

Relationship between creativity and academic achievement: A study of gender differences

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Abstract: The objective of this research is to examine if a relationship exists between creativity and academic achievement and if the relationship differs between males and females. Two research questions are examined in this paper: (1) what is the relationship between different aspects of creativity and academic achievement? (2) Is there any significant gender differences regarding the relationship between different aspects of creativity and academic achievement? Participants (N= 153; male = 105 and female = 48) completed creativity test. Cumulative grade point average (CGPA) was used to select the participants. Creativity was measured using the Khatena-Torrance Creative Perception Inventory (KTCPI). Pearson Correlation analysis indicated that aspects of creativity are related to academic achievement for both males and females. However, implications of the findings for this study in creativity and academic achievement are discussed. [Journal of American Science 2009;5(8):83-92]. (ISSN: 1545-1003).

Keywords: Academic Achievement, Creativity, Gender

1. Introduction

Numerous recent research has been conducted on the subject of creativity (Charlton, 2009; Heinze, Shapira, Rogers, & Senker, 2009; Ivcevic, 2009; Miller, 2007; Runco, 2007a, 2007b; Simonton & James, 2007; Yusuf, 2009) in relation to academic achievement (Deary et al., 2007; Lau & Roeser, 2008; Nofle & Robins, 2007; Steinmayr & Spinath, 2009), creativity and academic achievement (Ai, 1999; Coyle & Pillow, 2008; Palaniappan, 2005; Palaniappan, 2007a; Steinmayr & Spinath, 2009) academic achievement and gender (Barkatsas, Kasimatis, & Gialamas, 2009; Hosenfeld, Köller, & Baumert, 1999; Penner & Paret, 2008) as well as creativity and gender (Ai, 1999; Habibollah. et al., 2008; Naderi et al., 2008; Palaniappan, 2000, 2007b).

Earlier investigations have revealed that an individual's background characteristics affect his/her cognitive and non-cognitive behaviors (Ai, 1999). Such studies indicated that gender is one of the most significant and influential characteristics in academic achievement (Ai, 1999; Fennema, 1998; Habibollah. et al., 2008; Naderi et al., 2008). However, the literature on gender differences and the relationship between creativity and academic achievement is limited (Ai, 1999). Hence, investigators in this research concentrated on gender differences in their examination of the

relationship between creativity and academic achievement.

The relationship between creativity and academic achievement has been examined by a number of investigators. According to one study, creativity is hardly correlated with academic achievement (Ai, 1999). Ai (1999) noted that "the zeal to investigate the relationship between creativity and academic achievement dates back to the 1960s, when Getzels (1962) first reported the results of their research on the role of creativity in school achievement". Their investigation had an important effect on psychology in the field of education and set off a flood of investigations to understand what the nature of creativity was like. Their study involved 449 high school students, on whom they examined in order to find similarities and differences in the groups of students who had scored well on intelligence assessments and students who had scored well on creativity tests (Guilford of scores).

Ai (1999) studied the relation between creativity and academic achievement especially. In this study, the students were randomly selected from 68 schools (2,264 students, 38% were boys and 62% were girls). Three creativity batteries, the Torrance Test of Creative Thinking (TTCT), the Abedi-Schumacher Creativity Test (CT), and the Villa and Auzmendi Creativity Test (VAT), were administered to the students. The academic

achievement of the students' was assessed using a self-reported achievement in six subject areas: Spanish, Basque, English, natural science, mathematics and social science. A canonical correlation analysis found that when operationalized by their grades, creativity was related to academic achievement for both boys and girls. For girls, *elaboration* related to four of the academic subject areas (Basque, Spanish, social science and English) and *fluency* related to natural science and mathematics. For boys, *flexibility* was the predominant factor that related to all six academic subject areas. When operationalized by the other three measures (TTCT, VAT and CT), on the other hand, creativity was scarcely related to academic achievement. Yet, several other researchers also have alluded to the idea that creativity is related to academic achievement (Asha, 1980; Karimi, 2000; Mohamad Taghi Mahmodi, 1998; Marjoribanks, 1976; Murphy & 1973).

