ORIGINAL ARTICLE Received 2 April. 2016 Accepted 2 July. 2016

Vol. 5, Issue 3, 228-240, 2016

Academic Journal of Psychological Studies

ISSN: 2333-0821

ajps.worldofresearches.com

Predicting Creative Thinking of Students Based on Sternberg Thinking Styles

Saeed chegeni[1*], Rezvan Darabi[2], Maryam Niroomandi[2]

[1]M.A Degree General Psychology, Department of Psychology, Boroujerd Branch, Islamic Azad University, Boroujerd, Iran

[2]M.A Degree Clinical Psychology, Department of Psychology, Boroujerd Branch, Islamic Azad University, Boroujerd, Iran

A B S T R A C T

The aim of this study was to investigate how to predict students' creative thinking based on Sternberg thinking styles among high school students. The research is descriptive and correlational. The target population included all the high school students of Borujerd city in Iran (Male and female). Based on the multi-stage random sampling according to Morgan Table 375 subjects (191 females and 184 males) of the students in this area filled Sternberg - Wagner Thinking Styles (2000) inventory. Statistical data were analyzed by Pearson correlation, independent t-test, one-way analysis of variance and multiple regression analysis. Results of the study showed that there is a significant relationship between thinking styles and creativity (P <0.5), also it was determined that there is a significant differences between girls and boys in terms of global thinking, liberal and internal and external styles(P <0.5). In addition, no significant difference was observed between girls and boys in terms of creativity (P> 0.5). Based on the results it is recommended to consider the thinking styles and their effect on the creativity of the students and teach thinking styles should to students.

Keywords: Creativity, Thinking Styles, Gender, Student.

INTRODUCTION

Creative thinking is one of the most complex and highest manifestations of human thought, creativity is the ability to create new ideas at a high level which a combination of innovation, flexibility and sensitivity to existing beliefs and allows the person to think about the finding of others by a logical and rational thought to have positive achievements for other people[1] The term word creativity was first proposed and defined in 1950 by Guildford in America Psychological Association and where the effect of education in creativity was focused by the researchers. Creativity exists in everyone, although it is not the same in all people. Electronic information revolution and the explosion of knowledge has cause the prediction of the necessary knowledge to deal effectively with environmental conditions face

* . Corresponding Author: Chegeni, S.

DOI: In prossing

To cite this article: Chegeni, S., Darabi, R., Niroomandi, M. (2016). Predicting Creative Thinking of Students Based on Sternberg Thinking Styles. *Academic Journal of Psychological Studies,* 5 (3), 228-240.

problem, so the scholars and researchers have considered the solution in considering human intellectual creativity and capabilities [1, 2, 3, 4] They also state that creativity is not a one-sided concept and believes that multi-dimensional cognitive and emotional abilities are a good situation for the realization of creativity. Sternberg defines creativity as rethinking about the things in an unusual and unique way. He also considers thinking styles, knowledge, character and environment as effective in creativity. Grigorenko[5] believes that knowing and applying the thinking styles and related factors are essential in the world of professional training the ignorance of which in educational opportunities can lead to the lack of training and neglecting abilities. Analyzing the studies related to creativity shows that cognitive factors including thinking styles affect creativity but the thing that which thinking style has positive or negative correlation with creativity is still unclear.

Thinking styles refer to individuals' preferences to use their abilities. Therefore the thinking style itself is not ability but it refers to the use of capacities. The basic feature of human being is his thinking power. Humans have been able to overcome the complex and varied environment by their thinking and survive[6].

Also Daemi[7] Zare[8] Solgi[9] showed that people with their own thinking styles think of doing things. The term style is not synonymous with the ability but it is the manner to use one's ability. Sternberg in mental self-governing theory defines 13 styles of thinking classified in 5 dimensions of functions, forms, levels, scopes and leaning. In short, in terms of function, the person with regulatory style tends to create, invent, design and do the things in his own way. A person with the executive style performs what he is said to do and the person with judicial thinking style tends to judge and evaluate the people and things. In leaning dimension the person with liberal thinking style tends to do things in new ways and he disagrees with the customs and the person with conservative thinking style tends to do things in a correct predetermined way. The researchers believe that the positive and negative thinking styles are relative over time, place and situation and people are flexible in providing thinking styles[10].

