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Construction and Validation of Questionnaire about Designing Free Architecture Institute with the Approach of Environmental Effect on Creativity Improvement in Architecture Students (A Case Study of Mazandaran University Students)

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ABSTRACT

With the aim of constructing and validating questionnaire about designing free architecture institute with the approach of the effect of environmental effect on creativity improvement in architecture learners, the present project was performed based on polling the opinion of some architecture students in some universities of Mazandaran Province. Using cluster sampling method, 210 architecture students were selected and questionnaires were distributed among them. The applied questionnaire was analyzed using SPSS software. The applied methods included items analysis, content validity, construct validity (factor analysis), and Cronbach's alpha (to measure reliability of whole the questionnaire and factors). As the result of factor analysis, 8 factors were identified including natural stimuli, participation and teamwork, flexibility of operations, sorting, increased curiosity, increased imagination, increased motivation, and increased initiative. Using Cronbach's alpha, reliability of the questionnaire was computed 0.926. According to the obtained results, it can be stated that the questionnaire is both valid and reliable and the obtained factor analysis can appropriately measure the environmental effect on creativity improvement in the architecture students in the educational space of architecture. In other words, through gathering architecture students' opinions in designing pattern with the introduced factors, the questionnaire can measure the extent of the factors' effect and a pattern to design an educational space of architecture to improve creativity.

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INTRODUCTION

Creativity is an obvious distinction between human and animal. Granting the knowledge to human, God gave them the ability of reproduction and having divine attributes. In fact, one of the manifestations of the similarity between human and God is the power of initiative, imagination and creativity. All achievements obtained by human owe to the efforts of scholars and their creative mind. Accordingly, a country which is able to train creative individuals can outperform in social, economic, scientific, technical, and cultural areas. Creativity is considered as the basic factor of communities' development and advancement. Since creativity is an acquirable and teachable fact, the necessary facilities and equipments can be created to train creative individuals and from this aspect, schools are appropriate places to train students' creativity (Cheragh Cheshm 2007). Educational space is an environment for the next generation's learning. If learning environment encourages learning, the next generation will be creative human. A long time ago, creativity related issues have been discussed and students' creativity bloom has been considered as one of the basic objectives of education. However, in spite of such a background, few studies have been conducted on foundation and planning to train students' creativity so far while there has been and there is a sever need of creative and initiative generation. Under the current conditions and with respect to the rapid changes of the world and inevitable need of adjustment with sciences' advancement and changes, fundamental and applied researches regarding creativity and its improvement and parallel to such a fact, systematic and purposeful education to practically use these findings is of the highest importance in Iranian education (Fazeli, 2008).

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Therefore, investigating environmental factors' effect on creativity improvement in educational space of architecture as well as opinion polling and reviewing previous studies conducted by experts of creative education in architecture and psychology, the present research tends to present some designing components. Also, extracting the components and polling the students' opinions related to designing pattern, the present work attempts to design a conceptual model to present designing patterns in the form of the environmental effect on the students' creativity improvement in the educational space of architecture.

Associated Scopes:

The present study is associated to three scopes of architecture (educational spaces), architecture students and creativity. It is better to discuss each of the mentioned scopes through its own specific method:

Architecture:

Architecture can be regarded as a super system encompassing spatial, functional and structural systems (Noghre Kar, 2005). By spatial system, it is referred to all the factors related to architectural shape, physic and appearance. Functional system emphasizes the function and method of architectural spaces use. Structural system includes the issues related to architectural structure. In the present study, due to economic limitations, structure designing obligation and the necessity of its strengthening, structural system can be less manipulated. However, spatial and functional systems can be relatively changed. If all human related issues are considered under the name f human system, the scopes of architecture students and creativity would be investigated in this system:

Creativity:

In the following, there are some definitions about creativity:

According to Britannica encyclopedia, "creativity is an ability to create new things such as a new solution for a problem, a new method or a means, a form or an art work ".

According to Torrace, "creativity is a mental process which includes new concepts or theories".

According to Omar Faruq, "creativity is unique and better response to solve a problem".

Although there are various and sometimes contrast definitions regarding creativity, there is a general consensus regarding one issue: creativity is the ability of generating new and innovative idea, theories, sights, or phenomena and reconstructing sciences and other area and it is scientifically, aesthetically, technologically, and socially regarded valuable.

