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Measuring and evaluating factors affecting the nurturing and emergence of creativity in architecture, in the view of Architects & Design Professionals

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ABSTRACT

Creativity, as one of the aspects affecting the quality of design, is significantly integrated with design knowledge in the world of design and architecture. Undoubtedly, nurturing creative novices is one of the most important goals of architecture education. According to the results of the relevant studies, some prominent creative people in architecture have rarely mentioned the role of educational environment and professors as effective factors in nurturing and developing their abilities and creativity. The present study was conducted with the aim of examining and recognizing the factors affecting development of abilities and the emergence of creativity in the field of architecture, which finally due to the prevailing attitude towards the research issue the creativity of architecture professors will be measured and evaluated. Method The present study is considered as fundamental research in terms of purpose, and in terms of data collection method, it is descriptive-correlational research. The statistical population of this study includes professors teaching architecture at the level of Azad universities. The research sampling method was one-stage cluster random sampling. In this way, professors with the status of tuition fees in Tehran were randomly selected. The research tool was the standard Torrance Creativity Test. Data were analyzed using SPSS 21 software and t-test, Pearson correlation coefficient, Levin, analysis of variance. According to the results, out of a total of 100 people in the sample population, 50 professors were evaluated as very highly creative professors, 38 as highly creative professors, 5 as moderately creative professors and 7 as professors with little creativity. Also, according to the average amount of professors' creativity, 97.33; it can be concluded that the average creativity is significantly larger than the criterion number 85. In other words, it is estimated that the creativity of professors is at a high level. There is also a significant relationship between creativity and demographic variables.

Keywords: *Architecture, Creativity, Creativity in Architecture, Factors Affecting Creativity, Architects & Design Professionals.*

1. Introduction

Nowadays, thinkers and researchers believe that creativity is the basis of human civilization; therefore, the survival and excellence of any society depends on how much attention is paid to the emergence and expansion of this ability. Also, finding talented, creative individuals and cultivating them properly is one of the most important factors for the growth and development of any society [1].

Given that creativity is something that can be learned and taught, it is possible to nurture creative minds by creating the necessary conditions, equipment and facilities; In this regard, the key role of the professor is very important in order to nurture and enhance the creativity of new students; because a professor who has a creative motivation is both a model for being creative and reinforces the creativity-related process.

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However, the fundamental question is, "Do architecture professors have enough creativity as a key factor in fostering the creativity of newcomers to the field?" On the other hand, the quality of the educational environment is considered as a suitable place for educating and nurturing the creativity of architecture students. "Educational environments are one of the most important places where people's creativity can be nurtured, and professors are among the people who can provoke the creativity of learners or, conversely, cause their creativity to be barren by applying inappropriate methods [2]." However, another question is "How educational environments that are built to motivate the maximum use of the minimum space, due to not paying attention to the most obvious requirements, per capita standard educational space, can be a suitable context for creativity?" Torrance believes that human civilization has been indebted to the creative thought of man, and it will be impossible for it to survive without the use of creativity, which is the highest function of the human mind, so in the present situation, creativity is not a necessity, but a condition for survival [3]. In recent years, a lot of research has been done on the development of creativity of children and students in the field of emotional-cognitive and educational issues, but unfortunately the architecture and the role of the educational environment and the professor in fostering creativity has received less attention, whereas, we desperately need a creative and innovative generation this past and present. In the current sensitive situation, and given the rapid changes in the world and the inevitable need to adapt to advances and changes in science, fundamental and applied study and creativity in the field of creativity is what we need most in our education. McLaughlin and Lee believe that the ultimate goal of education is to stimulate learners' potentials to create and generate ideas, concepts, and knowledge. [4] To achieve this, teachers need to provide a set of meaningful learning experiences through which novice creativity can flourish. [5] In this regard, teachers can play an important role by encouraging, identifying and strengthening the creativity of new students [6]. Regarding the issue and why to address this issue, studies in this regard show that some prominent creative people in architecture rarely mention the role of professors and the university (educational environment) as factors affecting the growth and development of their abilities and creativity. This is despite the fact that newcomers spend a lot of time at the university; It is expected that the university under the heading of environmental factors and professor; Play a key role in realizing creativity and fostering it in the future based on educational goals. Therefore, in order to clarify this issue, it is important to examine the discrepancies in the attitudes of some prominent creative people in architecture with what is expected based on educational goals. The purpose of this study is to investigate and identify the factors affecting the development of abilities and the emergence of creativity in the field of architecture and on the other hand to examine the relationship between components, factors and barriers to creativity. Also, in this study, one of the effective factors in fostering creativity in the university has been selected and among the influential factors in the university, the key role of the professor in fostering creativity has been emphasized. In this regard, the study of creativity and its four dimensions in professors as the main goal based on Torrance theory and its analysis in relation to demographic variables were assessed and evaluated. The most important research questions are:

1- What are the components and factors affecting the cultivation of creativity in architecture students?