Also Sirvasta[3] revealed that there is positive relationship between global styles and creativity and there is a negative relationship between creativity and analytical style. In addition in Iran Razavi and Shiri[11], Nouri[12] in their study concluded that there is a relationship between thinking style and creativity. So the liberal thinking is related to increased creativity and conservative style is related to the reduced creativity. The need for such research to understand the relationship between creativity and thinking styles of students is necessary.Lobart[13] showed that thinking styles are associated with creativity and creative people rend to legislative and global thinking styles.

Also the results of Nateghian[14], Soltani Amrabadi[15] and Abedi[16] regarding the creative thinking style showed that the legislative, judicial, global, hierarchical

and liberal thinking styles can predict higher scores in creativity; therefore the researchers are determined to know which thinking style is the strongest predictor for creativity of students.

Since many achievements and human progress is the result of creative thinking ability, attention to this issue and providing facilities for the development of it is obvious. Here the effect of the educator in the field of creativity is direct and pervasive. In other words, the teacher is the most important factor in the growth and creativity of learners. Here the education of students given the critical role in nurturing students who are creative force in the country is of higher importance. Given the importance of the development of the country and growing creative forces in the absent of a comprehensive study in this area, we decided to address the concept of creativity in the field of education and training among the students.

METHODOLOGY

This research is a descriptive and correlational study. The study population includes all male and female high school students in the academic year 2014-2015 out of which 375 students (191 girls and 184 boys) were selected by multi-stage random sampling.

In this study to examine the thinking styles the short form of Sternberg and Wagner's thinking style inventory was used. The questionnaire consists of 65 items and 13 subscales. Each subscale consists of 5 questions that measure a thinking style. The reliability of the questionnaire in previous studies is between 0.57 and 0.81, but in the present study Cronbach's alpha coefficient was used to measure the reliability which gave the value of 0.79. Also the concurrent validity of the questionnaire with the complete thinking style inventory is 0.81[10, 17].

In recent years, numerous studies have been done to measure creativity that have led to various tests measuring creativity including[18, 19]. One of the tests that have been mostly used is Torrance Test of Creative Thinking. Neal[20] argues that so far over two thousand published articles have used Torrance Test of Creative Thinking as the criterion. Torrance considers creativity as the combination of the following factors: 1- fluency: the talent of generating various ideas. 2. Elaboration: The talent of considering the particulars. 3. Innovation: The talent of generating novel and unusual ideas. 4. Flexibility: The talent of generating different ideas and procedures. Abedi reported Cronbach's alpha coefficient for fluency, creativity, flexibility, and elaboration asn 0.87, 0.72, 0.69 and 0.73 respectively. The validity of Torrance creativity test and other tests is 0.92 which is significant.

RESULTS

Table 1. Descriptive statistics of students' thinking style and creativity based on gender

	Total (375)		Boy (189)		Girl (189)	
	Mean	SD	Mean	SD	Mean	SD
Thinking style	228.17	22.89	242.23	20.71	235.04	48.23
Legislative	18.13	6.85	17.69	6.23	16.39	6.67
Executive	18.16	3.53	18.36	6.23	17.53	2.98
Judicial	15.02	5.12	16.48	5.23	15.68	5.12
Global	17.34	5.41	18.87	4.23	16.72	5.81
Local	19.12	2.62	19.20	3.45	18.86	2.31
Liberal	17.56	6.06	21.28	3.12	16.16	5.71
Conservative	20.39	3.47	18.16	6.45	21.30	2.94
Hierarchical	18.52	5.86	19.06	5.18	18.61	2.23
Monarchic	20	1.40	19.98	1.45	20.34	1.41
Oligarchic	19.45	1.12	19.16	1.05	19.64	1.99
Anarchic	19.23	3.18	19.85	3.43	19.29	3.23
Internal	18.53	5.99	19.677	5.21	16.34	6.92
External	18.58	5.25	16.20	4.36	19.34	5.238
Creativity	111.67	13.95	112.46	15.61	141.39	12.21

The results of Table 1 indicate that the lowest and highest means are related to judicial and conservative thinking styles respectively, which means that most students had higher conservative than judicial thinking style in terms of function. Also among boys the lowest and highest means are related to external and liberal thinking styles respectively, moreover, among girls the lowest and highest means are related to internal and conservative thinking styles respectively.