Creativity is considered as a core term to explain creative designing and education in all designing scopes. Recognizing and defining the term of creativity can lead to a better understanding and achieve a more successful trend in architectural designing process. Creativity has been taken from the verb of create (Dehkhoda, vol. 21, 1968: 677). Creativity is a mental process compounding of initiative power and flexibility aiming at generating a valuable, applied and innovative product. In the mind a creative architecture, this process has necessarily two pre-requisites including conception and imagination (Antonidas, Poetics of Architecture, p. 30). Creativity is a wide scope which cannot be comprehensively recognized. According to many psychologists and theorists, creativity cannot be measured or evaluated and only students' works can be evaluated which is the result of creativity process. Some believe that in spite of its complexity, creativity can be divided into the following four qualities to evaluate:

- Creative person: includes all factors related to the personality traits of a creative person;
- Creativity process: includes different stages, from perception to creation an art work;
- Creative product: is the quality of a work obtained as a result of creativity process.
- Environment: includes all environmental factors which positive influence creativity process.

Theory of Environmental Perspectives on Creativity:

Scholars have studied creativity from various perspectives including cognitive perspective, personality perspectives, environmental perspectives, production-based perspectives, social relations-based perspectives, and individual pattern-based perspectives.

The focus of the present study is on environmental perspectives. This class of theories emphasizes on the effect of environment on creativity. According to this theory, creativity is the result of a social need arousing individuals to create unique and innovative responses. Brin (1953) defined creativity as the process of manipulating the environment. According to her definition, the environment provides an appropriate context to create new ideas, patterns and relations.

Methods Of Evaluating Questionnaire:

To evaluate the questionnaire, three methods have been used including items analysis, reliability and validation.

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Statistical Population and Sampling Method:

In this study, the statistical population included 210 architecture students of some universities in Mazandaran Province (Amol, Babolsar and Ramsar cities). Due to specific features of architecture discipline and its learners, previously done studies in this area and related scholars' views were firstly studied. Due to lack of standard questionnaire relating to the considered subject, data was obtained from a researcher-made questionnaire and its reliability and validity were evaluated through SPSS software. Using factor analysis, then, effective factors in the study were determined. The obtained data were analyzed through descriptive-statistical analysis method; the effective factors were extracted through factor analysis method and based on the analyses, a linear model was presented. Therefore, using AMOS software, the direct and indirect relations between the variables were obtained and the model was modified. To ensure the accuracy of the model, fitness tests were performed. Finally, the results obtained from the study based on the model, the effect of architectural ideas to design the space of free institute of architecture were investigated to improve motivation, initiative, curiosity, imagination, and finally, learners' creativity and designing idea were extracted.

To randomly select the analysis unit, some Islamic Azad Universities, non-profit making institutes and State University of Mazandaran which had architecture discipline were used. Random cluster sampling method was used to select the statistical sample such that a 120-people sample of architecture students was firstly selected and the questionnaire was distributed among them. Then, the main plan containing 64 items was implemented in the frame of a 120-people sample of architecture students and the questionnaire was distributed among them. Totally, 210 questionnaires were collected. The collected questionnaires were analyzed using the principal component analysis method and Varimax rotation through SPSS software. The criterion of KMO was computed 0.835, indicating the efficiency of sampling.

Sample Size:

With respect to the number of the observed variables (14), in this study, the minimum sample size should be 15× 14 = 210. Accordingly, the present work used a 210-peoplr sample to minimize the error of the model estimation.

Research Instrument:

In the present paper, a questionnaire about designing free architecture institute with the approach of the effect of environmental effect on creativity improvement in architecture learners. The applied questionnaire included 64 Likert scale-based items (in the form of 5 alternatives ranging from very low to very high). Items of each questionnaire are of high importance. Items should be legible, valid and reliable. By validity, it means that to what extent the items measure the research subject. By reliability, it is referred to the consistency of the items; that is, if the test is repeated, the obtained results of two stages should be similar (Gall *et al*., 2003). To this end, content-objective table is used. To regulate such a table, in this study, the effective factors or the features related to each of human and architecture systems were placed at the main column and row of the table (see Table 1). In the table cells, in the intersection of each column and row, at least one question was designed which asked about the considered content and evaluated the objectives. During designing the questions, to confirm the content validity, content-objective table was used. Table 1 shows the relation of each question with various objectives and factors.

Table 1: Content-Objective Table (Resource: the Researcher).

