# Academic Achievement of Groups Formed Based on Creativity and Intelligence

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**Abstract**
The relationship between creativity and academic achievement is investigated in this study to understand the nature of these relationships in the intelligence continuum among 497 Form Four Malaysian students. Intelligence was measured using Cattel's Culture Fair Intelligence Tests and Creativity was measured using Torrance Tests of Creative Thinking. Four groups were formed based on creativity and intelligence scores, namely, High IQ – High Creative, High IQ – Low Creative, Low IQ – High Creative and Low IQ – Low Creative. The mean academic achievement scores of these four groups were compared. One-way ANOVA indicate that there are significant differences in the mean academic achievement scores among the four groups. There were significant differences between High IQ – Low Creative and Low IQ – Low Creative groups as well as between High IQ – High Creative and Low IQ – Low Creative groups. These findings are only to be expected as the difference in IQ between these pairs of groups are 48 and 50 points respectively. However, there are no significant differences in academic achievement between the High IQ - Low Creative and Low IQ - High Creative groups. This supports the findings reported by Getzels and Jackson (1962), Torrance (1959) and Yamamoto (1964a) of equivalent academic achievement among the highly intelligent and highly creative groups. Although the Low IQ – High Creative group had a mean IQ 46 points lower than the High IQ – Low Creative group, the former appears to be able to compensate for this with their higher level of creativity. Another significant finding is the equivalent academic achievement levels of the High IQ – High Creativity and the Low IQ – High Creativity groups although the latter has a mean IQ 50 points lower than the former group. This further accentuates previous findings that creativity may help compensate the lack of intelligence in enhancing academic achievement. These findings have important implications in curriculum design and instruction aimed at infusing creative thinking and enhancing academic achievement among students of varying level of intelligence.

**Keywords:** Academic Achievement, Creativity, Intelligence, Intelligence Threshold

## Introduction

Intelligence thresholds in the relationships between creativity and intelligence have been investigated ever since Torrance (1962) and Yamamoto (1964ab) reported differences in these correlations in the intelligence continuum. Some studies (Preckel, Holling & Wiese, 2006, Kim, 2005 and Runco & Albert, 1986) have indicated an absence of these variations across the intelligence continuum. Studies have also investigated intelligence thresholds in the relationships involving creativity, intelligence and academic achievement (Torrance, 1959, 1960; Getzels and Jackson, 1962, and Yamamoto, 1964ab). While the majority of these studies indicate positive correlations between creativity and academic achievement, some did not. These studies were mainly based on American samples. This study reports findings on investigations into these relationships among Malaysian Form Four (US Grade 10) students; thus exploring cultural influences in these relationships.

## Past Research

The study which had a great impact on psychologists in the field of education and which had set off a boom in research into the area of creativity was the study of 449 high school children in Chicago, published by J. W. Getzels and P. W. Jackson in 1962. They compared a group of middle-class adolescent pupils who had scored well on intelligence tests with pupils who scored well on creativity tests designed by Guilford. They found that highly creative children were superior in scholastic achievement to pupils with high I.Q., although the high creatives had 20 I.Q. points lower than the high I.Q. students - indicating a positive relationship between creativity and academic ability. The high creatives, although having an average I.Q. 5 points less than their school population taken as a whole performed better in school achievement.

Getzels and Jackson's (1962) study drew criticisms as to its design and the sampling procedures employed. But the educational implications of Getzels and Jackson's study were undeniable. Several research studies replicated the study on other samples. Torrance (1962), for example, undertook eight replications of this famous study. Five of these studies were on elementary school students, one at high-school level and two at graduate level. It was found that six of these studies supported the findings of Getzels and Jackson that creativity is related to academic achievement. The two discrepant studies showed that creativity may be dependent on other factors such as the range of intelligence of the sample studied and the type of school the students attended.

Yamamoto (1964a) replicated Getzels and Jackson's (1962) study on 272 ninth through twelfth grade students of the University of Minnesota High School. The students in each grade were grouped into three groups based on their level of creativity and intelligence scores. The groups were the high intelligence group (comprising students in the upper 20% on IQ but not in the upper 20% on creativity scores), the high creative group (comprising students in the upper 20% on creativity scores but not in the upper 20% on IQ) and the high intelligent-high creative group which comprised students in the upper 20% on both the I.Q. and creativity measures. On analyzing the academic achievement scores of these groups, Yamamoto (1964a) found no difference in academic achievement between the high creatives and the high I.Q. groups although there was a mean difference of twenty I.Q. points. The creatives seem to be able to "compensate" for what they lack in intelligence by their creative ability to attain similar level of academic achievement.