2- Are the professors of architecture, as one of the key factors in fostering the creativity of architecture students, sufficiently creative?

3- What effect do each of the demographic variables have on the creativity of professors?

4- What is the role of the university in fostering the creativity of new students?

2. Research background

Esbern proposed the first methods for developing creativity in 1948, resulting in an emphasis on teamwork and the brainstorming method. [7] Efforts were then made to institutionalize models for developing creativity during the 1960s. And 1970, which at the end of the second millennium led to the Nikersen Twelve Process based on the abilities, experiences, and knowledge of individuals. [8] Previous research is discussed in two parts, according to the purpose. Studies are reviewed that emphasize the role of the teacher on creativity [9]. There are few studies that emphasize the role of the environment on creativity, although this issue is very important. Believing that the environment has a more prominent role than creative factors in creativity, and it is much easier to change the environmental factors than individual characteristics and talents [10]. Most research has examined the problem in a limited way, and has mainly focused on examining one or more specific environmental factors to enhance the dimensions or creativity of a certain segment of environmental users. In general, it can be concluded that the environment is one of the factors that facilitates or inhibits creativity.

Table 1. Summary of previous research findings.

No	Source	research findings
1	Cenberci (2018)	Investigating the tendency to creative thinking in professors and the importance of providing a suitable environment for the development of creative thinking levels of professors, the need to modify teaching methods and emphasize the tendency of creative thinking [11].
2	Sawyer (2017)	Providing environmental characteristics to promote the creativity of learners Flexible training = independence of action - search and exploration - teacher as an artist in the classroom - flexibility of ultimate goals [12].

3	Goss, Sonnemann, and Griffiths (2017)	Determining the role of creative teachers in providing a suitable space and context by explaining the appropriate educational strategies of creative teachers [13].
4	Chee, Yahaya, Ibrahim, and Hasan, (2016)	Emphasis on the role of creative teachers and its impact on fostering creativity [14].
5	Azemati, Karimi Azari and Aghaghi Kallaki(2016)	Principles of effective design in increasing creativity in educational spaces with reference to the relationship of physical factors in stimulating creative factors [15].
6	Lapeniene and Dumciene, (2014)	Analyzing the concept of creativity and examining the creativity of 261 Lithuanian teachers and determining the factors affecting it, including internal motivation, creative self-efficacy, supportive social context [16].
7	Chan and Yuen(2014)	Examining the views of Hong Kong professors on the level of creativity, by determining the motivating and deterrent factors, including: individual personality, motivation, attitude and purposefulness, and environmental factors, including the environment and others [17].
8	Torabi and Islami(2013)	Expression of extraction and transfer strategy in creative education in order to reduce the difference of the level between the level of professor and architecture novice in learning [18].
9	Bisadi and Hosseini (2013)	Emphasis on spatial traits effective in enhancing creativity such as solitude, beauty, spatial diversity, flexibility , all neighborhood , visibility and ... [19].
10	Jebeliadeh and Sobhani, (2012)	Evaluating the application of creative teaching methods on the creativity of new students and its impact on the growth and development of creativity [20].
11	Jabbari, and Mirzaei (2011)	Designing suitable spaces to foster creativity by using environmental graphics and aesthetic [21].
12	Beghetto and Kaufman (2010)	Investigating the role of the environment in promoting creativity [22].
13	Shafaei and Madani (2009)	Investigating environmental capabilities affecting the mind and behavior to promote creativity[23].
14	Agha Latifi (2009)	The role of the environment in fostering creativity and presenting spatial and physical ideas affecting it [24].

Nowadays, subjects such as creativity in teaching and creative teachers from different dimensions have been considered by researchers. Some of the most relevant of them are mentioned in the present study. In assessing the tendency to creative thinking among professors, the importance of providing a suitable environment for the development of thinking levels, and even the need to reform teachers' teaching methods and emphasize the tendency of creative thinking of professional learners, and familiarize future professors with the importance of creative thinking. To acquire skills in creative thinking, he points out the centrality of the curriculum and the development of their thinking.

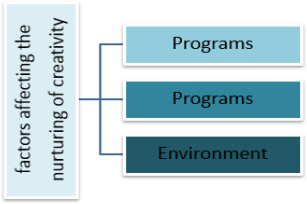

Figure 1. factors affecting the nurturing of creativity.

