

The Differences in Creative Thinking: The Comparison of Male and Female Students

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Abstract

In the literature, previous studies reported that females were more creative than males. In opposite, some studies informed that males are more creative than females. Also, it was notified that there was no significant difference between females and males according to other studies. For this reason, this study was conducted to study the creative thinking ability in terms of gender differences in order to obtain new findings to this area. Accordingly, Turkish university female students were compared with male students to determine whether significant difference. According to results, it was found significant difference between females and males upon creative thinking in favor of females. Also, it was found that females scored higher on the *originality* and *strengths* subscales of the creative thinking than males. Thus, it was concluded that female students might possess creative and innovative as creative style in thinking process significantly than male students in higher education level.

Keywords: Creativity, insight, productive thinking, innovative creative style, originality

The creativity is the most crucial issue for individuals. As Cha'vez-Eakle, Eakle, and Cruz-Fuentes (2012) stated, the creativity enhances human adaptation to the environment and circumstances. Many studies have supported that one of the most important of certain personality attributes is the creativity; however, creative performance may vary from one culture to another (Sternberg, 2006). Also, the creative performance might be different from female to male as gender. The gender differences in terms of the creativity have been discussed since decades. The studies in past carried out on this issue and reported different findings belonged to participants in various education levels. Although there have been some findings, it can be said that these findings on creativity have not been enough to understand the gender differences on the creative thinking.

The creativity involves a large number of definitions. As Torrance (1962) stated, the creativity is production of something as *new* or *original*. In recent decades, it has been reached a consensus that creativity involves *novel* and *useful* (Mumford, 2003). However, it is not possible to say that there has been any existing consensus upon the gender differences regarding creativity. For instance, Torrance (1962) stated that most creative boy students had a great impact on their classmates than most creative girl students. Whereas, Mullineaux and Dilalla (2009) stated that some previous studies suggested that females might have advantage on the creativity measurements in middle childhood and adolescence. On the other hand, Charyton, Basham and Elliot (2008) reported that there were not significant gender differences between university students in terms of general creativity measures. Accordingly, Lau and Cheung (2010) stated, previous studies showed that boys and girls also vary on different measures of divergent thinking. For this issue, Runco, Millar, Acar and Cramond (2010) stated that some forecasts of creativity demonstrated differences between men and women. However, based on evidence of gender differences in creativity overview, Baer and Kaufman (2008) stated that existing proofs showed that women and girls inclined to score higher on creativity tests than men and boys, but there were also studies that reported the opposite findings. Although there are various study reports in the literature in terms of large variety of participants about difference (or indifference) in creative thinking as gender, Hong, Peng, O'Neil and Wu (2013) based on previous studies also stated that females scored higher on verbal matters, whereas males scored higher on figural items in divergent thinking measures.

To this point, Besançon and Lubart (2008) stated that some previous studies (e.g. Petrulytė, 2007; Thomas & Berk, 1981) reported that there were different results on the

creativity regarding gender. Accordingly, Wang (2012) emphasized that gender differences on creative performance was ambiguous in the literature. However, Hong et al., (2013) underlined that gender comparisons were vital subject for understanding gender differences in creative thinking ability. As Torrance (1965) stated, the creative thinking abilities could be complex, but differences might be associated logically with the nature of the differential rewards and influence on the kinds of experiencing open to boys and to girls. At this point, it can be said that creative thinking between male and female are important, and the related literature on this issue has still not included different findings obtained from variety of participants. Hence, Isaksen and Puccio (1988) indicated that future research would be necessary, and more studies should conduct to determine creative thinking ability (Hong et al., 2013). As Lau and Cheung (e.g., 2010) stated, the analyzing upon the gender differences can give us an understanding in terms of the creative thinking development. On the other hand, Baer and Kaufman (e.g., 2008) based on researchers pointed out that most of subjects of studies on the gender differences in creativity were consisted with children or high education students, but they stated that these participants might not yet showed prominent creative achievement. Also, Torrance (e.g., 1965) warned that gender differences in creative thinking might not be similar in all cultures. According to him, a culture may encourage or discourage creative behavior. Based on these clarifications, it can be said that supplemental new research data will be useful on this issue regarding creative thinking development in related literature as well. That is, the more studies examine the gender differences in the creativity, the more likely we can understand the creative thinking. For that, this study aimed to determine the differences between male and female students' creative thinking in higher education level. Thus, present study was the first in regard to compare of the creative thinking of Turkish male and female students in the higher education level with using of the Torrance Tests of Creative Thinking (TTCT) Figural-B form. Accordingly, this study was performed to answer these research questions as follows:

Research questions

Q1- Is there significant difference between Turkish male and female students' creative thinking in the higher education level.

Q2- Is there significant difference between Turkish male and female students' creative thinking subscales as *Fluency*, *Originality*, *Elaboration*, *Abstractness of (Titles)*, *Resistance to Premature (Closure)* and *Creative (Strengths)* in the higher education level.

Method

This study was carried out in a public university of the Turkey as a quantitative research design to determine the possible differences in the creative thinking of students in the higher education level regarding gender variable.

Samples

The university students (male $N= 43$; female $N= 41$) participated in this study. The participating students pursue their education at education faculty. The male students ($M_{age} = 18.74$) and female students ($M_{age} = 18.26$) followed of education faculty in their first semester of university education stage. The data analyzed in this study was collected during the autumn of 2014 semester.

Measurements

In this study, the *Torrance Tests of Creative Thinking (TTCT) Figural – B* form was used to measure of creative thinking of the students. TTCT Figural form gives provides opportunity to measure of creative thinking subscales widely as *Fluency*, *Originality*, *Elaboration*, *Abstractness of (Titles)*, *Resistance to Premature (Closure)* and *Creative (Strengths)*. This form was invented by Torrance (1966). The manual of TTCT as third edition in 1984 was used for scoring procedure in this study. The Turkish version of the TTCT was performed reliability and validity studies by Aslan (2001). For reliability and validity studies, the data was collected from preschool students to university students ($N= 922$). The reliability analysis as Cronbach Alpha coefficient was found as .70. For the validity study, the Wechsler Adult Intelligence Scale (WAIS) was compared with the Turkish version of the TTCT. Also, the original TTCT (in the English language) and the Turkish version of the TTCT' scores were belonged same samples were compared in terms of linguistic equivalence and it was found high positive linear relationship (*Pearson-Product Moment*) between these scores. Consequently, Aslan (2001) reported that studies of the reliability, validity and, linguistic equivalence of the Turkish version of the TTCT were provided by these analyses.

Data analysis

For the data analysis, the Analysis of Covariance (ANCOVA) was used to compare of the creative thinking of male students and female students to find the sources of the differences between the mean score of the creative thinking as gender variable. To answer the research questions of the study, the gender was took as independent variable. The creative thinking (TTCT) was also used as dependent variable in the ANCOVA. Thus, the age was held as covariate to control of external validity, because, the age can be very important indicator for creative thinking development (e.g., Mullineaux & Dilalla, 2009).

Findings

The ANCOVA analysis revealed the significant difference between gender as female and male students on creative thinking [$F(1, 81) = 4.33, p = .04, \eta^2 = .05$]. The unadjusted and adjusted means for creative thinking scores of the participating students regarding gender can be seen in Table 1. Participating female students' mean score of the creative thinking was found significantly higher (adjusted $M = 9.33, SE = .43$) than male students (adjusted $M = 8.03, SE = .42$).