It is not always the case that studies of the relationship between creativity and academic achievement are consistent with each other in their results (Ai, 1999). Edwards (1965) examined 181 ninth grade students and found that for these students, creativity was not related to school achievement. In another research investigation, Nori (2002) studied the sex difference and the type of relationship between creativity and academic achievement among high school students in Shiraz city. There were 306 high school students (150 boys and 156 girls) in the research. To measure the rate of creativity, Nori (2002) used an Abedi questionnaire and CGPA for academic achievement. The results were analyzed by CGPA for academic achievement. The analysis revealed that there was no significant relationship between creativity and academic achievement, but the result was different for the two sexes. Other researchers, such as (Behroozi, 1997; Mayhon, 1966; Tanpraphat, 1976; E. P. Torrance, 1962) also supported the view that creativity was not related to academic achievement.

Some investigators have found a low correlation between academic achievement and creativity. For example (Karimi, 2000) replicated the studies of (Haddon, 1968; Krause, 1972, 1977) on secondary school students in the Shiraz school in Iran. The results show the relationship between creativity and academic achievement to be as low as 25%. According to some studies (Haddon, 1968; Krause, 1972, 1977), creativity has low correlation with academic achievement. Ai (1999) wrote that "some researchers in other countries also reported low correlations between school achievement and creativity test scores." Such was the case on Haddon's work done in the United

Kingdom. A research on the Federal Republic of Germany and Switzerland (Krause, 1972, 1977) showed that correlations between creativity scores and grades were as low as .09 (physics) or .15 (art). In fact, a longitudinal study from the 7th to the 11th grade in West Germany (Sierwald, 1989) revealed a correlation between creativity test scores and school grades that was actually negative in the case of physics (-.12) and did not go beyond .26, even for art.

The research studies referred to above can be separated into three groups according to their conclusions in respect of how creativity relates to academic achievement. Some researchers (Ai, 1999; Asha, 1980; Getzels, 1962; Karimi, 2000; Mohamad Taghi Mahmodi, 1998; Marjoribanks, 1976; Murphy & 1973; K. Yamamoto, 1964, (1964)) found that there is a relationship between creativity and academic achievement. Other researchers (Behroozi, 1997; Edwards, 1965; Mayhon, 1966; Nori, 2002; Tanpraphat, 1976) showed that creativity was not related to academic achievement in any significant way. However, Ai (1999) referred to others who investigated this matter (J. C Bentley, 1966; S. H. Shin, & Jacobs, S. S, 1973; I. L. Smith, 1971) and deduced that creativity was actually correlated with advanced levels of academic achievement.

What are the possible reasons for the lack of a final conclusion in the previous research studies conducted on creativity, and how it is related to academic achievement? One possible rationalization is that the relationship between creativity and academic achievement is possibly dissimilar for females and males, depending on which special aspects of creativity are being considered. Also, past research has usually concentrated simply on whether there is a relationship between creativity and academic achievement without taking into consideration whether the relationship could be dissimilar for the two groups, male and female (Ai, 1999).

Not many researchers have examined gender differences in the relationship between creativity and academic achievement (Ai, 1999; Asha, 1980; Habibollah. et al., 2008; Palaniappan, 1994; 2000). Those that have focused their studies on this aspect mention that creativity is related to academic achievement for both males and females, but this does not infer that different aspects of creativity might be important for males and females. The study undertaken as part of this research aimed to examine the relationship between creativity and academic achievement, and it looked at whether the relationship may be different for males and females. Given the goals of this study, the research questions were as follows;

1. What is the relationship between different aspects of creativity and academic achievement?
2. Are there any significant gender differences with regard to the relationship between the different aspects of creativity and academic achievement?

2. Methodology

2.1 Sample

One hundred and fifty three Iranian undergraduate students in Malaysian Universities (31.4% females and 68.6% males) were recruited as respondents in this study. Their ages ranged from 18-27 years for females and 19-27 years for males.