Table 2. Test results of the significance of the relationship between thinking styles and creativity of the students

Variables	Mean	correlation coefficient	sig
Legislative	17.13	0.443**	0.001
Executive	18.16	-0.406**	0.001

Judicial	16.02	0.586**	0.002
Global	17.78	0.492**	0.000
Local	19.04	-0.197**	0.001
Liberal	17.50	0.501**	0.000
Conservative	21.19	-0.463**	0.001
Hierarchical	18.52	0.429**	0.000
Monarchic	20	-0.084**	0.105
Oligarchic	19.15	-0.093**	0.073
Anarchic	19.83	0.142**	0.006
Internal	18.23	0.154**	0.003
External	18.28	-0.103**	0.047

** Level of significance is 0.01, * level of significance is 0.05

The results of Pearson correlation coefficient test indicate that there is a significant relationship between creativity and all thinking styles except the monarchic and oligarchic styles at the level of 0.01 (with the confidence of 99%). The correlation coefficient between creativity and legislative, executive, judicial, global, local, liberal, conservative, hierarchical, monarchic, oligarchic, anarchic, internal and external thinking styles was 0.433, 0.406, 0.586, 0.492, -0.197, 0.501, -0.463, 0.429, 0.142, 0.154 and -0.103 respectively. It can be concluded that the students with legislative, judicial, global, liberal, hierarchical, anarchic and internal thinking styles had higher creativity and students with, executive, local, conservative and external thinking styles had lower creativity.

Table 3. The independent t-test to study the differences in male and female students' creativity

Gender	Mean	SD	DF	Test statistics	sig
Boy	112.46	15.51	373	3.120	0.41
Girl	111.29	12.21			

The obtained results indicate that the t stat is equal to 3.120 and the level of significance is 0.41. Since the level of significance is above 0.05, the research hypothesis cannot be confirmed at 0.05 and there is no significant difference between the creativity of male and female students at 95%.

Table 4. The independent t-test to study the differences in male and female students' creativity

Variable	Gender	Mean	SD	DF	Test statistics	sig
Legislative	Girl	16.59	6.67	373	1.55	0.121
	Boy	17.69	7			
Executive	Girl	17.93	2.98	373	1.23	0.216
	Boy	18.38	4			
Judicial	Girl	15.58	5.12	373	1.71	0.088
	Boy	16.48	5.09			
Global	Girl	16.72	5.70	373	3.93	0.000
	Boy	18.87	4.86			
Local	Girl	18.86	2.11	373	1.22	0.221
	Boy	19.20	3.04			
Liberal	Girl	16.86	5.71	373	2.08	0.038
	Boy	21.28	3.94			
Conservative	Girl	21.10	2.94	373	0.494	0.621
	Boy	18.16	6.33			
Hierarchical	Girl	18.01	6	373	1.74	0.083
	Boy	19.06	5.69			
Monarchic	Girl	20.02	1.41	373	-0.222	0.825
	Boy	19.98	1.39			
Oligarchic	Girl	19.14	0.99	373	0.203	0.839
	Boy	19.16	1.24			
Anarchic	Girl	19.79	3.20	373	0.191	0.849
	Boy	19.85	3.16			
Internal	Girl	16.66	5.92	373	5.04	0.001
	Boy	19.67	5.60			
External	Girl	19.82	5.68	373	-5.67	0.001
	Boy	16.83	4.26			

The obtained results indicate that there is a significant difference between male and female students only in terms of global, liberal, internal and external thinking styles so that this significance in global, liberal and internal thinking styles is in favor of boys and it is in favor of girls in external thinking style.