Other researchers like Ahrens (1962), Jacobson (1966), Lucht (1963), Feldhusen, Treffinger and Elias (1970) have come out in support of the Getzels and Jackson phenomenon. Researchers who used the Grade Point Average as a measure of academic achievement, namely, Taylor (1958), Nuss (1961), Parker (1979), Wilson (1968) and Cline, Richards and Needham (1963) have also reported results consistent with the findings of Getzels and Jackson.

However, there are studies that did not support the Getzels and Jackson phenomenon of equivalent achievement of the high creative and the high I.Q groups. Among the earliest were the discrepant studies reported by Torrance (1962) based on his replications of the Getzels and Jackson's study. Many reasons were put forward to explain this. Among them were the lower level of intelligence among the subjects studied, the different kinds of academic ability measured and to the presence of an I.Q. threshold in the relationship between creativity and academic achievement.

This study intends to further investigate this phenomenon using Form Four (US Grade 10) Malaysian students to explore if this phenomena is prevalent in other cultures.

## Procedure

Subjects totaling 467 Form Four students were drawn from three secondary schools in the township of Kuantan, in the state of Pahang in Malaysia. Their average age was 13.3 years and the students had undergone six years of primary and three years of secondary school

education. The students were divided into 4 subgroups: high IQ – low creativity or HI-LC group (subjects in the upper 20% on IQ scores but not in the upper 20% on Creativity scores), low IQ - high Creativity or LI-HC group (subjects in the upper 20% on Creativity scores but not in the upper 20% on IQ scores), high IQ – high Creativity or HI-HC group (subjects in the upper 20% on both Creativity and IQ scores) and the low IQ – low Creativity or LI-LC group (subjects not in the upper 20% on both Creativity and IQ scores).

Three instruments were administered to assess intelligence, creativity and academic achievement. Measures of intelligence were obtained using Form B of the Cattel Culture Fair Intelligence Test Scale 2 (Cattel & Cattel, 1960).

The Torrance Tests of Creative Thinking (TTCT), both the Figural and Verbal Forms A were used to obtain the various measures of creativity. The Figural Form A yields four components of Figural Creativity, namely, Figural Fluency, Figural Flexibility, Figural Originality and Figural Elaboration while Verbal Form A yields three components of Verbal Creativity, namely, Verbal Fluency, Verbal Flexibility and Verbal Originality. The standard scores of the various components were summed to derive the composite creativity scores.

Academic Achievement was the aggregate of the grade points and marks obtained by the students. The marks were those that were obtained in two monthly examinations prior to this study and grades were those obtained in the standardized examination, Lower Certificate of Education or *Sijil Rendah Pelajaran*.

Table 1 shows the composition of the students in this study. It can be seen that although there are 57 High IQ and 62 High Creative students, there are only 31 students in the High IQ and High Creative group. This indicates that if students were identified or selected for programs based on intelligence scores alone, 62 out of 93 highly creative students (about 67%) will be excluded, while if students were selected based on creativity scores alone, it will eliminate about 57 out of 88 (about 65%) highly intelligent students.

**Table 1.** Composition of Subjects Based on Sex and Groups formed Based on IQ and Creativity

| Groups | Frequency | | | Percentage |
|---|---|---|---|---|
| | Male | Female | Subtotal | |
| HI-LC | 37 | 20 | 57 | 12.2 |
| LI-HC | 39 | 23 | 62 | 13.3 |
| HI-HC | 23 | 8 | 31 | 6.6 |
| LI-LC | 145 | 172 | 317 | 67.9 |
| Total | 244 | 223 | 467 | 100.0 |

## Results

Table 2 shows the means and standard deviations of IQ, creativity and academic achievement of the four groups. These four groups were then compared on their academic achievement

scores using One-way Analyses of Variance. The level of significance was set at $p < .05$. The results are shown in Tables 3 and 4.