2.2 Measures

2.2.1 Cumulative Grade Point Average (CGPA)

For the purposes of this study, Cumulative Grade Point Average (CGPA) was used as a proxy of academic achievement. The CGPA was calculated by dividing the total number of grade points earned by the total number of credit hours attempted. A student's academic achievement was based on their mid-year examination results. Academic achievement was the aggregate or the total number of grade points in the mid-year examinations. In these examinations, each university subject was graded along a one hundred (or four) point scale, the best grade point being one hundred (or four) and the lowest being zero. Hence the aggregate would range from 75 to 100 (3 to 4); notably the lower the aggregate, the better the academic achievement. This approach was used because other researchers have used the measure and found it an acceptable one for measuring academic achievement (Palaniappan, 2007a) cited several researchers (Nuss, 1961; J. P. Parker, 1979; Taylor, 1958; Wilson, 1968).

2.2.2 Khatena-Torrance Creative Perception Inventory (KTCPI)

Every student was examined using a Khatena-Torrance Creative Perception Inventory (KTCPI) to measure the creative perception of the undergraduate students (Palaniappan, 2005). The KTCPI instrument was comprised of two subscales, namely, "Something About Myself" (SAM) and "What Kind of Person Are You" (WKOPAY)? Table 1 shows the SAM measure of creative perception which is based on the rationale that creative behavior is reflected in an individual's personal creative characteristics, characteristics possessed and in use in creative thinking and creative productions (Palaniappan, 2005; 2007a). It tests six factors, namely, *environmental sensitivity*, *initiative*, *intellectuality*, *self-strength*, *individuality* and *artistry* (p.125).

According to Palaniappan's (2005; 2007a) definitions, *environmental sensitivity* relates to being open to ideas of others, relating ideas to what can be seen, touched, or heard, interest in

beautiful and humorous aspects of experiences, and sensitivity to meaningful relations. *Initiative* relates to directing, producing, and /or playing leads in dramatic and musical productions; producing new formulas or new products; and bringing about changes in procedures or organization. *Self-strength* relates to self-confidence in matching talents against others, resourcefulness, versatility, willingness to take risks, desire to excel and organizational ability. *Intellectuality* relates to intellectual curiosity, enjoyment of challenging tasks, imagination, preference or adventure over routine, liking for reconstruction of things and ideas to form something different, and dislike for doing things in a prescribed routine. *Individuality* relates to preference for working by oneself rather than in a group, seeing oneself as a self-starter and somewhat eccentric, critical of others' work, thinking for oneself and working for long periods without getting tired and *artistry* relates to production of objects, models, paintings, carvings, musical composition, receiving awards or prizes or holding exhibitions, production of stories, plays, poems and other literary pieces.

The WKOPAY measure of creative perception is based on the rationale that an individual has a psychological self whose structures have incorporated both creative and noncreative ways of behaving. It covers five factors: *acceptance of authority*, *self-confidence*, *inquisitiveness*, *awareness of others* and *disciplined imagination*. The Creative Perception score is the total score obtained on the 'What Kind of Person Are You?' inventory (Palaniappan, 2005; 2007a).

According to (Palaniappan, 2005; 2007a) *acceptance of authority* relates to being obedient, courteous, conforming, and accepting of the judgments of authorities. *Self- confidence* relates to being socially well adjusted, self-confident, energetic, curious, thorough and remembering well. *Inquisitiveness* relates to always asking questions, being self-assertive, feeling strong emotions, being talkative and obedient. *Awareness of others* relates to being courteous, socially well-adjusted, popular or well-liked, considerate of others, and preferring to work in a group and *disciplined imagination* relates to being energetic, persistent, thorough, industrious, imaginative, adventurous, never bored, attempting difficult tasks and preferring complex tasks.

Two subscales of 100 items were used. The SAM consisted of 50 items that required 'yes'

or 'no' answers and the WKOPAY was comprised of 50 items that needed 'A' or 'B' responses. The scoring of responses to this measure presented little difficulty; it was done by simple frequency counts of the positive responses on the total scale. The respondents took their time to complete the test, but it usually took 20-30 minutes (Palaniappan, 2007). All blank responses were scored zero. The test was

translated into the Persian language, the first language of the respondents. The reliability was established in a pilot study. The pilot study had good reliability in the assessment of creativity both for the SAM ($\alpha = 0.779$) and WKOPAY ($\alpha = 0.775$).

