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Investigating the relationship between thinking styles and creativity, Tendency to Innovation and academic motivation in students

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Abstract

Purpose: This research has been designed and implemented with the aim of determining the relationship between thinking styles with creativity, orientation towards innovation and academic motivation in students. **Methodology**: The research method was descriptive-correlational and the sample consisted of 309 master students among twelve majors of the Islamic Azad University for Kermanshah Branch, which was selected by stratified random sampling method. The Sternberg-Wagner Thinking Styles Questionnaire was used to determine the style of thinking, Randsip's standardized questionnaire was used to assess the creativity, Researcher-made questionnaire with Likert comparison was used to determine the tendency for innovation, and also Vallerand standard questionnaire has been used to assess the academic motivation. The collected data were analyzed using descriptive statistical methods including mean, median, mode, variance, standard deviation, tables and graphs of inferential statistics including multivariate regression. **Findings**: The results of the research showed that there was a significant relationship between the executive, exterior, judiciary, legislator, individualist, minor, conservative thinking styles, with the creativity. However, there was no positive and significant relationship between the open mindedness, the inner and general thinking styles with the creativity. There was also a positive and significant relationship between all styles of thinking with tendency to innovation. With increasing the academic motivation, there was only a significant relationship between general and executive thinking styles with the academic motivation, whereas in other styles there was no significant relationship with the academic motivation. **Discussion:** Based on that, it is suggested to design and implement the methods and the training process in accordance with the student's type and style of thinking to guide and encourage them to pay attention to creativity and innovation, as well as academic motivation at universities and educational institutions.

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1. Introduction

In many universities and in many fields, including psychology (USA), the first-year students are widely encouraged for executive, minor-looking and conservative styles, while for the senior students, the judiciary style becomes more important than the executive style. When the students enter to the higher education or research courses, they are more likely to be encouraged for creative ideas, which means more for the legislator style; however, the executive style is also encouraged. As a result, in general, the higher-level students are more legislator and libertarian (Sternberg, 1997, quoted from Emamipour and Seif, 2003, p. 38).

For more than half a century, the researchers have studied the role of thinking styles in human behavior and functions in both scientific and non-scientific environments (Zhang, 2008, p. 37). Consistency between thinking styles and abilities creates an incremental force that is much more than the total of its components, therefore, those who are thought to be incapable of doing something may not be due to lack of ability, but their thinking style does not match those who rate it. Thinking styles help one better understand why some activities are suitable for him and some others are not (Haghighatjou, 1998, p. 14). With the increasing progress of knowledge and technology and the widespread of information flow, today the community needs to train the skills that can keep pace with the development of science and technology. The goal is to cultivate the humans capable of facing the problems with creative thinking and solving them; in such a way that humans can communicate well and solve the problems with utilizing the collective knowledge and the production of new ideas. Nowadays people need to be educated the creativity in order to move toward a happy society with creation of new thoughts (Babapour et al., 2011; P. 27).

One master student is expected to be innovative in his field, in addition to research. Creativity, tendency to innovation and academic motivation are the features that cause the development of divergent thinking in a person and prepare him for the invention. In this regard, the research question is to investigate the relationship between thinking styles with the creativity, tendency to innovation and academic motivation in students. If the relationship between these fields is clear, one can hope to provide the field of education for the students who are talented, because it is believed that the creativity and innovation can be taught. Therefore, the research question is "Is there any significant relationship between thinking styles and creativity, the tendency to innovate the academic achievement of students in the statistical society".

2. Literature review

Zhang and Sternberg (2000), used a thinking style questionnaire, Biggs study process and creativity and founded that the difference between men and women in thinking style questionnaire was significant. Regarding the correlation between thinking styles and creativity, the findings showed that there is a significant relationship between legislator, judiciary, libertarian and hierarchical style with creativity, but the executive thinking style has not a significant relationship with the creativity.

Kim and Faikel (1995), conducted a study on the relationship between thinking styles and creativity in Korean students, in which 92 boys and 110 girls formed the sample group. Their creativity was measured by the Torrance creativity test and the results showed that there is little relation between the thinking style and creativity, and women tend to be more creative than men. But regardless of the gender of students, legislator and judiciary thinking styles have gotten higher grades than the executive thinking style and have a positive relationship with creativity.

Hamidi (2009), in his research showed that there is a positive relationship between creativity and documentary styles and the judiciary, individualist, libertarian, and legislator thinking style, but there is a negative relationship between creativity with the executive thinking style. That is, the more the executive style thinking increases, creativity decreases.

