Creativity as a predictor of intelligence among undergraduate students

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Abstract: This research examines the extent to which the level of creativity and different components of creativity: Something about myself, Environmental sensitivity, Initiative, Intellectuality, Self-strength, Individuality and Artistry among undergraduate students predict intelligence. Respondents in the research comprises of 153 from six Malaysian universities. Multiple regression analysis reveals that a total variance in intelligences accounted for by the creativity factors is 13.5% (multiple $R^2 = 0.135$, $F_{(7, 145)} = 3.222$, $p = .003$). This implies that creativity is important when considering the factors that influence the intelligence of students. [The Journal of American Science. 2010;6(2):189-194]. (ISSN 1545-1003).

Keywords: Intelligence, Creativity, Something about myself, Environmental sensitivity, Initiative, Intellectuality, Self-strength, Individuality and Artistry

1.   Introduction

Furnham & Bachtiar (2008) stated there are more than 60 definitions of creativity with no single authoritative and consensus on its definition, or operational measure. An straightforward meaning of creativity view is 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 in 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 impact 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 frequently related to intelligence (Furnham & Bachtiar, 2008), but several early researchers (Andrews, 1930; Getzels & Jackson, 1962; McCloy. W and N.C. Meier, 1931)

have revealed that the relationship between creativity and intelligence has only modest (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 who 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 demonstrated that intelligence quotient (I.Q) accounted for 80% of the variance in creativity ($R^2 = 0.80$). This percentage is statistically significant. According to this study, intelligence quotient (I.Q) also significantly predicts each of the four components of creativity (fluency, originality, flexibility and creativity motivation). Funchs and Karen (1993) examined the creativity and intelligence among 496 preschoolers applying for admission to a special program for gifted preschoolers. 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 is therefore designed to examine the influence of creative perception inventory and the different components of creativity in Something About Myself, which include Environmental Sensitivity, Initiative, Intellectuality, Self-strength, Individuality and Artistry on intelligence among Iranian undergraduate students in Malaysian Universities. This study attempts to investigate the following hypotheses: (i) creative perception inventory will not significantly predict the intelligence among students, and (ii) The components of creativity will not significantly predict intelligence among the students.

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 Catell Culture Fair Intelligence Test

To evaluate the intelligence, every student was administered 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 intelligence. This test comprised four individually timed subsections a) Series, b) Classification, c) Matrices, and d) Typology. Each is made up of multiple-choice problems with progressing difficulty and incorporates 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.

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)? 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; 2007). It tests six factors, namely, Environmental Sensitivity, Initiative, Intellectuality, Self-strength, Individuality and Artistry.

According to Palaniappan's (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 for the assessment of creativity [the SAM], established in a pilot study was good (alpha =0.779)].

2.2.3 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. The aggregate ranged from 75 to 100 (3 to 4). Hence, the higher 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 some researchers using CGPA as a proxy for academic achievement (Nuss, 1961; Parker, 1979; Taylor, 1958; Wilson, 1968).

3.2 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 based on 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 participants, women (18-27 years) and men (19-27years), were asked to respond during the regular course time. Both written and oral instructions were given to all participants. Multiple significance tests were conducted and the data were analyzed using Regression analysis. Participants were allowed to answer 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 on intelligence. The finding of this result shows that the mean score for intelligence was 104.55, standard deviation (15.70), while the mean scores for creativity and its components were as follows: 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

3.3 Data Analysis
3.3.1 Hypothesis One

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

Table 2. Regression summary table showing the effect of creativity on intelligence 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 R2 = .135
Adjusted R2 = .093
Standard Error of the Estimate= 14.95475

3.3.2 Hypothesis Two

It states that the each of the constituents of creativity of the subjects will not significantly predict intelligence. In Table 3, the multiple R2 columns reveals the total variance in intelligence accounted for by each of the creativity components of students. The highest contributing component to intelligence is Environmental Sensitivity (R2=0.165). This is closely followed by Intellectuality (R2=0.134), then, followed by Initiative (R2=0.122), artistry (R2=0.114), Individuality (R2=0.113) and lastly, by Self Strength (R2=0.090). The contribution of each of the component is different. The difference between the highest and lowest contributors is 0.156 (15.6%). each component of creativity except Environmental Sensitivity (Sig= .041). Each component of creativity except Environmental Sensitivity (Sig= .041) does not significantly predict intelligence. However, Normal P-P Plot graphs (Expected Cumulative Probability by Observed Cumulative Probability) were obtained for intelligence scores is shown in Figure 1.

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

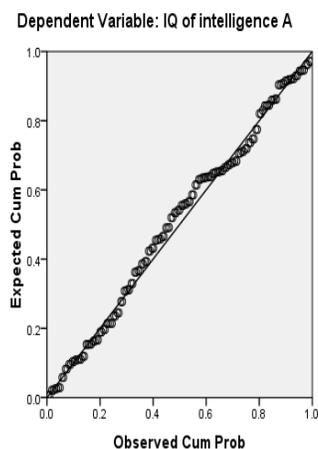| Creativity components	R	Multiple R Square	Adjusted R Square	Standard Error of the Estimate	F	Sig
Artistry	.114	.013	.006	15.651	1.972	.162
Environmental Sensitivity	.165	.027	.021	15.536	4.232	.041*
Self Strength	.090	.008	.001	15.689	1.228	.270
Individuality	.113	.013	.006	15.652	1.941	.166
Intellectuality	.134	.018	.011	15.611	2.751	.099
Initiative	.122	.015	.008	15.634	2.279	.132

 * Significant at 0.05 level of confidence

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

4. Discussion and Conclusion

Creativity predicts intelligence 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 past studies have shown low correlation between intelligence and creativity scores in various instruments (Andrews, 1930; Getzels & Jackson, 1962; McCloy. W and N.C. Meier, 1931). However, the finding of this study is not out of place. It supports the relationship between intelligence and creativity found in studies conducted by Funchs and Karen (1993) as well as Olatoye and Oyundoyin, (2007). These researchers 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 may include assignments requiring creative skills for high intelligence students.

Creativity as used in this research has six components, namely Environmental Sensitivity, Initiative, Intellectuality, Self-Strength, Individuality and Artistry. The relative effect of each of the creativity component considered in this investigation on intelligence indicates that their contributions are each unique. On its own, each of the creativity component (except Environmental Sensitivity) is not enough to measure the creativity of the students. This means that if a counselor or teacher wishes to measure creativity, using any of the components separately (except environmental sensitivity) will not be sufficient to measure a student's creativity. This study was conducted in Kuala Lumpur (capital city) and a metropolitan area (Selangor) in which the Malaysian universities were located. As such, the extent to which the results apply to other cities and universities is not known. Therefore, the conclusion in this study needs to be verified by conducting similar studies in other universities in Malaysia (Naderi et. al. 2009).

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