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Creative Processes in Female and Male College Students

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Abstract

The present study was conducted on 3770 male and female students in nine universities of Iran. The aim was to reach a comparison concerning the creative processes in female and male students. Research instruments included the Creative Test (CT) and analogy sub-scales of Weschler Adult Intelligence Scale (WALS). The results show that there are some significant elements of creativity as a general capacity. Based on the findings, a theoretical cognitive model has been formulated. Finally, a few suggestions have been offered for the purposes of identifying creative processes as well as for developing and improving such processes.

Keywords

Creativity; Creative Processes; Predictive Factors of Creativity;

INTRODUCTION

Creative persons are considered assets of a company, organization, or nation. A large, rigidity structured bureaucracy may obscure individual creativity. If the educational system is based on such non-flexible structural policies, creativity will be diminished. But a flexible system of educational strategies will provide opportunities for enhancing the ability of creative problem-solving. The creative students will be detected and their talents expanded.

The present study investigates factors which are correlated with the creative processes in the students. It discusses a possible mechanism which is conducive for the growth of such a capability and provides an appropriate condition for it.

THE NATURE OF CREATIVITY

How does creativity work? This has been one of the humankind's fundamental and ancient questions. Plato turned to divine inspirations to explain creativity, two and half millennia ago (Perkins, 2000). Today many psychologists, educators, and philosophers of science have endeavoured to articulate commonly acceptable definitions of creativity. This clearly reveals the complexity of creativity as a scientific construct. For example, *Vygotsky* believed that imaginative ability is basic for all forms of creativity (Ghassemzadeh, 1999).

Guilford (1950) based on a model of factor analysis defined creativity as a divergent thinking in problem solving. *Piaget* (O'Neil, Abedi, and Spielberger, 1994) holds that if you want to be creative, stay in part a child, because the creativity and invention characterize children before adulthood deforms them. Other scholars have emphasized the importance of reframing in creativity.

Gestalt psychologists recognized the hegemony of pattern and the role of pattern breaking in creative thought (Perkins, 2000). *Parness*, *Noller*, and *Biondi* (1977), for example, believes that the essence of creativity is the fundamental notion of the "aha", meaning the fresh and relevant association of thought, facts, ideas into a new configuration which has many meanings beyond the sum of the parts.

Creativity has also been conceived of as the exploration and transformation of conceptual spaces, and has been seen as a novel

combination of old ideas (Boden, 1990), and that how people perceive and interpret the world (Hodder, 1993). *Hodder* (1993) believes that creativity is as much a physical process involving the routines and practices of the body, but since one can not divorce individuals from their social and historical contexts, so the creativity is a social process, and people are caught up within the webs of material symbols they create. Others see analogy and metaphor as lying at the heart of creativity (Mithen, 1998).

In general, cognitive science provides concepts of immense value about creativity. It provides a broader view of creativity, one that encompasses the process of interpretation and which identifies creativity to be as much a process related to the body, to the society, and to material culture, as to the mind alone. So although creative thinking seems to appear suddenly in human evolution, its cognitive basis had a long evolutionary history during which the three foundations evolved, each largely on an independent basis:

1. A theory of mind
2. The capacity for language
3. The complex material culture

Beginning from 50,000 years ago, these came to form the potent ingredients of a cognitive/social material mix that did indeed lead to a creative explosion. Computational psychology that draws many of its theoretical concepts from artificial intelligence (AI) also can help us to understand how human creativity is possible (Mithen, 1998).

THEORETICAL BASIS OF CREATIVITY

There are two ways of viewing creativity: 1) the "genius" view which conceives of creativity as the result of extraordinary thought processes, and 2) "ordinary" view, which sees creativity as resulting from thought processes possessed by all of us, seen most clearly when we solve problems. So according to *Langley* et al. (1987) sudden discovery can generally be explained as a more incremental, progressive kind of problem-solving and sequential reasoning accounts for such scientific discovery. The view of *Koestler* (1964) about creativity is also an ordinary approach. He holds that normal thought operates within a frame of reference, in a familiar and established domain; problems arise and get solved, opportunities

emerge and are taken, but in *Koestler*'s notion of bisociation, creativity involves jumping from the tracks of prevailing frames of reference onto a different paradigm.