Objective / Content	Increased Initiative	Increased Curiosity	Increased Motivation	Increased imagination
Sorting variability	2 and 1	4 and 3	5	6
Operations' flexibility and separation through partitioning	8 and7	11 and 10 and 9	13 and 12	14
Intimate and cozy space	15	16	17	18
Collective space	21 and 20 and 19	23 and 22	27,26, 25 and 24	28
Pause space in corridors to display works	29	30	31	32
Color variation	34 and 33	35	36	37
Materials variability	39 and 38	40	41	42
Light control and variability	44 and 43	47, 26 and 25	52,51,50,49 and 48	53
Natural elements such as water and plants	54	56 and 55	58 and 57	60 and 59
Plants variation in internal space	61	62	63	64

Table 1 has been shown with the title of statistical reliability 1, Cronbach's alpha 2 and the number of items. As shown in table 2, the computed value of Cronbach's alpha of the whole pretest questionnaire is 0.926, indicating a high reliability of the questionnaire. The following table also shows the value of internal correlation between each of the items. At the last column of Table 3, the values of Cronbach's alpha after omitting that item have been shown, indicating that omitting none of the items causes the increase of alpha coefficient. Therefore,

with respect to higher value of alpha coefficient ($\alpha > 0.9$), it can be said that there will be no need to change the questionnaire.

Table 2: Reliability Statistics (Resource: the Researcher).

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.926	.926	64

Findings:

To analyze the items, discrimination index and loop method were used. Discrimination index indicates that whether the item were able to discriminate various individuals; to investigate such a fact, the correlation level between each item and total test score would be computed. To investigate the items using loop method, reliability coefficient of all the items would be computed.

Table 3 presents the internal correlation values of each item. At the last column of the table, alpha coefficient values after omitting the item was shown, indicating that omitting none of the items leads to the increase of alpha coefficient. Therefore, with respect to higher value of alpha coefficient ($\alpha > 0.9$), it can be said that there will be no need to change the questionnaire. Table 3 shows that no item was omitted and all of them are appropriate to be included in computations.

To validate the questionnaire and ensure that whether the questionnaire measures what it should measure or not, content validity and construction validity were used. In content validity, characteristics table was designed based on the related theoretical literature and some questions were designed for the questionnaire. The information was presented in table 1. After analyzing the content and objective of the items, 64 items were obtained. The characteristics was given to 6 architecture experts; the experts were asked to validate the items with the scores 1 to 20. Then, the questionnaire was distributed among 120 students to ensure the comprehensibility of the items. Ultimately, the final questionnaire was distributed among the respondents.

To find out the number of important and significant saturated factors forming the questionnaire, exploratory factor analysis was performed through Varimax rotation and principal components. Factor analysis is of R type since the purpose of the present work is to summarize the variables and achieve the latent dimensions existing in a wide range of the variables (Doas, 1997: 35). For factor analysis, the principal component analysis method since this study attempted to predict and determine the least numbers of factors which are able to explain the most variance existing in the principal values (Field, 2005: 12). The rotation carried out in this project is orthogonally Varimax since the considered purpose is to obtain the factors' results and use them for the next analyses in other researches and the co-linearity problem is also removed. Moreover, orthogonal rotation was used since there was no evidence on the independency of factors from each other. By the way, it has been proved that Varimax method, as an analytical strategy, has outperformed in orthogonal factor rotation compared to the other methods and it also presents more stable results (Hair, 1990: 20).

Firstly, to investigate the adequacy of the sample size for factor analysis, Kaiser - Meyer - Oklin (KMO) measure of sampling adequacy was used. Further, to specify that the correlation between test materials is not zero in the population, Bartlet test was applied. The size of KMO should be greater than 0.6. In the present study, this value equals 0.835, indicating the adequacy of the sampling. Bartelt test is also significant at the level of 0.0001 ($P > 0.0001$). Table 4 present the information related to factor analysis. At exploratory analysis stage, the present research identified 8 factors which are in accordance with the content-objective characteristics' table.

Due to factor loading greater than 1, investigating special values of 14 factors showed to be extractable while investigating the value of a variance created by each factor revealed that if 8 factors were extracted, the first factors to the eighth factor would explain 17.045%, 10.030%, 8.244%, 6.604% 5.312%, 4.917%, and 4.934%, respectively (see Table 4). Since other factors had no significant effect on explaining variance, 8 factors were considered.