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Nateghiyan (2008), has done a research titled "Comparison of Thinking Styles in Students with High and Low Creativity". Thinking styles refer to the preferences of individuals in using their individual abilities. Scientists consider thinking as both the fundamental element and the transformation of human existence. As a result, thoughts play a fundamental role in human behavior. Participants (165 girls and 183 boys) were asked to complete the Sternberg Thinking Style Questionnaire, Abedi Creativity Questionnaire and Demographic Questionnaire. To analyze the collected data, multiple regression analysis was used. The findings showed that the legislator, judiciary, holistic, hierarchical and libertarian thinking style can predict higher creativity scores. These styles are a set of thinking styles that have been introduced as creativity generators and require complex information processing, and also the thinking style cannot predict the creativity.

Hashemiyan (2008), in a research entitled "The Relationship between Thinking Styles and Creativity with the Students' Happiness" showed that 32% of the legislator thinking style and 33% of the judiciary thinking style had a significant relationship with the creativity. There is not a significant relationship between the executive thinking style and the creativity.

Khoeini (2005), studied the relationship between the thinking styles and creativity of female master students of the English language major in Tehran City. The sample of the study was 180 ones out of 4 colleges, selected by multistage cluster sampling. To measure the creativity, Abedi's creativity test was used and the Sternberg Thinking Style Questionnaire was used to measure the students' thinking styles. After collecting data, the following results were obtained using Pearson correlation coefficient: There is a significant relationship between the legislator and judiciary thinking styles with creativity, but the relationship between executive thinking style and creativity is not significant.

3. Methodology

This type of research is applied, according to the purpose. It is a descriptive research and in a correlation method in terms of methodological nature. The logical method, used in the researches of the most researchers, are used to characterize a scientific research. According to the nature of the data, the multivariable regression has been used in this research. To collect the data, a questionnaire-randomized tool was used. The statistical population of this study is the students of twelve different majors from the Islamic Azad University of Kermanshah City. The statistical population in this research includes all master students in Kermanshah Islamic Azad University in the academic year 2014-2015, who studied in 12 majors. The number of these students is 1570 ones. The sample consisted of 309 students of Kermanshah Azad University. In this research, the stratified sampling method was used. In this research, Sternberg-Wagner Thinking Styles questionnaire, Randsip's Creativity Score, 28-item Vallerand questionnaire on academic motivation and a 25-item innovation questionnaire were used.

4. Findings

The results of the data analysis show that among 309 participants who participated in this study, 166 ones equal to 53.7% of total sample were male and 143 ones, equal to 46.3% were women. 31 ones, 10% of the total sample, were between 20-30 years old, 194 ones, equal to 62.8% were between 31-40 years old, 62 ones, equal to 20.1% were between 41-50 years old, and 22 ones, equal to 1.7% were older than 50 years old.

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To test the normal distribution of variables, we used the Kolmogorov-Smirnov test. The zero hypothesis in this test shows the normal distribution of variables. If the test level is less than 0.05, then the zero hypothesis is rejected and we conclude that the distribution of the desired variable is not normal.

Table 1. The results of the Kolmogorov-Smirnov test to verify the data following from the normal distribution

variable	numbers	mean	Standard deviation	Value of statistics z	Significance level	Result of test
Legislation	309	4.83	1.551	2.916	0.000	Not normal
Executive	309	4.81	1.584	3.403	0.000	Not normal
Judicial	309	4.89	1.641	2.892	0.000	Not normal
Monotony	309	4.49	1.464	2.931	0.000	Not normal
Ordering	309	4.98	1.559	3.626	0.000	Not normal
Groupware	309	4	1.513	3.019	0.000	Not normal
Chaos	309	4.42	1.451	2.581	0.000	Not normal
General	309	4.54	1.521	2.352	0.000	Not normal
Minor	309	4.32	1.457	2.597	0.000	Not normal
Inner	309	4.06	1.461	2.735	0.000	Not normal
external	309	5.03	1.647	3.154	0.000	Not normal
libertarian	309	5.04	1.699	2.825	0.000	Not normal
Conservatism	309	4.27	1.482	2.281	0.000	Not normal
Creativity	309	3.31	0.618	3.935	0.000	Not normal
educational motivation	309	4.34	1.025	1.763	0.004	Not normal
Tendency to Innovation	309	3.33	0.368	2.117	0.000	Not normal

The results of the data analysis indicate that none of the components in this study follow normal distribution.
First hypothesis: There is a relationship between the legislator thinking style and the level of creativity, tendency to innovation and academic motivation.