Table 5. Analysis of variance to determine the role of predictor variables in explaining the total students' criterion variable's variance

	S.S	df	M.S	F	R^2	sig
Regression	41668/324	13	3205/256	37.202	0.355	0.001
Error	31102/875	361	86.175			
Total	72771.109	374				

Table 6. Results of regression coefficients to determine the role of predictor variables on criterion variables of students

Variable	Non- standardized regression coefficients (B)	Standardized regression coefficients (Beta)	Test statistics	Sig
Constant value	95.159		3.610	0.001
Legislative	1.072	0.527	2.902	0.004
Executive	0.715	0.181	2.181	0.030
Judicial	2.077	0.762	6.013	0.001
Global	-0.850	-0.330	-2.821	0.005
Local	1.277	0.240	3.997	0.001
Liberal	0.567	0.246	2.768	0.006
Conservative	-0.945	-0.235	-3.530	0.001
Hierarchical	-0.679	-0.285	-1.674	0.095
Monarchic	-2.724	-0.273	-3.215	0.230
Oligarchic	0.740	0.059	1.219	0.224
Anarchic	3.177	0.723	7.937	0.150
Internal	-1.676	-0.720	-5.605	0.122
External	-1.454	-0.547	-4.752	0.080

To address this research question linear regression analysis with concurrent entry was used. The findings obtained from the regression analysis showed that only 35 percent of the observed changes in the students' creativity are related to their differences in thinking styles. The column of the level of significance in the table shows that only legislative, executive, judicial, global, local, liberal and conservative thinking styles have a significant effect on predicting creativity. By examining the standardized regression coefficients column in the table it can be seen that among the mentioned thinking styles, judicial thinking style with standardized coefficient of 0.762 is a stronger predictor of students' creativity.

Table 7. The level of using different thinking styles (from highest to lowest) on the knowledge of students

Variable	Mean	SD
Conservative	21.19	3.47
Monarchic	20	1.40
Anarchic	19.83	3.18
Oligarchic	19.15	1.12
Local	19.04	2.62
Hierarchical	18.52	5.86
External	18.28	5.25
Internal	18.23	5.99
Executive	18.16	3.53
Global	17.78	5.41
Liberal	17.50	6.06
Legislative	17.13	6.85
Judicial	16.02	5.12

The results of Table 7 show that the students have used conservative, monarchic, anarchic, oligarchic, local, hierarchical, external, internal, executive, global, liberal, legislative and judicial thinking styles. To assess the relationship between productive and effective variables in shaping students' creativity and the creativity of the study population Pearson correlation test was used. The results of the correlation between the variables indicate there is positive correlation at 1% and 5% between creative thinking of students and the variables of the potential to apply innovative ideas, quick identification of opportunities and threats related to the job, independence, risk-taking, confidence and experience. So by growing the

productive variables in forming the students' creativity, it is possible to hope that their creative thinking increases.

Table 8. The result of correlation test between productive and effective variables in forming students' creativity and the creative thinking

Variable	r	Sig
the talent of generating various ideas	0.045	0.341
The talent of generating novel and unusual ideas Applying new ideas	0.435	0.002
The talent of considering the particulars	0.341	0.001
Working knowledge (knowledge of the elements and principles governing the areas)	0.058	0.235
Technical expertise in the area of education	0.088	0.120
The hard work	0.153	0.105
Quick Identification Of Opportunities	0.154	0.035
Threats Self-Confidence	0.314	**0.009**
Independence	0.237	0.029
Being open to criticism	0.095	0.215
Risk taking	0.202	0.007
Age	0.107	0.146
Experience	0.189	0.032

CONCLUSION

In this study students' creative thinking prediction was investigated by Sternberg thinking styles. The population included all high school students (boys and girls) out of which 375 subjects were selected based on Morgan's Table among whom 49.1% (184 subjects) were male and 50.9% (191 subjects) were female. Descriptive statistics of thinking styles show that among the students the lowest and highest averages were related to judicial and conservative thinking styles. Also among boys the lowest and highest means are related to external and liberal thinking styles respectively, moreover, among girls the lowest and highest means are related to internal and conservative thinking styles respectively. The findings obtained from the analysis of the first hypothesis suggest that there is that there is a significant relationship between creativity and all thinking styles except the monarchic and oligarchic styles at the level of 0.01 (with the confidence of 99%). The results of this result are consistent with **[10, 13, 14, 21, 22, 23, 24, and 25]** who found that

