Intelligence as a predictor of creativity among undergraduate students

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Abstract: This research examined how intelligence predicts level of creativity and different constituent of creativity; Something about myself, Environmental sensitivity, Initiative, Intellectuality, Self-strength, Individuality and Artistry among undergraduate students. One hundred and fifty three Iranian students were selected from six Malaysian universities to participate in the research. Data was analyzed using multiple regression analysis. The total variance accounted for by the intelligence factor is 13.5% (multiple $R2 = 0.135$), $F (7, 145) = 3.222$, $p= .003<0/01$). This implies that intelligence is important when considering the factors that influence creativity of students. [Journal of American Science 2010;6(5):86-90]. (ISSN: 1545-1003).

Introduction

Furnham & Bachtiar (2008) stated there are more than 60 definitions of creativity with no single authoritative and agreed upon definition, or operational measure. An easy meaning of creativity view is as generating something novel, original, and unexpected(Sternberg & Lubart, 1999). According to Palaniappan (2007b) creativity is some of the many intellectual constructs that has been defined as many different ways as the number of researchers investigating them. Creativity has been defined as a product, process, person as well as the press (environment) that impacts on the individual (Rhodes, 1961). For purpose of this study, creativity is investigated as a personality (KTCPI as the measure), because it is a new measure for assessment of creativity by this instrument. Creativity Perception refers to the perception of oneself as being creative and capable of creative productions. It is one of the most important personality traits related to creativity (Biondi, 1976; Davis, 1983). This is further confirmed by (Khatena, 1977) when he said that " an individual who perceives himself as creative and with accuracy, is a person who can be expected to behave in creative ways".

The conception of creativity is regularly related to intelligence(Furnham & Bachtiar, 2008), but according note's (Furnham & Bachtiar, 2008) several early researchers (Andrews, 1930; Getzels & Jackson, 1962; McCloy. W and N.C. Meier, 1931) have been shown the relation between creativity and intelligence has only modest correlations (r= .07, .22, .26, respectively). In another study (Furnham & Bachtiar, 2008) intelligence [as measured by the Wonderlic Personnel Test (WPT)] was not correlated with any of the creativity [as measured by the Divergent Thinking (DT), Biographical Inventory of Creative Behaviours (BICB), Self-Rating of creativity (SR), Barron–Welsh Art Scale (BWAS)].

In a study conducted by (Olatoye & Oyundoyin, 2007) on the creativity and intelligence among 460 students were randomly selected from 20 secondary schools, it was found that intelligence quotient (I.Q) [as measured by Slosson's Intelligence Test (SIT)] was significantly related to creativity [Ibadan Creative Assessment Scale (ICAS)]. Their finding has been shown intelligence quotient (I.Q) accounted for 8% of variance in creativity ($R2 = 0.80$). This percentage is statistically significant. According to this result also intelligence quotient (I.Q) significantly predicts each of the four components of creativity (fluency, originality, flexibility and creativity motivation). (Funchs & Karen, 1993) studied on the creativity and intelligence in which four hundred and ninety six preschoolers of children looking admission to a special program for gifted preschoolers participated, it was found that creativity (as assessed by the Thinking Creativity in Action and Movement Scales) was significantly related to intelligence (as assessed by the standard I.Q tests).

This research was hence designed to examine the influence of intelligence on both level of creative perception inventory and the different component of creativity; something about myself, Environmental Sensitivity, Initiative, Intellectuality, Self-strength, Individuality and Artistry among Iranian undergraduate students in Malaysian Universities. This study look for investigate the following hypotheses; intelligence will not

significantly predict the level of creative perception inventory among students. Intelligence will not significantly predict each of the components of creativity among the students.

Material and 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
Catell Culture Fair Intelligence Test

To evaluate the intelligence, every student was administered by a Scale 3 of the Catell Culture fair Intelligence Test (CFIT-3a & b). Roberto Colom, Botella, & Santacreu (2002) reported that this test is a well-known test on fluid intelligence (GF). Participants completed Cattell's culture fair intelligence test battery to assess individual differences in fluid intelligence. Cattell's Culture Fair Intelligence Test (1971), which is a nonverbal test of fluid intelligence or Spearman's general of intelligence. This test contained four individually timed subsections a) Series, b) Classification, c) Matrices, d) Typology, each with multiple-choice problems progressing in difficulty and incorporating a particular aspect of visuospatial reasoning. Raw scores on each subtest are summed together to form a composite score, which may also be converted into a standardized IQ.

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 (A. K. Palaniappan, 2005). The KTCPI instrument was comprised of two subscales, namely, "Something About Myself" (SAM) and "What Kind of Person Are You" (WKOPAY)? 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; A. K Palaniappan, 2007). It tests six factors, namely, Environmental Sensitivity, Initiative, Intellectuality, Self-strength, Individuality and Artistry (p.125).