After rotating the mentioned 8 factors through Varimax (orthogonal) method, factor loading of the factor 1 to the factor 8 found more even distribution. Total variance explained after rotation showed that the first factor to the eighth factor were effective as much as 16.65%, 10.353%, 8.210%, 7.772%, 6.861%, 5.488%, 5.006%, and 4.566%, respectively (see Table 4). Therefore, the so called factors were considered as the main factors. Then, the items related to each factor were determined and the mentioned factors were interpreted with respect to the common content of the items related to each factor. In other words, conceptual corresponding of each factor with architecture and human variable was specified (Table 4).

Confirmatory Factor Analysis:

The factors obtained from exploratory factor analysis were again analyzed through AMOS software. Confirmatory factor analysis is a method in which the relations between variables are estimated using parameters and hypotheses testing with respect to the number of underlying factors. In this method, researchers determine the amount of data accordance with a factor structure. Thus, in confirmatory factor analysis, the value of research data is measured through a set of hypothetical factors. In the present study, Chi-square, goodness-of-

fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fitness index (CFI), root mean square error of estimation (RMSES), and root mean of residuals (RMR) were investigated.

Table 3: Item-Total Statistics(Resource: the Researcher).

N	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	272.143	234.843	.317	.925
2	272.071	233.347	.502	.924
4	272.286	229.166	.658	.923
5	271.929	239.683	.093	.927
6	272.143	236.715	.218	.926
7	272.357	236.247	.221	.926
8	272.143	229.659	.757	.923
9	272.571	229.783	.556	.924
10	272.214	229.418	.620	.923
11	272.071	248.755	-.345	.931
12	271.786	234.602	.518	.924
13	272.143	229.083	.625	.923
14	272.643	238.551	.085	.928
15	271.929	231.475	.656	.923
16	272.429	237.703	.209	.926
17	272.000	231.120	.515	.924
18	272.071	234.931	.398	.925
19	271.929	231.043	.686	.923
20	271.786	242.378	-.097	.927
21	272.071	232.915	.531	.924
22	271.929	229.891	.766	.923
23	271.786	236.618	.356	.925
24	271.929	236.947	.278	.925
25	272.000	231.408	.500	.924
26	272.071	239.971	.069	.927
27	271.643	239.271	.246	.926
28	271.857	239.163	.138	.926
29	271.857	233.115	.576	.924
30	271.929	231.475	.656	.923
31	272.143	224.187	.666	.922
32	272.071	235.219	.379	.925
33	272.071	234.499	.426	.925
34	271.929	233.635	.506	.924
35	272.071	229.315	.772	.923
36	272.429	233.959	.353	.925
37	272.214	232.874	.558	.924
38	272.429	235.255	.364	.925
39	272.143	244.203	-.168	.929
40	272.571	227.623	.668	.923
41	272.429	229.207	.602	.923
42	272.571	234.967	.368	.925
43	272.429	224.311	.736	.922
44	272.571	223.447	.762	.922
45	272.357	226.743	.597	.923
46	272.429	237.703	.209	.926
47	272.143	244.491	-.183	.929
48	272.071	227.299	.608	.923
49	272.214	235.898	.350	.925
50	272.000	242.640	-.102	.928
51	272.286	232.766	.454	.924
52	272.571	234.103	.421	.925
53	272.571	232.087	.546	.924
54	272.214	238.202	.144	.927
55	272.214	231.866	.486	.924
56	272.000	241.056	.000	.927
57	271.929	243.283	-.147	.928
58	272.071	241.987	-.054	.929
59	272.214	224.234	.767	.922
60	272.500	221.292	.728	.922
61	272.571	233.095	.483	.924
62	272.786	232.874	.475	.924
63	272.071	238.099	.191	.926
64	272.429	229.207	.602	.923

Table 4: The Sum of Variances Determined Before Rotation and After Rotation (Resources: the Researcher).