3. Fundamentals and theoretical framework of research

3.1. The meaning and concept of creativity

There are many definitions for the concept of creativity, as more than one hundred definitions of creativity can be found in the literature of various disciplines [25]. Some researcher believes that that is a definition of creativity in terms of the number of writers and experts on creativity. [26] And in fact, there is no comprehensive definition or perspective on it. [27] Creativity refers to the process of creating new ideas and innovation in applying them successfully [28]. The multiplicity of definitions and perspectives also manifests itself even when the problem is limited to creativity in the design process. As Jones et al. The system as creativity [29]. Nevertheless, when thinkers define creativity in design, the importance of imagination seems to be particularly emphasized and imagination matters along with creativity and sometimes all its foundations. Mehdi Khakzand examines the design methods and supervision of great designers and concludes that mental image is one of the most important needs of creative design in architecture [30], which is created by receiving a set of information from the visual experience of the standard environment responding to the needs and the correct creative training seen by the creative person (teacher) in order to use the experience in the future to generate creative ideas in design.

3.2. Creativity education

There is a significant difference between the nature of creativity and knowledge, and creativity is not learnable, the nature of creativity and talent are the same, that is, creativity must be discovered and nurtured. The main task of the teacher in creative education is not to prepare and impart knowledge to the student, but his task is to provide the context for the acquisition and understanding of knowledge and wisdom by the student himself. Pre-university education is a one-way process of transferring

knowledge from teacher to learner, while the purpose of architecture education is to train architects. In this training, in addition to acquiring knowledge and skills and relying on them, the student should be able to create an artistic and architectural product. Obviously, the abundance of possessions and skills does not necessarily lead to the creation of the work. Education is obliged to awaken and strengthen the creative power in the student through special solutions. Strategies to stimulate creativity in the student are not predetermined and specific strategies, and as mentioned, should be designed and applied by recognizing the talents and characteristics of each student. [31] Creativity education in architecture has come to the conclusion that the learning environment is one of the most important factors in promoting creativity, and to achieve this goal, the environment needs to mainly support and encourage creative thinking and action. [22] Obviously, it is not possible to create creativity through pressure, but it must provide the ground for its emergence. Just as the farmer can't pull the bud out of the seed, but can provide the right conditions for seed growth. The same is true of creativity. It should provide a favorable environment for the growth and development of creativity of children and students. In my experience in psychology, it increased the likelihood of constructive creativity by providing psychological security and freedom. [32] Also, the learning environment should encourage students to use their knowledge creatively and independently naturally with emotional and social support. Obviously, it is not easy to create an environment that fosters creativity, and is realized when it needs to be constantly reshaped and controlled. Many thinkers emphasize creating an environment that is receptive to creativity and socially endorsed with the goal of fostering creativity. Training requires two types of space:

1. Physical space as an educational building
2. Non-physical space as a space in which the set of relationships between physical components is created in which education takes place. [33]

3.3. The role of the teacher in fostering creativity

Creative professors are those who have both creative personality traits and mastery of creative thinking processes, which they use to design educational strategies to enhance learning and motivate learners. [34] They are people who have moved beyond boundaries. Determined and highly risky, creative educators emphasize the potential psychological relationship between imagination and personal and professional experience both in the planning process and in their teaching, and place great value on curiosity and the development of imaginative ideas in themselves and their students [35].The professor should not teach the student knowledge in teaching creativity, but should provide the context that enables the student to acquire and understand knowledge and wisdom. In this type of training, the programs should be designed in such a way that the student is forced to experience and discover new points in various fields. The important point is that there are not always suitable conditions for understanding and observation for the student. The conditions of intuition and creation are provided for each student only in certain circumstances and in the face of certain stimuli. Creative education must be opportunistic. Every moment of the student's presence can lead to the acquisition of great knowledge and the creation of a valuable work. In general, the main task of the professor is to discover and apply the field of students' creativity, but it should be noted that this requires that the student's mind is not driven to a single direction, and pre-arranged programs that are actually based on convergent thinking should be replaced by open and diverse programs which are based on fostering divergent thinking. "Nowadays, there is a wide range of activities in the fields of skill, creativity, knowledge, knowledge and wisdom under the general heading of architecture education in architectural schools. Which leads to misconceptions and adverse reactions. "[31]

3.4. The role of the environment in fostering creativity

Architecture is one of the arts that surrounds us and human beings are influenced by it more than they affect the space. [33] One of the most important behavioral areas of the human mind is arisen in the face of the environment. There is a two-way relationship between man and the environment that is established through perception, and this perception is not a purely biological process and is different between individuals. Therefore, in this regard, special attention should be paid to the issue of motivation and its relationship with the concept of need. Man has various material, psychological and spiritual motivations that are considered as guiding and organizing forces in the perception of cognition and purposeful human behavior. Given that a person's behaviors occur to satisfy their needs, it is believed that the specific characteristics of an environment that is uniquely understood by the user, motivate the occurrence of behaviors to meet his needs and the degree of creativity in these behaviors highly depends on the mentioned