According to Palaniappan (2005; 2007) 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; 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 SAM consisted of 50 items that required 'yes' or 'no' answers. 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 reliability was established in a pilot study. The pilot study had good reliability in the assessment of creativity [the SAM (alpha =0.779)].

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; Parker, 1979; Taylor, 1958; Wilson, 1968).

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 (19-27years), 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 Regression analysis. 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 intelligence, the creativity scale and its factors, were entered into the SPSS statistical program.

3. Result
3.1 Descriptive Statistics

Table.1 shows descriptive statistics of intelligence. The finding of this result has been shown that the intelligences' mean scores were 104.55, standard deviation (15.70), creativity (the SAM) (M=32.30, SD= 4.44), Environmental Sensitivity (M= 4.83, SD= 1.15), Initiative (M= 2.74, SD=1.48), Self Strength (M=7.24, SD= 1.62), Intellectuality (M=6.69, SD=1.70), Individuality (M=3.54, SD=1.39) and Artistry (M= 2.50, SD=1.51).

Table.1 Descriptive Statistics (N=153)

Variables	Mean	Std. Deviation
Intelligence (The A Form)	104.55	15.70
Creativity (The SAM)	32.30	4.44
Environmental Sensitivity	4.83	1.15
Initiative	2.74	1.48
Self Strength	7.24	1.62
Intellectuality	6.69	1.70
Individuality	3.54	1.39
Artistry	2.50	1.51

3.2 Data Analysis
Hypothesis One

It states that the intelligence will not significantly predict creativity of the subjects. In table 1, intelligence significantly predicts creativity among subjects. The total variance accounted for by the intelligence factor is 13.5% (multiple R^2 = 0.135), $F_{(7, 145)}$ =3.222, p= .003<0/01). This implies that intelligence is important when considering the factors that influence creativity of Iranian undergraduate students in Malaysian universities.

Table.2. Regression summary table showing the effect of intelligence on creativity b

	Sum of Squares	Df	Mean Square	F	Sig*
Regression	5043.436	7	720.491	3.222	.003a
Residual	32428.446	145	223.644		
Total	37471.882	152			

a. Predictors: (Constant), Artistry, Individuality, Environmental Sensitivity, Self Strength, Intellectuality, Initiative, Creativity(Something About Myself)

b. Dependent Variable: intelligence

* = Significant at 0.01

Multiple R= .367
Multiple R^2 = .135
Adjusted R^2 = .093
Standard Error of the Estimate= 14.95475

Hypothesis Two

It states that the intelligence will not significantly predict each of the constituents of creativity of the subjects. In table 3, the multiple R^2 columns reveals the total variance accounted for by each of the creativity constituents in the total performance of students in creativity. The highest contributory constituents to creativity is environmental sensitivity (R^2 = 0.165). This is closely followed by intellectuality (R^2 = 0.134), than, followed by initiative (R^2 =0.122), artistry (R^2 = 0 .114), individuality (R^2 = 0.113) and lastly by self strength (R^2 = 0.090). The contribution of each of the constituents is almost the different. The difference between the highest and lowest contributors is 0.156 (15.6%). Intelligence was not significantly predicts each constituents of creativity except environmental sensitivity (Sig= .041).   However, Normal P-P Plot graphs (Expected Cumulative Probability by Observed Cumulative Probability) were obtained for intelligence scores is shown in Figure 1.

4. Discussion and Conclusion

Intelligence variable predicted creativity in this research, but the fact is that the value is low i.e. 13.5% (multiple R^2 = 0.135), (F7, 145=3.222, p<0/05). The findings of researchers like as (Andrews, 1930; Getzels & Jackson, 1962; McCloy. W and N.C. Meier, 1931) has been show low

correlation between intelligence and creativity scores in various instruments. However, the finding of this study is not out of place. Because some researchers, they found relationship between intelligence and creativity. For example, researcher (Funchs & Karen, 1993; Olatoye & Oyundoyin, 2007) found a significant relationship between the intelligence and creativity. Intelligence is a good predictor of creativity. It is recommended and suggested that employers of schools, universities and teachers must search assignments including creativity for high intelligence students. If student reveals lack of creativity on assignments, the teacher must be administering intelligence test in order to know whether the low creativity may be caused by the students' level of intelligence.