Component	Initial Eigen values			Again Eigen values		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.841	17.045	17.045	7.326	16.650	16.650
2	4.614	10.030	27.074	4.556	10.353	27.003
3	3.792	8.244	35.318	3.612	8.210	35.213
4	3.533	7.681	42.999	3.420	7.772	42.985
5	3.038	6.604	49.603	3.019	6.861	49.847
6	2.443	5.312	54.915	2.415	5.488	55.335
7	2.262	4.917	59.832	2.203	5.006	60.341
8	2.021	4.394	64.226	2.009	4.566	64.907
9	1.765	3.837	68.063	1.706	3.878	68.785
10	1.535	3.336	71.399	1.528	3.474	72.259
11	1.428	3.104	74.503	1.396	3.172	75.430
12	1.273	2.768	77.271	1.262	2.868	78.298
13	1.244	2.705	79.976	1.085	2.466	80.764
14	1.016	2.209	82.185	.980	2.227	82.990

Considering the fact that exploratory factor analysis was performed on the data obtained from the questionnaire about designing free architecture institute with the approach of the effect of environmental effect on creativity improvement in architecture learners and the environmental factors influencing improving architecture students' creativity were determined, the proposed model was evaluated using factor analysis method.

Evaluating of Fit:

A model is fitted to the observed data when implicit covariance matrix has been equaled to the observed data's covariance matrix; that is, when the matrix value is close to zero (Hoyle, 1995). The next steps in this stage are as follow:

Investigating total criterion of the model fit and testability of the model as well as evaluating the subject regarding the necessity of modification.

When a model is estimated, software program publish a series of statistics such as standard error, T-value and etc. regarding evaluating the model fitness with the data. If the model can be tested but the data are not appropriately fitted, a valid instrument to evaluate the expected changes in the model expression called modification index is applied to fit the model with the data. The most important fitness indices of the model are as follow:

The ratio of Chi-square to degree of freedom (X^2/df): in Chi-square test, the coordination hypothesis of the considered model is investigated through the pattern of covariance between the observed variables. The values less than 3 indicate more fitness (Gills, 2002: 87). The magnitude of Chi-square is highly depends on the sample size and large sample increased this magnitude more than which can be attributed to the model's inaccuracy (Ghazi Tabatabaei, 2002).

GFI and AGFI indices: these indices show the extent of a relative value of variances and covariances explained by the model. Both criteria vary between 0-1; the value which is closer to 1 will have more goodness-of-fit of the model with the observed data.

CFI: this index compares testing model with the model under null hypothesis in which no path connecting variables is defined and variables are independently considered. It seems that CFI is completely stable particularly with small size sample. Its value is placed at the range of (0,1) and the values less than 0.9 are not acceptable.

Normed fit index (NFI) and non-normed fit index (NNFI): NFI is not currently suggested due to it is influenced by the sample size and has a weak performance for small size sample (Hooman, 2001). The values more than 0.9 or above have been suggested as a good index for the fitness of theoretical models while some researchers use cut off point of 0.8. NNFI has a more accordance with the sample size and the values less than 0.9 involves reconsideration in the model.

RMR: in this index, the residuals of the observed variances and covariances are compared with the model estimations. The smaller values indicate better fitness (Hooman, 2001). The models in with the values less than 0.05 have a high fitness but the values between 0.05-0.08 are appropriate for a good model (Gills, 2002: 87).

RMSEA: this index is 0.08 and less for good models and the model in which the value of this index is 0.10 or more has a weak fitness.

To investigate the significance of path coefficients, t index has been shown in the above diagram. The critical value is also 1.96 at the confidence level of 95%. If the coefficients are greater than 1.96, the path is significant. The indices of fitness of the model indicating the appropriateness of measuring model, investigates the concept of each factors' impact since the ratio of X^2 to degree of freedom is less than 4, RMSEA is less than 0.08 and NNFI and AGFI are more than 0.9. in other words, the model and overall framework of increased

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initiative of each effective factor is significant and acceptable. Therefore, fitness model is highly good and acceptable in the present study.

Table 5: Fitness Indices of the Measuring Model (Resource: the Researcher).

Index	Chi-squared/df	RMSEA	NNFI	AGFI
Acceptance criterion	Less than 4	Less than 0.08	More than 0.9	More than 0.9
The value in the model	1.12	0.068	0.96	0.94

Introducing Factors:

As the result of factor analysis, 8 factors were identified including natural stimuli, participation and teamwork, flexibility of operations, sorting, increased curiosity, increased imagination, increased motivation, and increased initiative.

Entire the questionnaire measures the effect of architecture systems such as natural stimuli, flexibility of operations and sorting on human systems (the factors which are human traits) including participation and teamwork, increased curiosity, increased imagination, increased motivation, and increased initiative. The reliability of the questionnaire was evaluated using Cronbach's alpha. Table 6 shows reliability coefficients of the factors and the coefficients of the entire the questionnaire.