environmental characteristics [36]. It is necessary to focus on the concept of environmental capability in explaining it that categories such as meaning, beauty and user-friendliness are formed by potential and variable capabilities and these capabilities become actual, and this meaning is necessary for behavior and determines the level of creativity. [37] Therefore, educational environments will be one of the effective factors in the growth and development of creativity of newcomers in the field of education as well. Undoubtedly, creating spaces related to the activities of new students is necessary to modify the body of education in order to foster creativity properly. Spaces that have suitable conditions for the growth and development of creativity, which can be achieved by designing the details of the spaces according to the behavioral patterns. Social psychologists with an emphasis on creative situations explain social environments and conditions that have different effects unlike individuals. According to Hennessy, Craft and Amabil, creativity always emerges in a suitable context. They believe that understanding the importance of the suitable environment leads to creativity. "The most important reason why some people prefer the environmental approach to the individual creativity approach is that changing the environment is much easier than changing one's personality". According to Mihaly Csikszentmihaly, creativity is never the result of one's actions alone. For this reason, we can't focus on individuals and their creative work apart from the society in which they operate. [1] Therefore, it is necessary to pay attention to the wants and needs of new students and create a platform for their creativity in the architecture of the educational environment. Because attention to needs is one of the effective parameters on the factors that lead to creativity. Every architecture student spends significant hours at the university as an educational environment during their studies. Therefore, the environment must always provide the contexts for the emergence of creativity in order to nurture creativity as an effective factor.

4. Research method and data collection tools

The method used in the present study is fundamental in terms of purpose, and in terms of data collection method is descriptive-correlational. The statistical population of the present study includes professors teaching architecture at the level of free universities in the first half of the academic year 1401-1400. One-step cluster random method was used for sampling. In this way, contractual professors in Tehran were randomly selected. Testing tool - The TTCT (Torrance Tests of Creative Thinking) is one of the most practical tools for measuring creativity. 4 activities is the main axes of measuring creativity in the Torrance test, including:

Table 2. 4 main axes of measuring Torrance creativity

No	Dimension	Definition
1	Initiative	the ability to generate innovative, unusual, and new ideas
2	Flexibility	the ability to generate various ideas or methods
3	Expansion	the ability to pay attention to detail
4	Fluidity	the ability to generate a lot of ideas

Torrance Creativity is scored with the help of these 4 activities and using the test booklet. The Torrance Creativity Questionnaire consists of a total of 60 items. Items 1 to 15 measure the fluidity dimension, 16 to 30 the flexibility dimension, 31 to 45 the initiative dimension, and 46 to 60 the expansion dimension. This questionnaire has three options, and the respondent receives a score between zero and 2 per question, and a score of zero is given for unanswered questions. Thus, the maximum score in each dimension will be 30 and in total 120, which by definition, a score of 100 and above is equivalent to very high level of creativity, a score of 100-85 is equivalent to high level of creativity, a score of 85-75 is equivalent to moderate level of creativity, a score of 75-50 indicates low level of creativity and a score below 50 indicate very low level of creativity. The face and content validity of the Torrance Creativity Questionnaire was confirmed by experts and its reliability was calculated by Cronbach's alpha method. Cronbach's alpha's default is that the factor load all observed variables is the same for the hidden variable. In other words, Cronbach's alpha examines the reliability of observed variables based on the internal correlation of them. The minimum acceptable value for confirmation of reliability is 0.7. The table below shows the results of calculating Cronbach's alpha coefficients. According to the calculated values, it can be concluded that all research variables are very desirable in terms of reliability.

Table 3. Reliability of indicators

Component	Number of questions	Cronbach's alpha
Initiative dimension	15	0.97
Flexibility dimension	15	0.97
Expansion dimension	15	0.84
Fluidity dimension	15	0.75
The whole questionnaire	60	0.89

Participants were allowed to decide at any time to leave the study and also to choose the time required and the appropriate place to complete the questionnaire. Thus, the creativity variable was described both as an interval quantitative and as rating with statistics of mean, standard error of mean and maximum and minimum score in 4 each dimension and total creativity and finally analyzed using SPSS 21 appropriate to variables.

5. Results

According to the results, from a total of 100 samples, 50 professors (50%) were evaluated with a very high level of creativity, 38 (38%) professors with high level of creative and 7 professors (5%).with moderate level of creativity and 7 professors (10%) with low level of creativity.

Table 4. Evaluation of the creativity of professors

Number of professors	%	Very high	High	moderate	Low	Very low
50	50	✓				
38	38		✓			
5	5			✓		
7	7				✓	
100	100					

Also, the level of creativity of none of the professors of architecture was in the very low range (less than 50).

5.1. Investigating the relationship between creativity scores and its dimensions

Pearson correlation was used to examine the relationship between variables due to the normality of the research variables.

Table 5. Pearson correlation test.