**Table 2.** Means and Standard Deviations of Academic Achievement Scores of Subgroups Formed Based on IQ and Creativity Scores and the Total Sample

| Groups | | IQ | Creativity | Academic Achievement |
|---|---|---|---|---|
| HI-LC | Mean | 152.00 | 390.81 | 159.58 |
| | Std. Dev. | 11.00 | 39.16 | 21.43 |
| LI-HC | Mean | 106.00 | 481.12 | 151.31 |
| | Std. Dev. | 15.00 | 26.88 | 25.60 |
| HI-HC | Mean | 156.00 | 481.81 | 160.34 |
| | Std. Dev. | 15.00 | 22.56 | 20.55 |
| LI-LC | Mean | 106.00 | 378.97 | 147.01 |
| | Std. Dev. | 6.00 | 41.60 | 23.91 |
| Total Sample | Mean | 114.67 | 400.80 | 150.00 |
| | Std. Dev. | 24.29 | 55.82 | 24.09 |

**Table 3.** One-way Analyses of Variance of Academic Achievement Scores of the Four Subgroups

| | | Sum of Squares | df | Mean Squares | *F* |
|---|---|---|---|---|---|
| Academic Achievement | Between Groups | 11486.22 | 3 | 3828.74 | 6.85* |

* Significant at $p < .05$

**Table 4.** Mean Academic Achievement Differences of Intelligence – Creativity Groups

| | LI-HC | HI-HC | LI-LC |
|---|---|---|---|
| HI-LC | 8.27 | -.76 | 12.57* |
| LI-HC | | -9.03 | 4.30 |
| HI-HC | | | 13.33* |

* Significant at $p <.05$

Table 3 indicates that there are significant differences in the mean academic achievement scores among the four groups. Table 4 shows significant differences in academic achievement for comparisons between HI-LC and LI-LC groups as well as between HI-HC and LI-LC groups. These findings are only to be expected as the difference in IQ between these pairs of groups are 48 and 50 points respectively.

There are no significant differences in academic achievement between the HI-LC and LI-HC groups. This supports the findings reported by Getzels and Jackson (1962), Torrance (1959) and Yamamoto (1964a) of equivalent academic achievement among the highly intelligent and highly creative groups. Although the LI-HC group had a mean IQ 46 points lower than the HI-LC group, the former appears to be able to compensate for this with their higher level of creativity.

A very important finding in this study is the equivalent academic achievement levels of the HI-HC (Mean academic achievement = 160.34, SD = 20.55) and the LI-HC (Mean $_{\text{academic}}$ achievement = 151.31, SD = 25.60) groups although the latter has a mean IQ 50 points lower than the former group. This further accentuates previous findings that creativity may help compensate the lack of intelligence in enhancing academic achievement.

Another important finding is that although the LI-HC (Mean academic achievement = 151.31; *SD* = 25.60) group had a mean IQ 9 points lower than the general population (Mean academic achievement = 150.00; *SD* = 24.09), there were no significant differences in their academic achievement scores. Again, it may be deduced that creativity may be able to compensate for intelligence in enhancing academic achievement.

The HI-HC (Mean academic achievement = 160.34, SD = 20.55) and the HI-LC (Mean academic achievement = 159.58, SD = 21.43) groups also obtained similar academic achievement scores. This finding indicates that at very high IQ levels (in this study, at IQ 140 and above), an increase in creativity may not result in higher academic achievement. This suggests that there may be an intelligence threshold which delineates the nature of the relationship between creativity and academic achievement.

## Discussion

The equivalent academic achievement scores obtained by the HI-LC and LI-HC groups support the findings reported by Getzels and Jackson (1962), Torrance (1959) and Yamamoto (1964a). The fact that similar findings are obtained in another culture with a different education system after a lapse of about 40 years adds to the generalizability of this phenomenon of positive correlation between creativity and academic achievement across culture and time.

The similarity in achievement scores among the HI-HC and LI-HC groups further supports the contribution of creativity to academic achievement. The fact that students not in the top 20% in IQ are able to achieve just as well as students in the top 20% in IQ possibly due to their elevated creativity, may be considered a significant finding in this research. This finding also provides empirical evidence and support for the advocacy of creativity enhancing curricula and programs in Malaysia.

At very high IQ levels, the strength of the relationship between creativity and academic achievement appears to diminish. This finding appears to support the threshold concept in this relationship. It appears that above an intelligence threshold of about 140, creativity may not enhance academic achievement. However, this finding appears to contradict Yamamoto's (1964b) study which found that above the IQ level of 120, creativity would enhance academic achievement. It may be concluded that while the intelligence threshold concept appears to hold true, the nature of the relationship between creativity and academic achievement both above and below the threshold appears to differ in this Malaysian sample. Further research involving different samples and different measures of creativity, intelligence and academic achievement will throw more light on these relationships and the concept of intelligence threshold.

## Conclusion

This paper provides empirical support for the positive relationship between creativity and academic achievement and the finding that this relationship appears to differ across the intelligence continuum. This relationship appears to be positive until an intelligence threshold of around 140 above which it appears to diminish. Further studies need to be carried out to confirm the nature of this relationship for other measures academic achievement and across other cultures to establish the generalizability of this finding.

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