable regression and Friedman test and SPSS software.

RESULTS

Descriptive statistics results

The frequency distribution of gifted students showed 51% of students (128 students) are educating in secondary school and 49% (129 patients) in high school. 98.4% of boy students and 1.6% of students has not answered the question who were boys because our sample includes the boy-gifted students. Totally, 11.3% of gifted students has very low creativity, 51.4% low creativity, 12.1% average creativity and 25.3% high creativity. The results of descriptive statistics are presented in table 1.

Table 1: the results of descriptive statistics involved in designing confined spaces

Factor	Evaluation		
	Weak (%)	Average (%)	Strong (%)
The place of school building	1.6	47.1	51.4
The distribution of the outside mass of building	31.1	38.1	30.7
The distribution of in between spaces in the building	21.8	63	15.2
Routing and transportation of school	24.5	40.1	35.4
Social pace of the school	24.9	42.8	32.3
The comfortability of school	6.2	52.1	41.6
Outdoor space of the school	8.6	62.6	28.8
Learning environment of school	3.1	65.8	31.1
The health and security level of school	19.8	63.4	16.7
	Bad	Good	
The observation form of school	32.3	67.7	
Education outdoor and indoor space of school	13.6	86.4	

Inferred statistics results

Since the development of adolescents is related to the space and environment in which they live, it can play a vital role in this process by utilizing factors effecting on designing education spaces.

Assessing theoretical literature, the factors of the place of school building, the exterior cladding of the building (mass), the spaces in between, routing (commute routes to the school), social space, the comfortability of school, existence of outdoor space for learning, existence of learning environments (classrooms) and the health and security level of school are known as environmental factors.

The relation of architectural factors in developing the spaces for promoting the creativity of adolescents

The findings from Pearson correlation test showed there is significant relation between the variables of the place of school building, the spaces in between, routing, the comfortability of school, the health and security of school and the creativity of gifted students and this relation is direct and positive. This means betters the space in between, routing, the comfortability, learning environment and the health and security level is in view of gifted students, more creativity (table 2).

Table (2) correlation coefficient between different factors of the building and the creativity of talented students (N= 257 students)

Variable	Creativity	
The place of school building and creativity of gifted students	Significance	0.204
	Correlation	** 0.001
The exterior cladding of building and the creativity of gifted students	Significance	0.018
	Correlation	0.780
Spaces in between and the creativity of gifted students	Significance	0.148
	Correlation	** 0.018
Routing and the creativity of gifted students	Significance	0.201
	Correlation	** 0.001
Social space (classrooms) and the creativity of gifted students	Significance	0.084
	Correlation	0.177
The comfortability of school	Significance	0.138
	Correlation	** 0.027
Outdoor space of learning	Significance	0.121
	Correlation	0.052
Learning environment	Significance	0.157
	Correlation	** 0.012
The health and security level	Significance	0.195
	Correlation	** 0.002

** significance in level of 99%

* significance in level of 95%

The research results indicate that the first variable in the equation is the place of the school building, which explain 4.2% of changes in the dependent variable of gifted students' creativity by itself (R^2 = 0.042). According to the B coefficient of

the equation, 0.513 score will be added to creativity score of gifted students per one-unit increase or decrease in the place of school building at this stage. At the second stage, we put the health and security into the equation and this will add 6% to the explanatory power of the equation (R^2= 0.060). According to the B coefficient, 0.309 score will be added to the creativity score of gifted students per unit increase in the variable of health and security. Based on the β coefficient of the equation, the role of the school building's place in explaining the creativity of gifted students is more than the role of health and security level. So that, β coefficient for explaining the place of

school building is 0.157, while this coefficient is 0.144 for the health and security. This result is significant according to the F obtained at each stage and can be generalized to the entire of population.

Table 3. Multiple regression equation of gifted students' creativity for B and β coefficients in different stages

Stage	Variable	B coefficient	B coefficient	R	R^2	F	d.f	sig
First	The place of the school building	0.513	0.204	0.204	0.04	11.058	1.255	0.001
	Constants	55.628	-					
Second	The place of the school building	0.396	0.157	0.245	0.060	8.129	2.254	0.000
	Heath and security	0.309	0.144					
	Constants	53.376	-					

The relationship between architectural confined spaces involved in mental driving leading to the creativity of gifted students

The results from Chi square test showed that the effect of diversity, functional flexibility in the confined educational spaces on enhancing motivation and curiosity has been at the significance level of 0.05 and there is a significant relation between confined educational spaces and enhancing the motivation in students. That means the students agree that more diversity and functional flexibility of the spaces in color, material and light, more motivation and curiosity in the students.

The results from Chi square showed that there is a significant relationship between the indoor and outdoor connection in the confined educational spaces and motivation and between diversity of forms in confined educational spaces and creativity promotion in students. This means students agree that more the diversity and outdoor and indoor connection in confined educational spaces, more the motivation of students.