In the frame of ordinary view, three basic concepts of *selective encoding, selective combination* and *selective comparison,* make a worth-while contribution to understanding creativity as an ordinary thought processing (Strenberg and Davidson, 1995). *Newell* and *Simon* (1972) believe that the use of analogical thought in problem solving has important implications for our understanding of creativity. According to David Perkins, creativity has a fivefold structure that goes on as something like this: *long search*, *little apparent progress*, *precipitating event*, *cognitive snap*, and *transformation* (Parkins, 2000). Also it has been found that creativity includes *sensitivity to problems*, *fluency*, *flexibility*, *originality*, *elaboration*, and *redefinition* (Torrance and Goff.1989).

But educational systems that put too much emphasis on facts, details, memory and predetermined answers, force a left hemisphere dominance which could result in a lack of development of right brain creativity. In other words instructional strategies that use both sides of the brain can foster creativity (Sanders and Sanders, 1984).

According to *Bogen* and *Bogen* (1969), a major obstacle to high creativity was the left hemisphere inhibition on right hemisphere functions. At the same time Martindale found that creative subjects had significantly more right- than left-hemisphere activity. In other studies, it was found that hemispheric differences to be very pronounced in low creative subjects, while in contrast, the highly creative subjects showed a bilateral response (Carlsson, 1989). These results supported the *Lezak*'s view that the bilateral integration of cerebral function is most clearly exhibited by creative persons (Lezak, 1995).

In general, it seems that creativity is a functional system comprising the interaction of the cognitive functions in hemispheres. Creative person can use his or her imaginative ability in an *autonomous* way (Carlsson, Wendt, and Risberg, 2000).

But it seems that although many educational and training systems have achieved excellent results in terms of domain – specific declarative and procedural knowledge – this excellence has been at a

cost of reducing students' creativity, a kind of thinking that it is very important for the economy of social systems to have greater numbers of creative persons.

Based on the ordinary view of creativity and a multi-component model of it, in line with the aims of the present study using an explorative approach, the basic goals are the examination of the impact which the individual and familial properties have on creative processes. In this line, it has been tried to determine correlated factors of creative thought. Therefore we examined the students' creativity in nine universities considering different disciplines (majoring areas), gender, analogical thinking, handedness, previous academic achievement, off-campus activities or interests, parental level of education, the size of family, order of birth, and origins of citizenship. Finally, the predictability of creative thought has been examined by four subscales of CT.

METHOD

Population and Sample

The total population of this study consists of all newly enrolled students of nine universities of Iran. Three thousand and seventy seven hundred students (N = 3770) were randomly selected from this population. The age range was 16 to 41 years, with a mean score of 18 years. The range of mean score of their baccalaureate degree as an index of previous educational achievement was from 16.35 to18.18.

Instruments

Three instruments were used:

1. Creativity Test (CT) (Auzmendi, Villa, and Abedi, 1996);
2. Similarities subscale of *Weschler* Adult Intelligence Scale (WAIS) (Wechsler, 1981);
3. A demographic questionnaire.

A brief description of these instruments follows Creativity Test (CT): Many psychometric tests have been designed to measure creativity (e.g. *Torrance* tests of Creative Thinking (TTCT), and *Villa-Auzmendi* Creativity Test (VAT)). One of these instruments has been

designed by *Abedi* and his colleagues to develop a multiple choice test for establishing scores of the four traits underlying creative thinking.