		Fluidity	Flexibility	Expansion	Initiative
Creativity	Pearson	0.77	0.76	0.47	0.32
	Significance level	0.0001	0.0001	0.0001	0.0001
	Number	100	100	100	100

Given that to the significance level of all tests is less than 0.05, it can be said that there is a positive and significant relationship between creativity and its dimensions, and the highest correlation is related to the fluidity (correlation coefficient was equal to 0.77), flexibility (correlation coefficient was equal to 0.76), expansion (correlation coefficient was equal to 0.47) and initiative (correlation coefficient was equal to 0.32), respectively.

5.2. Investigating the creativity level of professors

One Sample t Test is used as a sample to compare the average creativity and its dimensions due to the normality of the distribution of scores to test the above hypothesis, the criterion number of 85 results is presented in the table below.

Table 6. One Sample t Test

	Statistics t	Degrees of freedom	Significance level	The average difference with the number 85	95% confidence interval for mean difference	
					Lower limit	upper limit
Creativity	10.43	99	0.0001	12.33	9.98	14.67

Given that the level of significance obtained from the above test (p = 0.0001) is less than the significance level of 0.005 and also according to the average creativity of professors equal to 97.33, it can be said that the average creativity is significantly greater than the criterion number, 85, in other words, the professors had a high level of creativity. Findings also show that the score of creativity and all four categories of Torrance creativity were directly related to the total score of creativity. In other words, people with low creativity were weak in all four dimensions and people with high creativity were strong in all four categories. In general, the highest score was related to fluidity and the lowest score was related to initiative.

5.3. Results related to the dimensions of creativity

Given that the significance level obtained from the above test for the dimensions of flexibility and expansion was less than 0.05, and that the means were very high at the level and was high for the initiative variable.

Table 7. One Sample t Test

Variable	Statistics t	Degrees of freedom	Significance level	The average difference with the number 21.25	95% confidence interval for mean difference	
					Lower limit	upper limit
Fluidity	11.04	99	0.0001	5.67	4.65	6.68
Flexibility	11.08	99	0.0001	5.68	4.66	6.69
Expansion	2.12	99	0.036	1.07	0.07	2.06
Initiative	-0.19	99	0.84	-0.09	-1.02	0.84

5.4. Determining the difference between creativity and its dimensions based on demographic variables

5.4.1. Gender variable

Table 8. Mean and standard deviation of research variables in both female and male groups.

Variable	Gender	Average	The standard deviation
Fluidity	Male	26.90	5.02
	Female	26.93	5.28
Flexibility	Male	26.92	5.01
	Female	26.93	5.28
Expansion	Male	23.45	4.58
	Female	21.14	5.25
Initiative	Male	21.09	5.26
	Female	21.22	4.13
Creativity	Male	98.37	11.18
	Female	96.24	12.47

Table 9. Independent two-sample t-test to examine the relationship between gender and the main variables of the research

	Levene's test, an inferential statistic used to assess the equality of variances		Independent two-sample t-test					
							95 % confidence interval for mean difference	
Variable	Test statistics	Significance level	Test statistics	Degrees of freedom	Significance level	Mean difference	Lower limit	upper line
Fluidity	0.04	0.82	-0.03	98	0.97	-0.03	-2.08	2.01
Flexibility	0.07	0.79	-0.01	98	0.98	-0.01	-2.06	2.02
Expansion	0.54	0.46	2.34	98	0.02	2.30	0.35	4.26
Initiative	4.57	0.03	-0.13	94.37	0.89	-0.12	-2.01	1.75
Creativity	0.04	0.83	0.89	98	0.37	2.12	-2.56	6.82

According to the above table, for all variables except the expansion dimension because the level of significance obtained is greater than 0.05, so it can be said that there was no significant difference between the mean scores of the two groups of men and women, but for the development dimension.

5.4.2. Age variable

Table 10. The one-way analysis of variance (ANOVA) test to examine the difference in scores of research variables based on age variable.

Variable	Age	sum of squares	Degrees of freedom	average of squares	Statistics F	Significance level
Fluidity	Intera group	415.37	3	138.45	7.96	0.0001
	Inter group	1599.96	92	17.39		
	Total	2015.33	95			
Flexibility	Intera group	421.48	3	140.49	8.16	0.0001
	Inter group	1584.005	92	17.21		
	Total	2005.49	95			
Expansion	Intera group	1153.22	3	384.41	26.17	0.0001
	Inter group	1351.01	92	14.68		
	Total	25094.24	95			
Initiative	Intera group	1251.93	3	417.31	40.38	0.0001
	Inter group	950.72	92	10.33		
	Total	2202.65	95			
Creativity	Intera group	1319.39	3	439.79	4.07	0.0001
	Inter group	9934.84	92	107.98		
	Total	11254.24	95			

According to the above table, because the level of significance obtained is less than 0.05, so it can be said that there was a significant difference between the mean scores of all dimensions in different age groups. This difference can be seen in the diagrams below. As the figures below show, creativity decreased with age, and this decrease was further observed in the initiative variable. Also, a more detailed study of this relationship using the comparison test of means showed that the mean variable of teachers 'age increased significantly with decreasing creativity rank, and in confirmation of what was said, with increasing age, teachers' creativity score decreased. And this decrease in points was more noticeable in the initiative variable.