judicial, legislative and liberal thinking styles had positive correlation with the creativity of the students. This result has a very important practical aspect. Sternberg and [5] are among people that consider this relationship as the context for the growth of creativity. They believe that considering the thinking style of each person and encouraging the styles that have a positive relationship with the creative style can enhance creativity. Also based on the results of testing the second research hypotheses it can be understood that there is no significant difference between girls and boys in terms of creativity. The results of this study are consistent with **[6, 12, 15, 26, and 27]**. Given that the results indicated the absence of significant difference between the creativity of boys and girls, it should be noted that the gender difference in creativity may be derived from social and cultural factors and some misconceptions in society as men are smarter than women and women should exert much effort to succeed may highlight these differences. In fact today girls obtain high academic qualifications under the same facilities. The results of testing the third hypothesis suggest that there was a significant difference between male and female students in some thinking styles. These thinking styles include: global, liberal, internal and external. Results obtained from testing this hypotheses is consistent with the investigations of **[9, 10, 11, 28, and 29]**. Studies conducted by Sternberg**[30]** on male and female thinking styles showed that men are mire liberal and global thinkers than women. Stated that after culture, gender is the second variable that has the potential to play a role in thinking styles [9]. Results of the first question indicate that among legislative, executive, judicial, global, local, liberal and conservative thinking styles, the judicial thinking style with the standardized coefficient of 0.762 is a stronger predictor of students' creativity. The results of this research question are consistent with Sternberg and **[5, 6]**.

Zare**[8]** and Emamipoor**[10]** Therefore if the educators encourage thinking styles associated with creativity and innovation among the students, they can increase self-worth and self-confidence **[31,8]** As a result, paying attention to thinking styles in schools as a place to provide specialized training to students can help to combine the education and capabilities to grow creativity. The results of thinking styles used by students from the highest to the lowest were as follows: conservative, monarchic, anarchic, oligarchic, local, hierarchical, external, internal, executive, global, liberal, legislative and judicial. In explaining the results of the research question it can be said: since the creativity score of the score of students in this study was lower than their counterparts in similar studies, as the results show, the thinking styles that inhibit creativity have been mostly used among the students participating in this research. Finally, based on the theory of Sternberg which states that there is no good or bad style and the thinking styles of people are their preferred method in using these styles, it can be concluded that students with any thinking style can take the highest advantage of their abilities and become efficient people in the society by the proper application of these styles of even the combination of them. In general the results of this study indicate the important role of individual variables independent of ability (i.e. thinking styles) in the

realization of creativity. According toSternberg[30] given that thinking styles are obtainable, it can be hoped to teach the teachers and learners the styles that create active learning in students and facilitate their creativity and innovation.

REFERENCES

1. Sternberg, R. J. (1998). *The Nature of Creativity: Contemporary Perspectives*. (Edited by Robert j. Sternberg). Published by Cambridge; New York: Cambridge university press.
2. Lizarraga, M. L., Baquedano M. T., Pollán Rufo, M. (2010). Effects of an Instrucation Method in Thinking Skills with Students from Compulsory Education. *Span Journal Psychology*, 13 (1): 127-137.
3. Srivasta, s., Childers, M. E., Baek, J. H., Strong, C. M., Hill, S. J., Warsett, K. S., Wang, P. W., Akiskal, H. S., Akiskal, K. K., Ketter, T. A. (2010). Toward Interaction of Affective and Cognitive Contributors to Creativity in Bipolar Disorders: A controlled study. *Journal of affective disorder*, 125 (1-3): 27-34.
4. Kazemi, H. (2011). The Relationship between efficacy and cognitive and emotional creativity in students' creativity. *The first national conference on the findings of cognitive science in education, Tehran*. [Persian]
5. Grigorenko, E. L., Sternberg, R. J. (1997). Styles of Thinking. Abilities, And Academic Performance. *Exceptional children*, 63 (3): 295-312.
6. Zhang, L. F. (2002). Thinking Styles and Modes of Thinking: Implications for Education and Research. *Journal of Psychol*, 136(3): 245-61.
7. Daemi, H. R., Moqimi Barforoosh, F. (2004). Creativity test standardization, *News in Cognitive Sciences, Tehran.* [Persian]
8. Zare, H., Akhoondi, N., Arab Sheibani, Kh. (2011). The relationship between thinking styles of creative male and female students in PNU, *the first national conference on the findings of cognitive science in education, Tehran*. [Persian]
9. Solgi, Z. (2010). The Relationship between Thinking Styles and Academic Achievement of Students. *The first national conference on the findings of cognitive science in education*. [Persian]
10. Emamipoor, S., Seif, A. (2003). Evaluation of Changes in Students' Thinking Styles and Their Relationship with Creativity and Achievement. *Journal of Educational Innovations*, 2 (3): 35-56. [Persian]
11. Razavi, A, Shiri, A., (2005). A Comparative Study of the Relationship between Thinking Styles and Academic Achievement of High School Boys and Girls. *Journal of Educational Innovations*, 4 (12): 86-108. [Persian]
12. Nouri, Z. (2003). *Evaluation of Gender Differences With Regard To the Relationship between Creativity and Academic Performance in Math, Science and Literature High*