1. Creativity Test (CT) is a self-rating instrument comprised of 56 items. CT is divided into four subscales: fluency (18 items), flexibility (11 items), originality (17 items), and elaboration (10 items). Each item has three options ranging from least to most creative response. Maximum scores for the total scale and four subscales (elaboration, flexibility, fluency, originality) are 168, 30, 33, 54, and 51, respectively. This inventory is widely used and has adequate validity and reliability. Estimates of internal consistency for CT which were obtained using *Cronbach*'s alpha; ranged from 0.61 to 0.75. Concurrent validity of CT and other tests (TTCT and VAT) and other measures is between 0.30 to. 0.54.

2. The similarities subscale of WAIS consists of 14 items each item contains a pair of words that subjects were asked to make a connection between two very different words. Or, they must explain similarities between pair of words. This subscale is a Persian form of similarities subscale of WAIS (Wechsler, 1981).

The maximum score for this subscale is 28. Each response has a score ranging from 0 to 2.

The range of reliabilities in this subscale is 0.60 to 0.96. The construct validity of this subscale ranged from 0.40 to 0.81

3. The General Demographic Questionnaire consists of the personal information such as age, sex, handedness, rate of birth, size of family, mean score of baccalaureate degree (as an index of previous academic achievement), off-campus activities or interests, parental level of education, regions of citizenship and major areas in universities. The tests and demographic questionnaire were administered on students in groups. The general demographic questionnaire was administered first followed by creativity test and similarities subscale. This was the way the tests were ordered.

Data Analysis

General demographic characteristics of the students, their scores on self-rating instruments were examined and compared in terms of gender. For comparisons involving continuous variables, T test and F tests, and for other relational aspects, correlation coefficients were

used. An alpha level of $P < 0.05$ and $P > 0.01$ was adopted for all comparisons.

RESULTS

General demographic characteristics of the students are presented in **Table1**.

Table 1. Socio-demographic and Descriptive Statistics for Background Variables

Variable		N	%
Gender	Female	1970	53.63%
	Male	1703	46.37%
	Total	**3673**	**100.00%**
Handedness	Right handed	3309	91.23%
	Left handed	318	8.77%
	Total	**3627**	**100.00%**
Off-campus Activities and/or Interested	Readings	3577	93.84%
	Artistic activities	3468	84.54%
	Sport	3542	88.96%
Residential Areas	Capital city	1085	29.68%
	Other provinces	2571	70.32%
	Total	**3656**	**100.00%**
Size of Family	1 to 3 siblings	1756	49.87%
	4 and more siblings	1765	50.13%
	Total	**3521**	**100.00%**
Rate of Birth	First child	1235	33.72%
	Second child	830	22.67%
	Third child	578	15.78%
	Forth and more child	1019	27.83%
	Total	**3662**	**100.00%**
Major Area in University	Technological and engineering	758	21.95%
	Basic sciences	1162	33.64%
	Human sciences	1484	42.96%
	Medical sciences	15	0.43%
	Art	35	1.01%
	Total	**3454**	**100.00%**

Creativity and Gender

Scores of CT and similarities subscale of WAIS in female and male students are presented in **Table 2**. Results show that there are not any significant differences between female and male students in total score of the creativity, but there are some significant differences between

males and females in subscales of CT. In elaboration scale, female students have higher mean score than male students ($P < 0.01$). This finding is similar to other findings in the literature. It has been shown that gender has a significant correlation with the elaboration subscale ($r = 0.021$; $P < 0.01$) (Auzmendi, Villa, and Abedi, 1996). It seems that females elaborate more than males do.

Results of the present study also showed that in flexibility and fluency subscales of CT, there were no significant differences in terms of gender. In originality subscale, however, there are significant differences between males and females. The mean score of originality in male students was higher than females' score ($P < 0.01$).