5.4.3. Education variable

Table 11. The one-way analysis of variance (ANOVA) test to examine the difference in scores of research variables based on education variable.

Variable	education	sum of squares	Degrees of freedom	average of squares	Statistics F	Significance level
Fluidity	Intera group	123.03	2	51.51	2.40	0.096
	Inter group	2484.32	97	25.61		
	Total	2607.36	99			
Flexibility	Intera group	118.63	2	59.31	2.32	0.10
	Inter group	2479.87	97	25.65		
	Total	2598.51	99			
Expansion	Intera group	867.03	2	433.51	25.56	0.0001
	Inter group	1644.72	97	16.95		
	Total	2511.76	99			
Initiative	Intera group	1283.78	2	641.89	67.41	0.0001
	Inter group	923.65	97	9.52		
	Total	2207.44	99			
Creativity	Intera group	3081.88	2	1540.94	13.89	0.0001
	Inter group	10754.22	97	110.86		
	Total	13836.11	99			

According to the above table, since the level of significance obtained for the variables of expansion, initiative and creativity was less than 0.05, so it can be said that there was a significant difference between people with different education degrees. As shown in the figure, the differences between the groups are significant. As can be seen, creativity decreases with increasing education, and the greatest reduction has been observed in the variables of expansion and initiative.

5.4.4. Teaching experience variable

Table 12. One-way analysis of variance test to evaluate the difference between the scores of research variables based on the variable of teaching experience.

Variable	teaching experience	sum of squares	Degrees of freedom	average of squares	Statistics F	Significance level
Fluidity	Intera group	364.80	4	91.20	3.86	0.096
	Inter group	2242.55	95	23.60		
	Total	2607.36	99			
Flexibility	Intera group	362.18	4	90.54	3.84	0.10
	Inter group	2236.32	95	23.54		
	Total	2598.51	99			
Expansion	Intera group	209.15	4	52.29	2.15	0.0001
	Inter group	2302.60	95	24.23		
	Total	2511.76	99			
Initiative	Intera group	1247.91	4	311.97	30.88	0.0001
	Inter group	959.53	95	10.10		
	Total	2207.44	99			
Creativity	Intera group	2129.47	4	532.36	4.22	0.0001
	Inter group	11706.63	95	123.22		
	Total	13836.11	99			

According to the results of the above test, because the level of significance obtained is less than 0.05, so it can be said that there is no significant difference between the average score of all dimensions and creativity. In fact, the results of the relationship between the variable of teaching history and creativity are significant, that is, it can be said that this variable is inversely related to creativity. And this relationship is weak. Also, the age variable intensifies the effect of the teaching history variable. Also, a more detailed study of this relationship using the test of comparing the means showed that the average of the variable of teachers 'teaching experience increased significantly with decreasing creativity rank and in confirmation of what was said, with increasing teaching experience, teachers' creativity score decreased.

6. Discussion

In general, out of 100 people from the sample population, 50 professors (50%) in the reviews, creativity with a very high rate, 38 (38%), high creativity and 7 professors (5%) have Creativity with moderate rate and 7 professors (10%) with low rate of creativity were evaluated. And the level of creativity of none of the professors of architecture was in the very low range (less than 50). Therefore, the research findings confirm the research hypothesis that professors have an acceptable level of creativity. Normality is the most basic premise of multivariate analysis. If this assumption is not met, some specific statistical tests are invalid and unusable. The importance of measuring the normality of data distribution is that some statistical methods such as t-tests are based on the assumption that the data is normal. There are several ways in statistical analysis to check the normality of a quantitative variable. Therefore, the present study has used the normal probability diagram to check the normality of the data due to the high sample size.

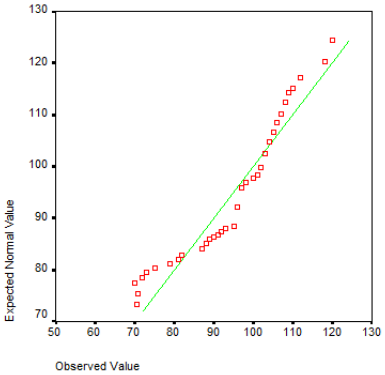

Figure 2. the normal probability plot of creativity

The creativity variable had a normal distribution among the contractual professors of architecture at Tehran Azad Universities, and the creativity of the professors was assessed at high level based on the Torrance questionnaire. It can also be concluded that there is a positive and significant relationship between creativity and its dimensions and the highest correlation for the dimensions of fluidity (correlation coefficient was equal to 0.77), flexibility (correlation coefficient was equal to 0.76), expansion (correlation coefficient was equal to / 47), respectively. 0) and initiative (correlation coefficient was equal to 0.32). The results of this study showed that in all tests, professors scored the highest score in the fluidity dimension and the lowest score in the Initiative dimension. That is, it can be said that creativity and then its importance,