Table 2. The relationship between legislator thinking styles and creativity, tendency to innovation and academic motivation

	Regression coefficients β	T value	The significance level
y-intercept	0.457	0.531	0.596
Motivation	-0.080	-0.862	0.390
Tendency to Innovation	1.057	4.060	0.000
Creativity	0.365	2.606	0.010

That is, for one unit of increasing creativity and tendency toward innovation, the legislator thinking style increases to 1.879 units.
Second hypothesis: There is a relationship between the executive thinking style and the level of creativity, tendency to innovation and academic motivation.

Table 3. Investigating the relationship between executive thinking styles and creativity, tendency to innovation and academic motivation

y-intercept	0.944	1.078	0.282
Motivation	-0.269	-2.832	0.005
Tendency to Innovation	1.205	4.547	0.000
Creativity	0.309	2.173	0.031

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That is, for one unit of increasing the creativity, the tendency toward innovation, the executive thinking style increases to 2.189 units.

The third hypothesis: There is a significant relationship between the judicial style thinking and the level of creativity, tendency to innovation and academic motivation.

Table 4. Relationship between the judicial thinking style and the level of creativity, tendency to innovation and academic motivation

y-intercept	0.582	0.636	0.525
Motivation	-0.103	-1.037	0.301
Tendency to Innovation	1.028	3.715	0.000
Creativity	0.402	2.705	0.007

That is, for one unit of increasing the creativity and tendency toward innovation, the judicial thinking style is increased to 2.012 units.

Fourth hypothesis: There is a relationship between the monotony thinking style and the level of creativity, tendency to innovation and academic motivation.

Table 5. The relationship between monotony thinking style and creativity, incentive to innovation and academic motivation

y-intercept	1.037	1.263	0.208
Motivation	-0.127	-1.433	0.153
Tendency to Innovation	0.923	3.717	0.000
Creativity	0.281	2.107	0.036

That is, for one unit of increasing the creativity and a tendency toward innovation, the ordering thinking style increases to 2.241 units.

Fifth hypothesis: There is a relationship between the ordering thinking style and the level of creativity, tendency to innovation, and academic motivation.

Table 6. The relationship between the ordering thinking style and the level of creativity, tendency to innovate and academic motivation

y-intercept	0.570	0.668	0.505
Motivation	-0.250	-2.701	0.007
Tendency to Innovation	1.469	1.469	0.000
Creativity	0.185	1.332	0.184

That is, for one unit of increasing the motivation and a tendency toward innovation, the groupware thinking style increases to 1.789.

Sixth hypothesis: There is a relationship between the groupware thinking style and the level of creativity, tendency to innovation and academic motivation.

Table 7. The relationship between groupware thinking style and creativity, tendency to innovation and academic motivation

y-intercept	-0.164	-0.195	0.846
Motivation	0.073	0.800	0.425
Tendency to Innovation	0.858	3.359	0.001
Creativity	0.300	2.184	0.030

That is, for one unit of increasing the creativity and a tendency to innovate, the group thinking style increases to 1.158 units.

Seventh hypothesis: There is a relationship between the chaotic thinking style and the level of creativity, tendency to innovation, and academic motivation.

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Table 8. The relationship between chaotic thinking styles and creativity, incentives for innovation and academic motivation

y-intercept	0.774	0.950	0.343
Motivation	0.004	0.048	0.962
Tendency to Innovation	0.802	3.255	0.001
Creativity	0.289	2.180	0.030

That is, for one unit of increasing the creativity and a tendency to innovate, the chaotic thinking style increases to 1.865 units.

Eighth hypothesis: There is a relationship between the general thinking style and the level of creativity, tendency to innovation and academic motivation.

Table 9. Relationship between general thinking style and creativity, tendency to innovation and academic motivation

y-intercept	1.592	1.846	0.066
Motivation	-0.105	-1.128	0.260
Tendency to Innovation	0.758	2.906	0.004
Creativity	0.266	1.899	0.059

That is, for one unit of increasing the tendency to innovation, the general thinking style increases to 2.35 units

Ninth hypothesis: There is a relationship between the thinking style and the level of creativity, tendency to innovation and academic motivation

Table 10. Relationship between the minor thinking style and the level of creativity, tendency to innovation and academic motivation

y-intercept	-1.497	-1.938	0.054
Motivation	-0.057	-0.683	0.495
Tendency to Innovation	1.537	6.580	0.000
Creativity	0.286	2.275	0.024

That is, for one unit of increasing the creativity and a tendency to innovation, the minor thinking style increases to 0.322 units

The tenth hypothesis: there is a relationship between the inner thinking style and the level of creativity, tendency to innovation, and academic motivation.