Creativity as used in this research has six constituents namely; environmental sensitivity, initiative, intellectuality, self-strength, individuality and artistry. The relative effect of all variables considered in this investigate on each of the creativity constituents indicated that the contribution of them is almost different. Each of the creativity constituents (except environmental sensitivity) is not enough to measure creativity between students, meaning that, if the counselor or teacher, who would like to measure creativity, any of separately these constituents (except environmental sensitivity) can not be taken as the act on creativity. This study was conducted in Kuala Lumpur (capital city) and metropolitan area (Selangor) at Malaysian universities. Thus the extent to which results apply to other cities universities is not known. Therefore, conclusions need to be verified by conducting similar studies across other universities in Malaysia (Naderi et. al. 2009).

Table.3. Regression summary table showing relative effect of intelligence on each of the creativity constituents

Creativity components	R	Multiple R Square	F	Sig
Artistry	.114	.013	1.972	.162
Environmental Sensitivity	.165	.027	4.232	.041*
Self Strength	.090	.008	1.228	.270
Individuality	.113	.013	1.941	.166
Intellectuality	.134	.018	2.751	.099
Initiative	.122	.015	2.279	.132

* Significant at 0.05 level of confidence

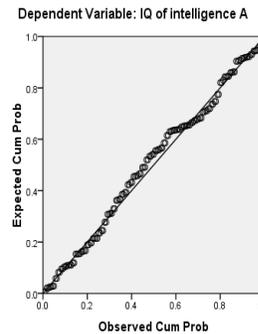Figure 1. Normal P-P plot of Regression Standardized Residual

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References

1. Andrews, E. G. (1930). The development of imagination in the preschool child: The University, Iowa City.
2. Biondi, A. M., & Parnes, S. J. (1976). Assessing creative growth: The tests and measured changes. New York: Bearly.
3. Davis, G. A. (1983). Creativity is forever. Dubuque: IA: Kendall- Hunt.
4. Funchs, B., & Karen, D. (1993). Creativity and intelligence in Preshoolers. Gifted Child Quarterly, 37(3), 113-117.
5. Furnham, A., & Bachtiar, V. (2008). Personality and intelligence as predictors of creativity.

Personality and Individual Differences, 45(7), 613-617.

6. Getzels, J. W., & Jackson, P. W. (1962). Creativity and intelligence: Explorations with gifted students: Wiley, Oxford, England

7. Khatena, J. (1977). The Khatena-Torrance Creative Perception Inventory for identification, diagnosis, facilitation and research. Gifted Child Quarterly, 21(4), 517- 525.

8. McCloy. W and N.C. Meier. (1931). Re-creative imagination, . Psychological Monographs, 51, 108-116.

9. Naderi, H., Abdullah, R., Aizan, H. T., Sharir, J., & V.Kumar. (2009). Creativity, Age And Gender As Predictors Of Academic Achievement Among Undergraduate Students. Journal of American Science, 5(5), 101-112.

10. Nuss, E. (1961). An Exploration of relationships between creativity and certain Personal-Social variables among Eight Grade Pupils. Unpublished Unpublished Doctoral Dissertation University of Maryland.

11. Olatoye, R. A., & Oyundoyin, J. O. (2007). Intelligence Quotient as a Predictor of Creativity Among Some Nigerian Secondary School Students. Educational Research and Review, 2(4), 92-95.

12. Palaniappan, A. K. (2005). creativity and Academic Achievement: A Malaysian Perspective. Shah Alam: Karis Publications.

13. Palaniappan, A. K. (2007a). Academic Achievement of Groups Formed Based on Creativity and Intelligence. Paper presented at the The 13th International Conference on Thinking Norrköping. fromhttp://www.ep.liu.se/ecp/021/vol1/020/index.html

14. Palaniappan, A. K. (2007). Creative Perception and Academic Achievement: Implications for education in Malaysia. Kuala Lumpour: Inreach Edition.

15. Palaniappan, A. K. (2007b). Cultural Influences on Creativity and Academic Achievement. Kuala Lumpur: Inreach Edition.

16. Parker, J. P. (1979). The predictive validity of creativity and intelligence tests administered at age five. Unpublished Dissertation Abstract International, 39A, 345.

17. Rhodes, J. M. (1961). An analysis of creativity. Phi Delta Kappan, 42, 302 - 310.

18. Sternberg, & Lubart. (1999). The concept of creativity: Prospects and paradigms.In: R.J. Sternberg, Editor, Handbook of creativity. Cambridge: Cambridge University Press pp. 3–15.

19. Taylor, C. W. (1958). Variables related to Creativity and Productivity Among men in two research Laboratories. Paper presented at the Second Utah Creativity Research Conference on the identification of creative Scientific Talent, Salt Lake City, University of Utah Press.

20. Wilson, M. P. (1968). The relationship of sense of humor to Creativity, Intelligence and Achievement. Unpublished Unpublished Ph.D. Dissertation, University of Southern California.

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