Initiative, was inversely related to the variable of age and teaching experience. Which was consistent with the results of the study of Martin et al. It should be noted that this relationship was seen in the teaching experience variable more than the age variable. In interpreting this relationship, it can be said that this result seems to be due to the stability of mental structures, decision-making in work or decreasing motivation and increasing conservatism. The results of the teaching experience variable showed that with the increase of teaching experience in addition to the initiative dimension, the score of expansion dimensions and fluidity also decreased significantly. But the remarkable thing is that the flexibility dimension of the flexibility remained almost constant. Decreased score after fluidity indicates that professors lose the power of thinking and decision-making in a different way after organizational time. Also, the decrease in scoring after expansion indicates the fact that professors do not even allow the expansion of organizational methods to new positions over time. This means that they wait for the organizational order in order to decide and act in any new position. Failure to reduce scores after flexibility with increasing teaching experience can also be related to the ability of professors to coordinate and adapt to the constant change of various decisions and methods, and even in conflict with the organizational hierarchy, over a period of time. Other studies show that there is no significant difference between the mean scores of men and women. The findings of the present study were in line with the results of Fire, Hennessy and Amabil (2010) Abraham et al. (2014) Torrance (2013). But it has become significant for after the difference. This shows that female professors are more concerned with the components of a subject or mental discovery. In other words, they have partial thinking with analysis, but in the categories of fluidity (ie, the production of many ideas), initiative (ie, the ability to produce new and unusual ideas) and conceptuality (ie, the ability to produce ideas in many different ways), there is a difference between professors. Men and women were not significant. The results also showed that completing an idea, adding details related to it or mentally in attention and considering the most detailed components related to a work is higher in female professors than male professors. The reason for this can be traced to the characteristic of women's partiality and men's gestaltism. Normally, women are interested in doing delicate work and men are able to do general and managerial work. These findings are consistent with the results of research in Spain, where the level of women is higher than men Azmandi et al .Now, according to the research findings and placing the level of creativity of professors at an acceptable level, the hypothesis that some creative architects today, rarely mention the role of professors as a factor affecting their creativity today, and it is a reason for the low level of creativity. Professors know, rejected. Also, regarding the second factor, namely the educational environment according to the body of most educational environments; Can be presented as a proposition. "Educational environments that are designed with the intention of using the minimum space to the maximum, without paying attention to the most obvious requirements, i.e., standard per capita educational space, will certainly not be a suitable platform for fostering creativity for future goals." And Rice is aligned.

7. Conclusion

In this research, based on the analysis and study of the factors affecting the emergence of creativity, it can be acknowledged that: Creativity has constituent elements. The first element of the skills domain is related to talent, training and experience in a particular field. Which are considered as raw materials for work. The second element is creative thinking skills that can be developed through training and experience. The third element is motivation. Motivation is the desire to work for the same thing. Therefore, it seems that for the emergence and strengthening of creativity in people, the intersection of these three elements must be determined. Because this is the crossroads of a powerful combination that leads one to creativity. It should be noted that although creativity is potentially and innately instilled in human beings, its emergence requires its cultivation.

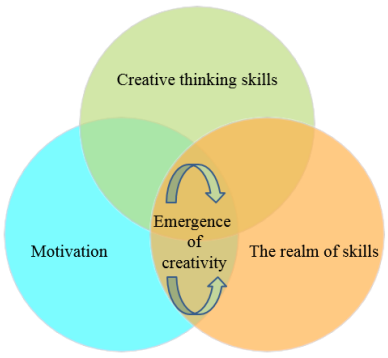

Figure 3. factors affecting the emergence of creativity.

Few studies can be found in the literature on creativity in measuring and evaluating the factors affecting creativity and in particular the creativity