Table 2. Scores on CT and Similarities Subscale of WAIS in Female and Male Students

Variable	Female			Male			t	df
	Mean	SD	N	Mean	SD	N		
Total	2.22	0.24	1951	2.22	0.24	1693	0.47	3642
Elaboration	2.40	0.24	1970	2.34	0.25	1703	6.33*	3642
Flexibility	2.13	0.31	1950	2.14	0.30	1676	1.14	3642
Fluency	2.25	0.30	1950	2.12	0.31	1687	1.13	3635
Originality	0.22	0.24	1940	2.29	0.30	1652	4.52*	3590
Similarities	1.37	0.30	1821	1.34	0.30	1410	2.09**	3229

* $P < 0.05$
** $P < 0.01$

Similarities and Gender

In similarities subscale of WAIS, there were significant differences between female and male: the mean score of female students are higher than that of male students ($P < 0.05$, 1.37 vs. 1.34).

Creativity and Handedness

The total scores of creativity and similarities with different type of handedness are presented in **Table 3**.

Table 3. Scores on CT and Similarities and Handedness

Variable	Right-handed			Left-handed			t	df
	Mean	SD	N	Mean	SD	N		
CT	2.22	0.24	3309	2.22	0.24	318	0.53	3625
Similarities	1.35	0.32	2937	1.39	0.34	280	1.64	3215

Significant differences were not found between the total score of creativity and its four subscales and of handedness. Again, significant difference was not found between the mean score of similarities and handedness.

Creativity, Similarities, and Previous Academic Achievement

The correlation Coefficients between total score of CT and four subscales and between CT and similarities and correlation coefficients between CT scores and previous academic achievement, and between similarities and previous achievement are presented in **Table 4**. The significant correlation was found to be between the total score of CT and subscales ($P < 0.001$). Also significant correlations were found between the total score of CT and previous academic achievement ($P < 0.01$) and scores of fluency, originality, and similarities ($P < 0.001$). But there was not significant correlation between previous academic achievement and flexibility. These findings are in line with other findings in literature (Auzmendi, Villa, and Abedi, 1996). The correlation coefficients between total score of the CT and similarities score were not significant. ($r = -0.04$)

Of some relevance to the construct validity of the CT are the inter-correlations of subscale.

Table 4. Correlation Coefficients between CT and Subscales of CT and Similarities Subscales with Previous Academic Achievement
(N = 3344)

Variable	CT and Subscales	Previous Academic Achievement
Total score of CT	1.00	0.10*
Elaboration	0.67**	0.08**
Fluency	0.88**	0.94**
Flexibility	0.80**	-0.008
Originality	0.84**	0.15**
Similarities Subscale	-0.04	0.10**

* $P < 0.01$
** $P < 0.001$

Creativity and Interest of Students

Scores on the CT (total and four subscales) and similarities with various off-campus activities or interests (the arts, sports, and reading different books) are presented in **Table 5**. The mean scores of the

students interested in the arts, sports, and reading were higher than those of the students who were not interested in the fields as specified.

Table 5. Scores on CT and Similarities with Various Off-Campus Activities (Arts, Sports, Reading)

Scale	Variable	Interested			Uninterested			t	df
		Mean	SD	N	Mean	SD	N		
CT	Arts	2.24	0.24	2932	2.12	0.25	536	10.73*	3466
	Sports	0.23	0.24	3151	2.13	0.27	391	6.82*	3540
	Reading	2.23	0.24	3357	2.06	0.25	220	9.90*	3575
Similarities	Arts	1.36	0.31	2618	1.37	0.37	461	0.92	3077
	Sports	1.35	0.32	2799	1.38	0.33	344	1.59	3141
	Reading	1.36	0.32	2988	1.32	0.36	188	1.65	3174

* P < 0.01

Creativity and Parents' Levels of Education

Scores on the CT and the levels of parents' education (no education, elementary education, high school education and graduate education) are presented in **Table 6**. The results of ANOVA between parents' different levels of education and total score of CT (and all four subscales) showed that most of students with the high scores in CT came from the families whose parents have had more educational levels. These results are in line with other findings that show there are inter-correlations between creativity measures and some features related to socioeconomic status including parental levels of education (e.g. Auzmendi, Villa, and Abedi, 1996).