Table 4. the effect of various factors in confined educational spaces on enhancing motivation, curiosity and innovation in gifted students by using x^2 test

Variable Diversity effect	Observed data	Expected data	Difference
I disagree and strongly disagree	31		
I agree and strongly agree	226	128.5	97.5
X^2 = 147.957	d.f= 1	Sig. = 0.000	
Functional flexibility	**Observed data**	**Expected data**	**Difference**
I disagree and strongly disagree	35	128.5	- 93.5
I agree and strongly agree	222	128.5	93.5
X^2 = 136.066	d.f = 1	Sig. = 0.000	
Indoor and outdoor relation	Observed data	Expected data	Difference
I disagree and strongly disagree	51	128.5	-77.5
I agree and strongly agree	206	128.5	77.5
X^2 = 93.482	d.f = 2	Sig. = 0.000	
Diversity of form	Observed data	Expected data	Difference
I disagree and strongly disagree	49	128.5	-79.5
I agree and strongly agree	208	128.5	79.5
X^2 = 147.957	d.f = 1	Sig. = 0.000	

The results from mean rankings showed that there is a significant relation between prioritizing mental driving in confined spaces on the creativity of gifted students at significance level of 0.000. As we can see from the table, the mean ranking of making diversity in confined educational spaces (2.58) is higher than others indicating that has the greatest effect on the creativity of gifted students among the mental driving components in confined space. Next, stablishing functional flexibility in educational spaces (2.55) and the diversity of form in confined educational spaces (2.44) has the greatest effect on the creativity of gifted students, respectively. It is suggested that among the mental driving components in confined spaces, the indoor and outdoor connection in confined educational space (2.43) has had the least effect on the creativity of gifted students (table 5).

Table 5- the results of Friedman test for prioritizing mental driving in confined spaces on the creativity of gifted students

	Mean ranking	Chi square	Significance level
Making diversity in confined educational spaces	2.58	26.776	0.000
Stablishing functional flexibility in educational spaces	2.55		
Indoor and outdoor relation in confined educational space	2.43		
The diversity of form in confined educational space	2.44		

Pearson correlation coefficient was used to assess the architectural factors effecting on the creativity of gifted adolescents and the following results are obtained.

The effect of building assessment components on the creativity of gifted students are presented in the table 6, considering to their significance level.

Table 6- the effect of building assessment components on the creativity of gifted students considering to their significance level.

Building assessment factor	Building assessment by students	Significance percent	The effect of effective designing factors on the creativity f gifted students
The place of building (ground)	Good	0.001	Positive and significant
Commute rout	Average	0.001	Positive and significant
The space in between (indoor and outdoor relation)	Average	0.018	Positive and significant
Comfortability	Average	0.027	Positive and significant
Social spaces	Average	0.177	Negative
The exterior cladding (mass)	Average	0.780	Negative
Outdoor learning environment	Average	0.052	Negative
Learning setting (classrooms)	Average	0.012	Positive and significant
Health level	Average	0.032	Positive and significant

The results of assessing the architectural factors effecting on designing educational space and its relation with creativity promotion in gifted students are provided in table 7.

Table 7- assessing the architectural factors effecting on designing educational space and its relation with creativity promotion in gifted students

Building evaluation factor	The correlation	Significance percent	Designing rules
The place of the school building (ground)	0.214	0.001	Observing the symmetry of building appearance with the surrounding buildings The proper place of the building in the site considering to the knowledge needs
Routing (commute rout)	0.201	0.001	Taking into account the adequate main and secondary transitions around the building
The space in between (indoor and outdoor relation)	0.148	0.018	Designing a central courtyard for the connection of indoor and outdoor Color variety of windows Space readability
The comfortability	0.138	0.027	Considering to the light and temperature and noise
Social spaces	0.084	0.177	Providing indoor and outdoor private spaces as an intimate atmosphere, which increases their sense of community.
The exterior cladding (mass)	0.780	0.018	Due to lack of creativity in the architecture of the studied building, so we can provide attractiveness and diversity by variating in the exterior cladding. Changing the environment and the interaction with the environment cause to developing brain simulation. Using a dynamic form cause to creativity promotion.
Outdoor learning space	0.121	0.052	Due to lack of any creativity in the open spaces, we should provide a space diversity in the open space.
Learning environment	0.157	0.012	Group tables provides the possibility of collective learning. Designing a flexible furniture Providing resting spaces such as living room for discussion and conversation Providing spaces encouraging to use multiple intelligences

			Direct connection of theoretical educational space with practical space
The health and security	0.195	0.002	Providing a sound and silent place in the school

In order to assessing the relation of these architectural qualities factors effecting on creativity promotion towards giving value to the presence of talented adolescents, the results from the effect of mental and creative driving on the creativity of gifted students in the confined spaces are given in the table 8 and 9, given to the significance level and effect of these driving. For this purpose, mental driving for designing are assessed on splitting the confined space.