of teachers with regard to their key role in the development of novices. According to the results of quantitative tests, the level of creativity of professors is at a desirable and acceptable level. Accordingly, it seems that it is possible to modify the structure of education in order to properly foster creativity by creating spaces related to the activities of learners, environments that have appropriate conditions for the growth and development of creativity. Undoubtedly, an environment that is commensurate with the consumer's expectations, if it has no effect on the emergence of individual creativity; will not prevent it from occurring. It should be noted that every student of architecture spends significant hours during his studies at the university as an educational environment, so the environment as an effective factor should always create the conditions for creativity in order to develop creativity. For an Iranian architect, the educational space such as school was not limited to the classroom; Rather, it was a collection of homogeneous physical elements and the surrounding space which formed the basis of a school that was worthy of the thirst for science and knowledge; Including Chahār Bāgh School in Isfahan and Agha Bozorg School in Kashan, which can be generalized to the university environment. Therefore, today's environments created with the motivation of using the maximum of the minimum space, can't be a context for fostering creativity due to not paying attention to the most obvious requirements, namely the per capita standard educational space. In the general sense, the university refers to a system that consists of three subsystems, including professors, educational programs and environment, the weakness of each of these components disrupts the interactive process of the other components and will even provide a distorted image of the other components. Thus, creative designers seldom mention the contribution of professors as a key factor in their creativity, because the unfavorable educational environment in which they grew up has left a weakened image due to the weakness of one component, the environmental factor, although some components have been at their best. In this study, the mental image created based on the low level of creativity of professors was rejected. In general, according to the research findings (evaluation of Master's creativity at an acceptable level), it seems that the main reason for the attitude of some creative people was the weakness of the second factor, namely the educational environment. It should be noted that environmental support is needed for the emergence of cultivation and the noon of creativity. There may be all the inner resources needed for creative thinking, but creativity can never be revealed without the support of the environment. Environmental barriers can be very minor, such as negative or macro feedback, such as confronting rules and norms. Therefore, when a person considers the environment without adequacy and necessary conditions, he does not try to flourish. Therefore, it seems that the development of novice creativity requires the provision of appropriate quality for environmental factors.

It should also be noted that the initiative component has a special place among other components of creativity. Therefore, a mind that can think innovatively will be able to provide pure and effective solutions for the most complex different situations. Therefore, it is necessary and necessary in the contemporary period to focus more than in the content on the process and creative and critical skills in addition to the content. But unfortunately, universities today, mostly due to advances in science and technology and due to some psychological approaches, have turned their attention more to the transmission of information and facts and have taken the training of creative novices in architecture for the future. Since the success of any educational system depends on its ability to analyze and make creative and thoughtful decisions, one of the goals that educational planners at the university level seem to pursue is to develop the ability to think creatively among beginners. According to what has been studied in this research, creativity can be perceived as an ability that is under various individual and environmental factors and individual factors are influenced by environmental factors. It should be noted that environmental factors play a key role in creativity, so fostering creativity requires a creative ecosystem. Just as in an ecosystem, living things are related to each other or to their ecosystem, so in a creative ecosystem, all members (novices, masters, all aspects of the environment are interacting). For example, just as in biology, environmental factors are non-linearly related to each other, in the ecosystem of creativity, all elements are closely and non-linearly related to each other. For example, in a greenhouse, some water and sunlight are needed for the plant to grow. The amount of water required also depends on other factors such as the amount of light and sun absorption set by the plant. So we can say that a person's creativity is the product of a creative ecosystem.

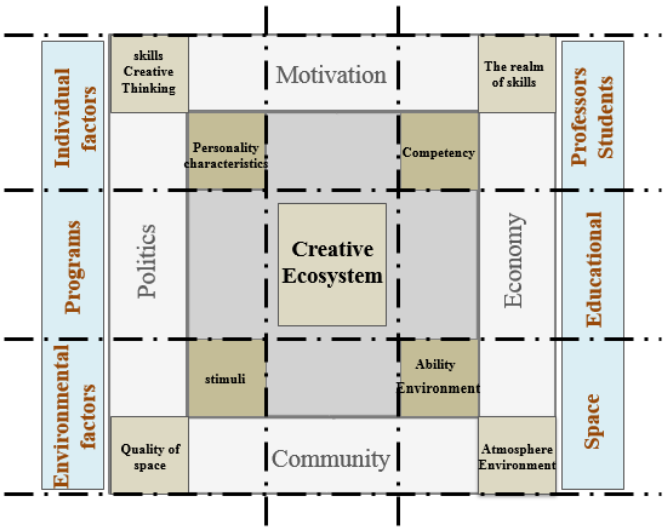

Figure 4. Creative Ecosystem

Also, in order to further improve the existing conditions in fostering creativity, the following approaches are proposed at different levels; 1. Suggesting teaching conditions based on creativity in the subject of architecture courses by planners based on demographic variables (age, gender, education, teaching history); 3.Selection of professors for each course based on demographic variables (age, gender, education, teaching history); 4. Determining the working group in the faculties in order to purposefully select the professors for teaching based on the level of creativity determined in the course title; By holding tests to measure creativity among professors, so that each teacher based on the creativity score obtained in the test to obtain a teaching license in the course; 5. Changing the method of teaching creativity; From individual to group, because architecture graduates will often work in architecture as a group after graduation, so it is important to know how to work in a group; 6. Reviewing the education methods of architecture students by changing the method, from direct and teacher-centered education to indirect and student-centered education with the aim of promoting creativity; 7. Informing professors about direct and indirect teaching strategies .8. Paying attention to the qualities of environmental elements and visual stimuli in order to foster the creativity of architecture students

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