Table 6. Scores on Total CT and Levels of Parents' Education

Parents' Education	Mothers			F	df	Fathers			F	df
	Mean	SD	N			Mean	SD	N		
No Education	2.18	0.23	494	29.80*	3360	2.19	0.25	258	15.41*	3363
Elementary	2.19	0.24	1074			2.19	0.24	925		
High School	2.23	0.23	1191			2.22	0.24	1059		
Graduate	2.29	0.23	604			2.29	0.23	1124		
Total			3363					3366		

* P < 0.01

Creativity and the Residential Areas

Scores on CT and the regions of citizenship are presented in **Table 7**. There were no significant differences between different local areas

(provinces) regarding the creativity test (total and subscales). But there was a significant difference between the capital city and all of provincial areas.

Table 7. Scores on CT and Residential Areas

Residential Areas	Mean	SD	N	t	df
Capital City (Tehrān)	2.41	0.25	1085	3.29*	3654
Other Provinces	2.21	0.24	2571		

* P < 0.01

Creativity and Size of the Family

Scores on the CT and size of family (1-3 siblings, 4 and more siblings) are presented in **Table 8**. The students' total score of CT in small or less populated families were higher than score in large or crowded families.

Table 8. Scores on CT and Size of Family (Number of Siblings)

Variable	Mean	SD	N	t	df
1 to 3 siblings	2.24	0.24	1756	5.90*	3519
4 and more siblings	2.19	0.24	1765		
Total			3521		

* P < 0.01

Creativity and Order of Birth

CT and the order of birth are presented in **Table 9.** There was a meaningful difference between students who were the first children of their families and those who were not the first children of their families (P < 0.01).

Table 9. Scores on CT and Order of Birth

Variable	Mean	SD	N
First child	2.24	0.24	123
Second child	2.19	0.24	830
Third child	2.22	0.24	578
Forth and more child	2.21	0.23	1019
Total			3662

Table 10. One-way ANOVA between Order of Birth and Total CT

Source of Variation	Degrees of Freedom	Sum of Squares	Mean of Squares	F
Between Groups	3	1.38	0.46	7.91*
Within groups	3658	212.93	0.06	
Total	3661	214.31		

* P < 0.01

Creativity and Majoring Areas in the Universities

Scores on the CT and major areas in the universities are presented in **Table 11**. The results of ANOVA between creativity and various areas (technical and engineering, basic sciences, human sciences, medical sciences and the arts) show that there is significant difference between students of technical and engineering and basic sciences as compared with students majoring in human sciences. The mean score of total CT of technical and engineering students were higher than the human science students, respectively ($P < 0.01$). At the same time there were no significant differences between total scores of CT and other majoring areas.

Table 11. Score on CT and the Majoring Areas in University

Variable	Mean	SD	N
Technical and Engineering	2.23	0.24	758
Basic Sciences	2.25	0.23	1162
Human Sciences	2.18	0.25	1484
Medical Sciences	2.25	0.27	15
Art	2.28	0.23	35
Total			3454

There were significant differences between similarities scores of the students in various areas. On the *Scheffe*'s test, for further analysis, we found that the mean sores of similarities of the basic sciences' students were higher than those of the students of the human sciences and the arts scores; The mean score of the similarities of technical and engineering students was higher than that of the human sciences and the arts students; And the mean score of the analogy score of the human science students also was higher than the arts students. Again, there were no significant differences between other educational areas (**Tables 12** and **13**).