School Students in Shiraz. Master's thesis. Institute for Humanities and Cultural Studies. [Persian]

13. Shu Ching, Y., Wen Chaun, L. (2004). The Relationship among Creative, Critical Thinking and Thinking Style in Taiwan high school students. *Journal of Instructional Psychology*, 31 (1): 33-45.

14. Nateghian, S. (2008). *Predicting Creative Thinking Styles of Students.* Master's Thesis, Faculty of Psychology and Educational Sciences, Tehran PNU. [Persian]

15. Soltani Amrabadi, M. (2002). *The Relationship between Creativity and Ways to Deal with Stress on High School Students in Isfahan*. Isfahan University. [Persian]

16. Abedi, J. (1993). Creativity and New Ways to Measure. *The Psychological Research*, 2 (3): 46-54. [Persian]

17. Sternberg. R. J., Wagner, R. K. (1992). *Thinking styles Inventory*. Yale University Unpublished test. Tufts Daily, November.

18. Proctor, R. M. G., Burnett, P. S. (2008). Measuring Cognitive and Dispositional Characteristics of Creativity in elementary students. *Creativity Research Journal*, 16 (4), 421-42 .

19. Ptacek, K. L., McKee T. L. (2004). "I've Got Some Bad News…": Veterinarians' Recollections of Communicating Bad News to Clients. *Journal of Applied Social Psychology*, 34 (2): 366-390.

20. Neal. (1994). Increasing Student's Thinking Skill. *College student Journal*, 4 (2): 14-21.

21. Zhang, L. F. (2002). Thinking Styles and Modes of Thinking: Implications for Education And Research. *Journal of Psychol*, 136 (3): 245-261.

22. Lumbe, J. (1994). *Thinking Styles and Accessing Information on the World Wide Web, Bangor, and University College of North Wales, Available*. Processes. Lanham, Maryland: The Scarecrow Press, Inc .

23. Ko, S. (2008). Do Thinking Styles Of Entrepreneurs Matter In Inn0vation. *Journal of Global Business and Technology*, 4 (2): 24+.

24. Chin and Sichuan, (2004). *The California Critical Thinking Skill Test: form B (CCTST)*. Millbrae: The California Academic Press.

25. Sternberg, R. J., Grigorenko, E. L. (2000). Teaching for Successful Intelligence: Principles, Procedures, and Practices. *Journal for the Education of the Gifted*, 27 (2-3): 207–228.

26. Adam, A., Manson, T. M. (2014). Using Pseudo-Science Activity To Teach Critical Thinking. *Teaching of Psychology*, 41 (2): 130-134.

27. Poorfaraj Omran, M. (2008). The Relationship between Creativity, Emotional Intelligence and Self-Efficacy. *The first national conference on creativity and innovation management in Iran*. [Persian]

28. Sternberg, R. J., Grigorenko, E. L. (1996). Teaching For Successful Intelligence: Principles, Procedures, and Practices. *Journal for the Education of the Gifted*, 27 (2-

3): 207–228.

29. Zhang. L. F. (2006). Thinking Styles And Big Five Personality Traits Revisited. *Personality and individual difference*, 40 (6): 1177-1187.

30. Sternberg, R. J. (1988). Mental self-Government: A Theory of Intellectual styles and their development. *Human Development*, 31 (4):197–224.

31. Alboszta, A. (2005). *Critical Thinking is Objective*. American Center Workshop Series.