TABLE 1. Subtest KTCPI

| KT CPI | SAM | WKOPAY |
|-----------|--|---|
| 1- SAM | Environmental Sensitivity Initiative Self-strength | Acceptance of authority Self confidence Inquisitiveness |
| 2- WKOPAY | Intellectuality Individuality Artistry | Awareness of others Disciplined Imagination |

2.3 Procedure

The students who participated in this study were all undergraduates. The research questions posed for the study required the students to identify and analyze the distributions and correlations of certain creativity perception were best addressed in the form of a descriptive study. Creativity levels were assessed by self-report instruments and were confirmed by consideration of the results from the administration offices of the universities (described below). They were then divided by gender, with the total scores and subscales calculated for each male and female.

The participant sample, women (18-27 years) and men (19-27 years), was asked to respond during the regular course time. Both written and oral instructions were given for all participants, and the subjects were ready to answer upcoming questions in the class. Multiple significance tests were conducted, and the data were analyzed by t-test. Participants answered the tests either using their name or anonymously (whichever they preferred). They received no rewards for participating but were advised they would be given information of their results in the form of a self-referenced level of abilities at a later date. Scores for the creativity scale and its factors, were entered into the SPSS statistical program.

3. Results

3.1 Descriptive Statistics

The data were analyzed on the basis of the relationship of creativity and academic achievement between males and females, and the results are reported in the Tables and Figures below. SPSS for Windows Version 16.0 was used to conduct the analysis. Table. 2 shows that the females' mean (2.89) score was lower than the males' mean (3.00) for cumulative grade point average; but the standard deviations between females and males were not highly different (males = 0.53 & females = 0.56).

In this study, the females' mean score was greater than the males for 'Something About Myself', but the standard deviations between females and males were not higher differences (males = 4.36 and females = 4.55). However, there was a different result for the factors scores. The females' mean scores were higher than the males' mean scores for *environmental sensitivity*, *self-strength*, *intellectuality*, and *individuality*, but the females' mean scores were lower than males' for *initiative* and *artistry*. There were also different results for 'What Kind of Person Are You' and its factor scores. The males' mean general or overall scores were greater than the females, as well as the factor scores of the subtest 'What Kind of Person Are You' (*acceptance of authority*, *self confidence*, *inquisitiveness*, *awareness of others* and *disciplined imagination*).

TABLE 2. Descriptive Statistics on Creativity

| | Males (n= 105) | | Females (n=48) | |
|-----------------------------|----------------|------|----------------|-------|
| | M | SD | M | SD |
| CGPA | 3.00 | .53 | 2.89 | .56 |
| Something About My Self | 31.90 | 4.36 | 33.21 | 4.55 |
| Environmental Sensitivity | 4.71 | 1.25 | 5.10 | 0.88 |
| Initiative | 2.98 | 1.61 | 2.23 | 0.973 |
| Self-strength | 7.10 | 1.68 | 7.58 | 1.47 |
| Intellectuality | 6.54 | 1.65 | 7.04 | 1.77 |
| Individuality | 3.48 | 1.30 | 3.70 | 1.57 |
| Artistry | 2.60 | 1.50 | 2.31 | 1.53 |
| What Kind of Person Are You | 28.97 | 4.80 | 26.75 | 5.25 |
| Acceptance of authority | 2.30 | 1.40 | 2.25 | 1.60 |
| Self confidence | 6.15 | 1.95 | 5.87 | 1.72 |
| Inquisitiveness | 2.79 | 1.09 | 2.56 | 1.341 |
| Awareness of others | 5.73 | 1.82 | 5.65 | 2.32 |
| Disciplined Imagination | 4.65 | 1.91 | 4.46 | 1.57 |

3.2 Pearson Correlation

This part presents the results from Pearson Correlation on creativity and academic achievement variable for the males and the females, respectively. Table 3. shows the relationship between creativity and its components with academic achievement and the differences for males and females.