Table 1
Means and Adjusted Means for Creative Thinking by the Gender

Dependent Variable	Gender (Independent Variable)				
	Female ^a		Male ^b		
TTCT					
Unadjusted Scores	<i>M (SD)</i>	9.65	2.42	7.72	3.34
Adjusted Scores	<i>M (SE)</i>	9.33	.43	8.03	.42

^a $N = 41, \sup bN = 43$

For each subscale of the creative thinking in the (TTCT) measurement, ANCOVA was conducted to determine the significant difference between female and male students regarding the gender. Accordingly, the each subscale was held as dependent variable. The gender was also taken as independent variable and the age of participants was assigned as covariate. The ANCOVA analysis revealed the significant difference between female and male students' creative thinking subscales on the *originality* [$F(1, 81) = 6.15, p = .015, \eta^2 = .07$], and the *strengths* [$F(1, 81) = 6.82, p = .011, \eta^2 = .07$] seen in Table 2. Also, the unadjusted and adjusted mean scores for creative thinking subscales are presented in Table 3.

Table 2
Analysis of Covariance for Creative Thinking Subscales by Gender

Subscales	<i>MS</i>	<i>F</i> (1, 81)	<i>P</i>
Fluency	17.76	.94	.33
Originality	58.84	6.15	.01*
Elaboration	.79	.18	.66
Closure	.00	.00	.97
Titles	19.91	2.05	.15
Strengths	14.27	6.82	.01*

* $p < .05$

Table 3
Analysis of Covariance for the Creative Thinking Subscales with Mean Scores and Adjusted Mean Scores by the Gender

Subscales		Gender				
		Female ^a		Male ^b		
Fluency	Unadjusted Posttest	<i>M (SD)</i>	13.43	4.07	12.00	4.67
	Adjusted Posttest	<i>M (SE)</i>	13.19	.69	12.23	.67
Originality	Unadjusted Posttest	<i>M (SD)</i>	6.14	3.21	4.13	3.00
	Adjusted Posttest	<i>M (SE)</i>	6.01	.49	4.26	.48
Elaboration	Unadjusted Posttest	<i>M (SD)</i>	8.34	1.93	7.69	2.42
	Adjusted Posttest	<i>M (SE)</i>	8.11	.33	7.91	.32
Closure	Unadjusted Posttest	<i>M (SD)</i>	1.58	.83	1.41	1.43
	Adjusted Posttest	<i>M (SE)</i>	1.49	.18	1.50	.17
Titles	Unadjusted Posttest	<i>M (SD)</i>	3.39	2.85	3.93	3.50
	Adjusted Posttest	<i>M (SE)</i>	3.14	.49	4.16	.48
Strengths	Unadjusted Posttest	<i>M (SD)</i>	3.07	1.45	1.93	1.57
	Adjusted Posttest	<i>M (SE)</i>	2.92	.23	2.06	.22

^a $N = 41$, ^b $N = 43$

Regarding the higher mean related to subscales were obtained by female participants than male ones. However, the Originality (adjusted $M_{\text{female}} = 6.01$, $SE = .49$; adjusted $M_{\text{male}} = 4.26$, $SE = .48$) and the Strengths (adjusted $M_{\text{female}} = 2.92$, $SE = .23$; adjusted $M_{\text{male}} = 2.06$, $SE = .22$) of creative thinking subscales were significantly different in favor of female students.

Discussion and Conclusion

According to present result, it was found that there was significant difference between male and female university students on creative thinking in favor of female ones. This result is supported by previous studies in various education levels as follow: Besançon and Lubart (e.g., 2008) found that creative performance significantly increased by gender in favor of girls from first grade toward the 4th grade. Lau and Cheung (e.g., 2010) found that girls outperformed boys in the junior high grades regarding creative thinking. Also, they found that creativity scores enlarged from Grade 7 to Grade 8 in favor of the girls, but narrowed down Grade 8 to Grade 9. Additionally, Mullineaux and Dilalla (e.g., 2009) found that girls excelled more than boys in creative thinking measurements between 5 year old and adolescence age. However, present result is not consistent with previous study of Lau and Cheung (e.g., 2010), who found that boys had higher creativity scores among the primary and secondary students (from Grade 4 toward Grade 9). Also, Isaksen and Puccio (e.g., 1988) found that there was no significant difference between men and women in terms of creative thinking among the college students.