Table 12. One-Way ANOVA between Majoring Areas and Total CT

Source of Variation	Degrees of Freedom	Sum of Squares	Mean of Squares	F
Between Groups	4	3.07	0.77	13.39*
Within groups	3449	197.74	0.06	
Total	3453	200.81		

* P < 0.01

Table 13. One-Way ANOVA between Majoring Areas and Similarities

Source of Variation	Degrees of Freedom	Sum of Squares	Mean of Squares	F
Between Groups	4	5.40	1.35	13.21*
Within groups	3079	314.73	0.10	
Total	3083	320.13		

* P < 0.01

Predictability of Creativity

The results show that there was a correlation between the total score of creativity and the scores of the all four subscales of creativity (the meaningful high and positive correlations were found between all of the subscales scores and the total score of creativity ($P < 0.001$)). The results of multiple regression analysis also showed that all predictive variables (fluency, flexibility, elaboration, and originality) can meaningfully predict the total score of creativity. The most predictive variables were fluency ($P < 0.001$), originality ($P < 0.001$), flexibility ($P < 0.001$), and elaboration ($P < 0.001$), respectively.

The results of repeated measure – ANOVA are presented in **Tables 14** and **15**.

Table 14. Multiple Regression-ANOVA for Predictability of Creativity Regarding Fluency, Originality, Flexibility, and Elaboration

Variables	Multiple R	R^2	SD	F	df
Fluency	0.87	0.77	0.11	11661.94*	13480
Originality	0.97	0.94	0.60	25035.47*	24479
Flexibility	0.99	0.98	0.40	47056.07*	33478
Elaboration	0.99	0.99	3.99	322322.06*	43477

* P < 0.001

Table 15. Multiple Regression-ANOVA for Predictability of Creativity

Variable	β	SD for β	Standard Coefficient
Fluency	0.32	3.02	0.42
Originality	0.30	3.08	0.37
Flexibility	0.19	3.01	0.25
Elaboration	0.17	3.24	0.18

DISCUSSION

The results on gender differences showed that there was no difference in terms of gender. These results not only have diminished the whole system of gender stereotypes, but even addressed the superiority of female students on similarities as an analogical thinking and elaboration. Therefore if universities provide the appropriate climate, the women, as men, will show creative thinking. These results are in line with *Hyde*'s findings about gender abilities (Hyde, 1996).

In the case of handedness there were no differences between right-handers and lefthanders.

Since handedness is an index of laterality, the results have consistency with Herrmann notion that creativity is a mental process utilizing all of the brain specialized capabilities and it is therefore "whole brained" (Herrmann, 1990).

The importance of verbal fluency as the most predictive variable of creativity implies the importance of language. Since the structure of a language involves both sequential as well as visuo-spatial functions, the verbal system organizes both discrete linguistic units and imagistic units in to higher order sequential structures. Words in general are tools for chunking the reality and producing new combination (Ghassemzadeh, 1999) these new combinations are the basis of the creativity. Thus, it can be argued that universities must cultivate fluency and extension of students' vocabulary. The more increased vocabulary, the more extended thought, which in turn produces flexible thinking. Therefore courses on literature can stimulate these abilities.

The originality was the second predictive factor of creativity. In effect, originality is one of the most fundamental underlying factors in many measures of creativity; it is an ability to produce unique ideas.

Since transferring one's knowledge on new problems is essential for originality, the universities should provide more information and instructions in the use of past experience to deal with new problems. Therefore universities can provide students with instruction on how external triggers that they had in the past can facilitate creative solutions to problems in various domains.

Regarding the flexibility as a third predictive variable of creativity, it can be explained that inflexible thought or rigidity has a major effect, that it prevents the free play of thinking and the free movement of the awareness and attention. This leads to false play of thought, which ultimately brings about a pervasive destructiveness while at the same time blocking natural creativity of human beings. So it requires that various forms of rigidity be changed fundamentally. Such a change can not be restricted to a single overall flash insight, but creativity must be sustained.