Female The correlations for females' creativity were negative and significantly related to Academic Achievement for components of *initiative* ($r = -.566$, $p < 0.01$), *self-strength* ($r = -.080$, $p < 0.01$), *artistry* ($r = -.190$, $p < 0.01$), *inquisitiveness* ($r = -.008$, $p < 0.01$) and *disciplined imagination* ($r = -.425$, $p < 0.05$). The overall

Something About My Self scores ($r = -.054$, $p < 0.05$) and What Kind of Person Are You ($r = -.506$, $p < 0.01$) were also significant and negatively related to Academic Achievement. All the others were positive and significantly correlated for components of *environmental sensitivity* ($r = .515$, $p < 0.01$), *acceptance of authority* ($r = .161$, $p < 0.01$), *self confidence* ($r = .248$, $p < 0.01$) and *awareness of others* ($r = .588$, $p < 0.01$).

Males *Environmental sensitivity* and Academic Achievement were positively significantly correlated ($r = .227$, $p < 0.01$), while *disciplined imagination*, on the other hand, were also significantly but negatively related to Academic Achievement ($r = -.219$, $p < 0.01$).

TABLE 3. Pearson Correlation Results for Males and Females^a

| Variables | Females | | Males | |
|---------------------------|---------|------|--------|------|
| | r | p | r | p |
| Something About My Self | -.054* | .010 | .285 | .381 |
| Environmental Sensitivity | .515** | .000 | .227** | .007 |
| Initiative | -.566** | .000 | .136 | .523 |
| Self-strength | -.080** | .004 | .116 | .995 |
| Intellectuality | .089 | .090 | .103 | .632 |

| | | | | |
|-----------------------------|----------|------|----------|------|
| Individuality | -.155 | .362 | -.041 | .218 |
| Artistry | -.190 ** | .000 | -.026 | .938 |
| What Kind of Person Are You | -.506** | .000 | .216 | .058 |
| Acceptance of authority | .161 ** | .000 | -.044 | .823 |
| Self confidence | .284 ** | .000 | .041 | .715 |
| Inquisitiveness | -.008 ** | .000 | .104 | .106 |
| Awareness of others | .588 ** | .000 | -.070 | .099 |
| Disciplined Imagination | -.425 * | .036 | -.219 ** | .005 |

a. Dependent Variable; CGPA

** p< 0.01

* p< 0.05

3.3 Academic achievement predictors

Females Tables 4 and 5 display the main effect of creativity and its factors which was found significant for academic achievement. Independent variables (creativity and its factors) explained .852 of the variance (R-squared) in academic

achievement (CGPA), which is significant, as indicated by the ($F_{(13, 34)} = 15.048, P<0.0001$). The finding indicated a high correlation independent variables and CGPA for females in this study (see Table 2 for means and SD).

TABLE 4. Model Summary for Females^b

| R | R-Square | Adjusted R | Std. Error |
|-------------------|----------|------------|------------|
| .923 ^a | .852 | .795 | .252 |

a. Predictors: Something About Myself, *environmental sensitivity, self-strength, intellectuality, individuality, initiative, artistry, acceptance of authority, self confidence, inquisitiveness, awareness of others and disciplined imagination*)

b. Dependent Variable: CGPA

TABLE 5
ANOVA for Females^b

| Model | Sum of Squares | df | Mean Square | F | Significance |
|------------|----------------|----|-------------|--------|--------------------|
| Regression | 12.454 | 13 | .958 | 15.048 | 0.000 ^a |
| Residual | 2.165 | 34 | .064 | | |
| Total | 14.619 | 47 | | | |

a. Predictors: Something About Myself, *environmental sensitivity, self-strength, intellectuality, individuality, initiative, artistry, acceptance of authority, self confidence, inquisitiveness, awareness of others and disciplined imagination*).

b. Dependent Variable: CGPA

TABLE 6. Model Summary for Males^b

| R | R-Square | Adjusted R | Std. Error |
|-------------------|----------|------------|------------|
| .527 ^a | .278 | .175 | .478 |