Accordingly, it can be said that creative thinking skills of students may be different as regarding the gender variable in different education levels. At this point, Cunningham and Macgregor (2013), as based on researchers (e.g., Sternberg & Davidson, 1999), stated that creative thinking would not be realized without an understanding of insight. Runco (2014) clarified that creative insights can result from an ability to transform one thing into another. As supported by Cha'vez-Eakle et al., (2012), creative thinking facilitates this transformation to be possible. On the other hand, Gestalt psychologists clarified two general processes related to insight as *productive thinking* and *re-productive thinking*. Accordingly, 'productive thinking' permits problem solver to consider a novelty and transformational (e.g., Cunningham & Macgregor, 2013). The *productive thinking* moves toward the new situation relevant to the specific problem or situation, while 're-productive thinking' interferes with an effective solution process on a new problem solved in the same way as a previous one (e.g., Cunningham & Macgregor, 2013). As based on the Gestalt tradition, Cunningham and Macgregor (e.g., 2013) stated that *productive thinking* may be a reaction to the idea of an organism's learning based merely on past experiences. As supported to this point, Cha'vez-Eakle et al., (2012) stated that higher activation in brain both right and left cerebral hemispheres was observed during vivid experience of insight in highly creative individuals. With referring to Kohler, they stated that animal exhibits insight in *problem-solving* new

situations as demonstration of the intelligence. Cunningham and Macgregor (e.g., 2013), as based on prominent researchers, stated that *productive thinking* starts with understanding of the structural characteristics of a problem, whereas *re-productive thinking* refers to habitual styles of thought. According to that, it can be put forward that productive thinking challenges habitual styles of thought including the novelty. As related to the present result, consequently, it can be said that females tend to ignore the habitual styles of thought and they initially tend to think creatively to understand the structure of a problem more than males. This situation is consistent with conclusions of Hong et al., (2013), based on researcher they stated that girls were more social and interpersonal problem solver than boys in early childhood. Perhaps, under the light of the present result, this situation might evolve from childhood age toward adulthood in girls continually as gender difference. Accordingly, girls mostly tend to think transformational based on productive thinking, and thus, the novelty in thinking may be cause of stifle habitual learning styles. Then, possible explanation of the present result with considering previous study findings can be that females possess creative outcomes through productive thinking more than males.

In present study, it was also found that there was significant difference between male and female students on the *originality* and *strengths* as creative thinking subscales in favor of the female ones. This result is supported by Mullineaux and Dilalla (e.g., 2009) who found that girls had significantly higher average in creative thinking and drawing production more novel at ages 10-15 than boys. Also, Lau and Cheung (e.g., 2010) found that girl students excelled in Fluency and Uniqueness (*originality*) than boy students in both Grade 7 and Grade 8. In contrast, Piaw (2013) found that male outperformed the female students on the *elaboration* as other subscale of the creative thinking. On the contrary to that, Hong et al., (2013) found that girl students scored higher in the Fluency and Elaboration than boy students (Grade 10). However, Aslan and Puccio (2006) reported that there were significant differences between women and men in favor of men regarding verbal Fluency among the adult samples. Considering to previous study findings, it can be said that findings regarding the gender in creative thinking subscales may vary according to the variety of the participants. However, present study findings indicate that female students may possess originality and creative strengths more than male students in higher education level. This result is also supported productive thinking theory as follow: King, McKee Walker and Broyles (1996) based on McCrae, 1987 stated that *curiosity*, *aesthetic sensitivity*, *liberal values*, and *emotional differentiation* were highly creative productive trait of individuals. Since the

productive thinking opens to the novelty and challenges habitual thought, it is possible that females may possess the 'curiosity', 'aesthetic sensitivity', 'liberal values', and 'emotional differentiation' more than males. Also, open individuals, as possess of openness trait, can be more likely to transform situations into relevant opportunities (King et al., 1996, 201). To this point, Guiford and Hoepfner (1971) stated that creative performance depend on the transformation during the production. This situation is very meaningful that creative individuals can tend to transform their abilities one thing into another thing originating from their possessive productive thinking.