Both teachers and students are caught up in subtler forms of the same false structure that they are explicitly trying to avoid. It seems that the whole conditioning of all who take part must be changed: the society, the family and the individual. Rigidity produces a functional fixedness and over a limited period of time, certain useful values, assumptions, and principles are regarded as necessary. A form of free exchange of ideas and information in universities and in classrooms is fundamentally relevant for transforming culture and freeing it from destructive misinformation so that creativity can be liberated. Elaboration was another predictive factor of creativity; elaboration is the ability to fill in the details. For improving this ability, the students must be provided with connections between learned concepts and ordinary concepts: to extend and explain the scientific concepts, and to create new connections between them by using metaphors. These can be instructed in classrooms. The role of metaphoric processing and teaching metaphorical thinking as a Meta sign system has been detected (Ghassemzadeh, 1999).

Off-campus activities or interests are other correlates of creativity. General or extra studies, for example, are precipitating factors that are considered as a key in creative thinking; they provide the long search and put one in a position to recognize the creative solutions. General studies identify the boundaries that limit the scope

of search and then act to reform them. They also provide flexible boundaries.

In this search, students break through new areas of space of possibilities, for instance, using objects in ways that go beyond their usual functions. Students focusing on different combinations of knowledge can break their mental sets and produce a deliberate selective encoding. A change in representation brought on other concepts or frames of reference can help to break set and provide deliberate selective combination.

Sports and the arts, as other fields of interests, also result in search for mental possibility of spaces, of movement and images. If, as *Cotterill* (2001) said, we assume that cognition is linked to overt or covert movement, and intelligence becomes the ability to consolidate individual motor elements into more complex pattern and creativity is centres on the motor areas, so sports activate the motor areas and these activations, in turn, are involved in novelty detection. In this manner, it has been shown that artistic attitude is particularly important with regard of its emphasis on the role of imagination. Imagination is the beginning of the entry to creative perception. For students, a proper appreciation of the artistic attitudes or interests should not be left solely to those who specialized in the arts. An artistic attitude is needed in every phase and every aspect of the life.

In sum, these off-campus activities or interests as a heuristic search are strategies that increase the chance of success, and provide a pause that may serve to refresh the individual.

Having examined some of the measures of socio-economic status, such as parental levels of education, size of family, and the region of citizenship on the creativity, it seems that the SES has indirect effects on creativity. Parents' level of education, for example, is related to differences in values, aspirations, and motivations of the youth and is a measure that provides enriched climate in the family and influences critical thinking, inquiry and searching. Similarly, the citizenship in capital city and a less populated family are important. Since creative thought is simulated interaction with environment, these appropriate environments are prerequisite for creativity. In the case of the birth rate a first child of family, brings more attention of parents and he/she

experiences independence and autonomy that are all important elements for creativity.

CONCLUSION

The potential for creativity is natural, but an excessively rigid attachment to fixed "programs" is the prime factor which prevents this creativity from acting.

In this manner the very core of contribution of science and universities to the creative surge would take the form of an extension of scientific attitude in to all human relationships. And, the contribution of art is to speak of an art of living in which the artistic attitude is conductive to a sustained creative perception (Bohm and Peat, 2000). But universities are principally degree-granting institutions, preparing the young for specific professional tasks. So there are some ways in which universities can increase students' performance. The task of providing high level of *motivation* and *commitment* is very important. Creating an environment that encourages students to develop expertise, and maximize their motivation is necessary.

How do we motivate students, so that they develop expertise and mastery over the problems? Regarding young students who have not yet embarked on a *career* we must get them interested in the first place, and make them to keep on being so. Exposure at an early age to subject matters of arts and sciences, structured in such a way as to appeal to the young can help the child to naturally develop an interest in one or several areas. At a later age, exposure to mentors can play multiple roles.

It is thus possible to increase creative output in various ways. Yet, none of these ideas are short-term in implementation or simple in nature to allow for a single conclusion. Creativity, as a multidimensional script, involves many cognitive, emotional, and motivational processes.

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