- a. Predictors: (Constant, Creativity Perception Inventory, Something About Myself, What Kind of Person Are You, *environmental sensitivity*, *self-strength*, *intellectuality*, *individuality*, *initiative*, *artistry*, *acceptance of authority*, *self confidence*, *inquisitiveness*, *awareness of others* and *disciplined imagination*).
- b. Dependent Variable: CGPA

TABLE 7. ANOVA for Male^b

| Model | Sum of Squares | df | Mean Square | F | Significance |
|------------|----------------|-----|-------------|-------|--------------------|
| Regression | 8.013 | 13 | .616 | 2.699 | 0.003 ^a |
| Residual | 20.784 | 91 | .228 | | |
| Total | 28.797 | 104 | | | |

- a. Predictors: (Constant, Creativity Perception Inventory, Something About Myself, What Kind of Person Are You, *environmental sensitivity*, *self-strength*, *intellectuality*, *individuality*, *initiative*, *artistry*, *acceptance of authority*, *self confidence*, *inquisitiveness*, *awareness of others* and *disciplined imagination*).
- b. Dependent Variable: CGPA

Males Tables 6 and 7 show a main effect of creativity and its factors was found significant for academic achievement. Independent variables (creativity and its factors) explained .278 of the variance (R squared) in academic achievement (CGPA), which is significant, as indicated by the ($F_{(13, 91)} = 2.699, P < 0.01$), which is significantly related. This finding indicates a low correlation of independent variables and CGPA for males in this study (see Table 2 for means and SD).

4. Discussion

The result of this research indicated that there existed gender differences regarding specific aspects of creativity, in relation to academic achievement. Dissimilar aspects of creativity and academic achievement were found to be significant for males and females. One interpretation that might explain this gender difference is that males and females do extremely well in different aspects

of creativity. This dissimilarity may be possibly due to gender identity. Some studies (Ai, 1999; Habibollah, Rohani, Tengku Aizan & Jamaluddin, 2009; Palaniappan, 2000) show that males surpass females on some components of creativity, but females are generally better than males on others. Habibollah et al. (2009) found no gender differences on the overall factor scores for both 'What Kind Of Person Are You?' and 'Something About Myself', except for *environmental sensitivity* and *initiative* among Iranian students. Females scored significantly higher on *environmental sensitivity* than males and males scored significantly higher on *initiative*. This is consistent with the findings in Palaniappan (2000)'s study, which supported the view that there are no gender differences for general factor scores, with the exception of *environmental sensitivity* and *initiative* among Malaysian students. Palaniappan (2000) stated there was no significance difference on the factor *environmental sensitivity* between males and females, while males obtained higher scores on *initiative* than females.

However, a study on Spanish students indicates that some differences exist between males and females on aspects of creativity related to academic achievement, although creativity is shown to be related to academic achievement for gender (Ai, 1999). These differences may be explained by the different gender roles for males and females in most countries. Hence, it is conceivable that the gender differences in creative ability are determined by the different characteristics that identify the genders.

Another possible explanation of the result may be related to the different batteries used to assess different aspects of creativity. The multiple batteries led to different conclusions about the relationship between creativity and academic achievement. Utilizing different aspects of creativity measures may be one of the reasons that lead previous researchers to different conclusions about the relationship between creativity and academic achievement. This explanation has a possible broader application. This implies that various measures may be employed to identify creative students.

As with all other studies, this research has some limitations. One concerns the operationalization of academic achievement. Academic achievement was measured using cumulative grade point average (CGPA) in general. However, this research needs to be

extended to include grades given by subject such as mathematics, language, science, and others, and standardized achievement examination scores in different fields of study.

5. Conclusion

To conclude, this study provides empirical support for the relationship between aspects of creativity and academic achievement and the finding that this relationship appears to have differences, depending on whether it is between males or females. The relationship could be altered when different gender is examined and when different creativity measure employed. Further research is needed to verify the nature of this relationship using other measures of creativity and academic achievement, and across other nations and different programs of study, in order to establish if similar findings hold in other settings and contexts.

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