Table 8- the effect of mental and creative driving in the confined spaces on the creativity elements of the gifted students according to the significance level

The factor of mental and creative driving in confined spaces	Creativity elements	Significance level	The effect of indoor mental driving of the building on the creativity elements of gifted students
Making diversity in the physical environment (changing materials, color and light)	Motivation	0.000	Positive and significant relation
Diversity in form (using dynamic forms)	Innovation	0.000	Positive and significant relation
Functional flexibility (the possibility of using one space in various times)	Curiosity	0.000	Positive and significant relation
Indoor and outdoor connection (extending the learning space from closed to semi-open)	Motivation	0.000	Positive and significant relation

Table 9- the effect of mental and creative driving in the confined spaces on the creativity elements of the gifted students

The factor of mental and creative driving in confined spaces	Creativity elements	Significance level	Designing rules
Making diversity in the physical environment (changing materials, color and light)	Motivation	0.000	Using skylights / Putting materials on the floor and roof / Diverse and harmonious use of colors / using colored glasses/ using overall windows / using overall windows/ Natural light control/ using plants in the indoor space
Diversity in form (using dynamic forms)	Innovation	0.000	Using diverse roofs and various floorings/ an extended and soft form for connection path/ change in body shape to the curve form/ the linkage of floor and roof/ The sequence of spaces in motion and pause / fluidity and space communication without borders
Functional flexibility (the possibility of using one space in various times)	Curiosity	0.000	The ability to integrate two or more users together (installing inventions and creative works by students in the hallway or on the bridge) / using hallways as the learning street / providing diverse spaces by using moving walls / providing spaces without walls/ Spatial arrangement by student/ using educational furniture with portability
Indoor and outdoor connection (extending the learning space from closed to semi-open)	Motivation	0.000	Providing a landscape by using educational terrace / using clear vision for blurring boundaries of inside to outside and vice versa / Creating a visual frame from inside to outside / Existence of wade and elevation difference for experience of different spatial quality/ using aquarium in passing spaces

Discussion and conclusion

The population studied includes 767 persons, which by using Cochran formula the sample size was obtained 257 persons. The results from statistical analyzing on the collected questionnaires are presented at below. According to descriptive statistics, gender distribution of respondents indicated that respondents were gifted adolescent boys in two level of guidance and high schools. In this research, given to discovering the environmental factors effecting on designing educational space for talented students by theoretical literature, the factors of the place of school buildings, the exterior cladding (mass), the spaces in between, routing (Commute routes to school), social spaces, the comfortability of the school, the existence of outdoor learning space, the existence of outdoor learning environment (classrooms) and

the health and security level are known as environmental factors.

Pearson correlation coefficient was used to identify architectural factors effecting on creativity promotion of gifted adolescents.

From the point of motivation, as one of the creativity elements, two factors of mental and creative driving in confined spaces including making diversity in the physical environment (changing materials, color and light) and Indoor and outdoor connection (extending the learning space from closed to semi-open), using skylights / Putting materials on the floor and roof / Diverse and harmonious use of colors / using colored glasses/ using overall windows / using overall windows/ Natural light control/ using plants in the indoor space and providing a landscape by using educational terrace / using clear vision for blurring boundaries of inside to outside and vice versa / Creating a visual frame from inside to outside / Existence of wade and elevation difference for experience of different spatial quality/ using aquarium in passing spaces are presented as designing rules (sig.= 0.000).

From the point of innovation as one of the creativity elements, Diversity in form (using dynamic forms) as one of the mental and creative driving factors in confined spaces, using diverse

roofs and various floorings/ an extended and soft form for connection path/ change in body shape to the curve form/ the linkage of floor and roof/ The sequence of spaces in motion and pause / fluidity and space communication without borders is presented as designing rules (Sig=0.000).

From the point of Functional flexibility (the possibility of using one space in various times), for curiosity as one of the creativity elements, the ability to integrate two or more users together (installing inventions and creative works by students in the hallway or on the bridge) / hallways using as the learning street / providing diverse spaces by using moving walls / providing spaces without walls/ Spatial arrangement by student/ using educational furniture with portability are presented as designing rules (sig=0.000).

Architectural environments whether in open spaces or confined spaces, can cause to mental driving, which will lead to the creativity in gifted students (Faryad, 2012; Maleki, 2012; Moqtaderi, 2013). Undoubtedly, any research encounter to a series of problems and limitations that effect on the research process and results willingly or unwillingly. This study, like other research works, faced with numerous difficulties and restrictions that will be recognized in future researches. This limitations and difficulties includes lack of a good grasp to the question especially to the special terms, lack of enough time to complete the questionnaire and so on. It can be suggested to conduct this study on the girl talented student's school in future in order to improve this research. Other factors effecting on the creativity will be evaluated in future research.

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