Table 11. The relationship between inner thinking style and creativity, tendency to innovation and academic motivation

y-intercept	0.170	0.208	0.835
Motivation	-0.033	-0.372	0.710
Tendency to Innovation	1.062	4.308	0.000
Creativity	0.152	1.146	0.253

That is, for one unit of increasing the tendency to innovation, the inner thinking style increases to 1.232 units.

The eleventh hypothesis: There is a relationship between the external thinking style and the level of creativity, tendency to innovation and academic motivation.

[DOR: 20.1001.1.26453460.2016.1.1.9.1]

Table 12. Relationship between external thinking styles and creativity, tendency to innovation and academic motivation

y-intercept	1.609	1.733	0.084
Motivation	-0.158	-1.571	0.117
Tendency to Innovation	0.923	3.284	0.001
Creativity	0.312	2.070	0.039

That is, for one unit of increasing the creativity and tendency to innovation, the external thinking style increases to 2.844 units.

The twelfth hypothesis: There is a relationship between the libertarian thinking style and the level of creativity, tendency to innovation and academic motivation.

Table 13. Relationship between libertarian thinking style and creativity, tendency to innovation and academic motivation

y-intercept	1.278	1.337	0.182
Motivation	-0.116	-1.124	0.262
Tendency to Innovation	1.191	4.116	0.000
Creativity	0.092	0.589	0.556

That is, for one unit of increasing the tendency to innovation, the libertarian thinking style increases to 2.469 units.

The thirteenth hypothesis: There is a relationship between the conservatism thinking style and the level of creativity, tendency to innovation, and academic motivation.

Table 14. Relationship between conservatism thinking style and creativity, orientation towards innovation and academic motivation

y-intercept	0.166	0.202	0.840
Motivation	-0.053	-0.597	0.551
Tendency to Innovation	0.871	3.50	0.001
Creativity	0.434	3.24	0.001

That is, for one unit of increasing the creativity and a tendency toward innovation, the conservatism thinking style increases to 1.471 units.

5. Discussion

The results of the research show that there is a positive and significant relationship between the executive, exterior, judiciary, legislator, individualist, minor, conservative thinking styles with the creativity and there is no positive and significant relationship between the libertarian, inner and general thinking style with the creativity. There is also a positive relationship between all thinking styles with the innovation, but with the academic motivation.

The results of this research are based on the results of the research done by Haghighatjou et al. (2009) based on the ability of principals with the executive thinking style in organizational health promotion of the universities; Sooneh (2009), based on the positive effect of leadership style (executives) on the teachers' creativity and innovation; Emamipour et al. (2003), based on the positive and significant relationship between the Darwin's executive thinking style with the creativity; the results of Selgi's (2011), based on the positive and significant relationship between executive thinking styles and academic achievement of students; the research done by Haghighatjou et al. (2008), based on the existence of a correlation between organizational health and executive practice, and the research done by Sarvghad (2010), based on a positive correlation between self-efficacy and the executive thinking style. The results of the research is not

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consistent with the results of the research done by Khoinie (2005), based on the lack of statistically significant relationship between the executive thinking style and the creativity of female students. It can be said that the reason for the relationship between the executive thinking style and tendency towards innovation in students, can be attributed to the order and precision in people with this style. Because people with this thinking style want to follow the rules and do things in a regular manner and have plans to do their work beforehand. Particularly, with increasing of the students' educational level, they less operate in a one-dimensional way, they solve the problems more systematically and on an organized basis. They pay attention to creativity and innovation in their work, and they are reluctant to follow the customary rules. Also, the results of the research is consistent with the results of Sternberg and Oeharwalbert' research (1997), that indicated there is a relationship between the high levels of creativity and the legislator thinking styles, and also with the results of the research by Sternberg Wellbart (1991), based on the relationship between thinking styles and creativity and the tendency of creative people to be consistent with the legislator styles; in addition, the results of Kiani's research (2003) based on the teachers' high efficiency with legislator thinking style; Selki's (2011) based on the positive correlation between legislator thinking style and academic achievement of students, Sarvghad et al. research (2010), based on the positive correlation between self-efficiency and the legislator thinking style, and the study of Haghighatjou et al. (2008) based on the positive correlation between entrepreneurship and the legislator thinking style. It is not consistent with the results of the research done by Emamipour and Seif (2003), based on the lack of statistical relationship between the legislator thinking style and creativity, and the research of Haghighatjou et al. (2008), on the lack of correlation between organizational health and the legislator thinking style. Because, in expressing the features of this kind of thinking style, Sternberg (1996) believes that people with this type of thinking style tend to create, invent, and design, and they do things in their own way, and doing things done by the others for them will displease them, and in the most cases this dissatisfaction leads to their failure.

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