Table 6: Reliability of the Factors and Items Related to Each Factor (Resource: the Researcher).

Reliability Statistics	
Name	Cronbach's Alpha
Natural stimuli	0.851
Participation and team work	0.846
Flexibility of operations	0.836
Sorting	0.760
Increased curiosity	0.746
Increased imagination	0.734
Increased motivation	0.813
Increased initiative	0.842

Discussion And Conclusion:

The present study was an attempt to construct and validate the questionnaire about designing free architecture institute with the approach of the effect of environmental effect on creativity improvement in architecture learners to be used in Iran. The provided questionnaire included 64 items which could be implemented individually or in group. To respond the items, 15 to 25 minutes was allocated. Various methods were used to evaluate the questionnaire's validity and reliability. All the items were firstly analyzed and discrimination coefficient and loop method was determined for each item. In this stage, with respect to the computations, there was no need to omit any item and all the items were discerned to be appropriate. To evaluate validity, content validity and construct validity were used. Considering the results of factor analysis, 14 factors were identified and after analyzing them, 8 main factors were extracted out the 14 factors. Then, the items related to each factor were determined and the mentioned factors were interpreted with respect to the common content of the items related to each factor. In other words, the conceptual corresponding of each statistical factor was specified through architecture system's variables of natural stimuli, flexibility of operations, participation and team work, and sorting.

As it was found in the study:

Factor 1 including stimulation of natural elements such as water, light, plant, and so forth: this factor is related to the items measuring the relation of making use of natural elements with human systems (human traits) and according to opinion polling by the questionnaire, this factors has a positive effect on human traits, leading to improving creativity. For example, natural and appropriate light in educational space increase the motivation of learners to attend in the space and it is considered as a natural stimulus. Or green space in educational space enhances learners' motivation to learn and it is also regarded a natural factor.

Factor 2 including participation and team work: this factor is related with the items measuring the amount of participation and team work for more cooperation between architecture students (in the form of group work) in some spaces such as common ateliers, intimate and cozy spaces, cooperation in study, model making, and designing) and according to opinion polling by the questionnaire, this factors has a positive effect on human traits, leading to improving creativity. For example, common ateliers cause to improve effective interaction between junior and senior students, contributing architecture learners to obtain idea from others works and encourage and criticize each other's works.

Factor 3 including flexibility of operations: by flexibility of operations, it means that a space can be used appropriate with educational programs with partial changes for different purposes. According to opinion polling

by the questionnaire, this factor has a positive effect on human traits, leading to improving creativity. For example, a big space can be considered as free atelier and if necessary, this space can be divided into small parts through partitions, removable shelves and light walls such that in each space, separate performances such as reading, designing, mapping, and model making can be predicted. In fact, a space is used for different purposes and performance at different times; it has necessary flexibility and increases motivation and curiosity; it also promotes learners' creativity by creating cozy and interactive spaces for learners' communication with each other.

Factor 4 including sorting: this factor is related with the items measuring the way of sorting and changing furniture of the used space. For example, in class and designing ateliers, learners' purposeful participation is increased with respect to the way of sorting furniture and internal design of educational space, leading to the increase of motivation and initiative.

Factor 5 including increased curiosity: it is related to the factors measuring architecture students; curiosity in different conditions.

Factor 6 including increased imagination: this factors is related to the items that measure providing the possibility of daydreaming for architecture learners in different conditions.

Factor 7 including increased motivation: this factor is related to the items causing the increase of architecture students' motivation in different conditions.

Factor 8 including increased initiative: it is related to the items increasing architecture students' initiative in different conditions.

Finally, as a response to the research question asking whether the applied questionnaire has the necessary validity in Iran or not, it should be said that the questionnaire is appropriately valid for the studied population. This validity was computed using factor analysis and construct validity methods.

Also, as a response to the research question asking whether the applied questionnaire has the necessary reliability in Iran or not, it should be said that according to the statistical findings, the scale of environmental effect on architecture learners' creativity has an acceptable degree of reliability ($\alpha = 0.926$) in the statistical population.

Totally, it can be concluded that the validity and reliability of this questionnaire is evaluated a good level and the factors obtained form factor analysis can appropriately measure the place of environmental effect on architecture students' creativity I educational spaces of architecture. In other words, designing pattern to design and construct educational spaces of architecture discipline can be considered and used by polling architecture students' opinions and the introduced factors.

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