On the other hand, Isaksen and Puccio (e.g., 1988) found the larger correlations between Kirton Adaption-Innovation Inventory (KAI) subscales and Torrance Tests of Creative Thinking (TTCT Verbal-B) subscales in favor of the men regarding Originality and Fluency among the college students. Thus, Isaksen and Puccio (e.g., 1988) stated that TTCT subscale of the Originality and Fluency exhibited extreme innovative than adaptive. Similarly, Kim (2006) confirmed that Originality, Fluency and Closure exhibited innovative factor of creative thinking, whereas the adaptive factor may be consisted of Elaboration, Titles, and Strengths. However, Kim (e.g., 2006) stated that factor models without Strengths were better fit than those with Strengths. Also, Isaksen and Puccio (e.g., 1988) emphasized that adaptive creative style was related to conformity, whereas innovative creative style associated with producing original ideas and it was not being of limited by the boundaries of a problem. According to present result, it can be said that female students can be more innovative than male ones. In contrast to that, Cunningham and Macgregor (e.g., 2013) found that males were slightly closer to the innovator than female university students in science and social sciences areas with using visual insight problems. However, Torrance (e.g., 1962) stated that creativity requires both sensitivity and independence. According to him, sensitivity is definitely a feminine character; by contrast, independence is a masculine virtue in our society. At this point, Torrance (e.g., 1962) explained that highly creative boy might appear to be more effeminate than other boys his age, and highly creative girls might appear to be more masculine than other girls her age. Such development, perhaps, it may cause many children to sacrifice their creativity at an early age (e.g., Torrance, 1965). Conversely, girls may possess both sensitive and independence as well. This situation may be also valid for boys. However, Torrance (e.g., 1965) emphasized that highly creative boys exhibit more uniqueness, inventiveness, and originality in the drawings or productions than highly creative girls. Torrance (e.g., 1965) stated that second grade elementary girl students tend to learn better

than boy ones when the learning based on authoritative identification rather than by more spontaneous or creative ways of learning. At this point, it can be put forward that it is possible impacts of the culture upon the creative thinking of the individuals regarding gender variable. Because, there are significant main effects of the society, gender and thinking style upon the creative thinking ability of students (e.g., Piaw, 2013). Considering this point, one can assess that there may be impact of cultural background upon creativity of individuals as based on previous studies (Baker, Rudd & Pomeroy, 2001). As Mumford (e.g., 2003) referred to Feldman in 1999 stated that creativity is complex that involves educational opportunities, opportunities to practice, encouraging family and family environment, and interact. Under the light of the present result, it can be also added the culture factor as regarding involving in the creative thinking with gender differences. Additionally, the gender differences can be also impact on learning style, besides the creative thinking style as innovative or adaptive. According to Piaw (2013), as based on researchers, there is difference between male and female students in terms of the learning style.

As the other result, the Strengths of the creative thinking subscale were found higher scores on the side of the female students. It can be said that this result is supported by Kim (2006) who found that factor models as innovative and adaptive of creative thinking worked better without Strengths. As Ülger (2016) stated, the strengths can be independent factor apart from innovative and adaptive factors. Consequently, present result indicates that there can be significant differences between female and male university students in terms of creative thinking and creative thinking subscales. Already, some differences between males and females have been also revealed according to some variables apart from the creative thinking. For instance, gender differences were found statistically significant in favor of men for the quantitative, mathematical literacy and document literacy domains. In contrast to that, women excelled significantly in the prose literacy domain and reading literacy in an international survey (Statistics Canada & OECD, 2005). It can be concluded that creative thinking and creative thinking styles (as innovative and adaptive) may be also added to these variables in terms of gender differences.

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