

Factors Affecting Academic Achievement in Students: An Empirical Study

Vinita Vader*
Hariharan Purohit#
Shreya Pandit**

Abstract

Academic achievement has been viewed as a nexus of several variables dynamically interacting to bring about an outcome, lending itself to great significance in an individual's academic and professional life. This study investigates the relationship between academic performance of students and personality, intelligence and creativity in Indian universities. The sample (n = 113) from a college in Mumbai responded to the Raven's Standard Progressive Matrices, NEO Five-Factor Inventory and Guilford's Alternate Uses Tasks as measures of intelligence, personality and creativity respectively. Students' GPA scores were used as a measure of academic achievement. Small but significant correlations were obtained between students' academic achievement and intelligence scores, and between personality dimensions of openness and extraversion with subscales of creativity. A regression analysis revealed that creativity scores on elaboration are the best predictors of academic achievement. The study also revealed gender differences in intelligence, personality and creativity variables.

* 302/Block 1, Vasant Lawns, Subhashnagar, Near Majiwada Junction, Thane(W)-400601, Maharashtra, India, Email: vinitavader@gmail.com

2A/1304, 13th Floor, New Mhada Complex, Near Lokhandwala Complex, Andheri West, Mumbai-400053, Maharashtra, India

** 401, 20-E, NTPC Colony, Panchratna Society, Opposite Heerapanna Mall, Near Primo Furniture, Powai, Mumbai-400076, Maharashtra, India

Introduction

MODERN times have seen an upsurge in the methods and application of knowledge in the form of technology and analytical abilities. These problem-solving abilities borrow their understanding from the early learning experiences primarily established through formal education. The demands of the newer job market are virtually and physically driven by the ability of the employees to solve problems resourcefully. Academic achievement becomes essential in deciding where and how each individual's potential can be maximised. In the milieu of these requirements, it is essential to revisit the theoretically driven models which have withstood the predictions about academic achievement.

Role of Intelligence and Creativity in Academic Achievement

Studies have iterated intelligence and academic achievement (AA) as correlated variables. IQ tests seem to predict performance better on traditional academic tasks (i.e. scholastic ability) than they predict performance on real-world complex problems which include traits like "street smartness" (Ormrod, 2008). Thus, several IQ tests do not serve as a reliable measure for the overall intelligence (Bracken & Walker, 1997). Considering this viewpoint, it is essential to determine the roles of other variables in predicting academic achievement.

Researchers initially viewed creativity as a component of intellectual prowess and thus elucidated fluency as the most basic output of creativity (Galton 1869, 1962; H. L. Hargreaves, 1927). As much as creativity is related to novelty, it is also related to problem-solving to a great extent (Kaufman & Sternberg, 2006). Thus, creative cognition is seen as dealing with basic cognitive processes, available to all which operate on stored knowledge to yield novel, contextually relevant ideas and solutions (Ward & Kolomyts, 2010). According to Csikszentmihalyi and Getzels (1971), the way people formulate problems and accomplish tasks is an inherent part of the creativity process. Others, such as Wallas (1926), describe a stage of incubation as essential for problem-solving. Moreover, the idea of problem-solving differs in terms of creative process and the final product. Thus, it is crucial to understand whether students who have different academic backgrounds initiate the problem-solving task in a different manner and if it has an effect on their overall academic performance.

School children who were high on creativity and those with high intelligence scores, both had comparable scores on a standardised achievement test (Getzels & Jackson, 1962). Supporting this study, Torrance (1962) proposed a theory that IQ would have an effect on AA up to a certain threshold IQ level (about 120) after which creativity would begin to have a significant effect (Xiaoxia Ai, 1999). On the other hand, other studies have reported no significant correlation between creativity and AA thus suggesting that creativity and intelligence consists of different skills and abilities thereby affecting the AA differently (Edwards & Tyler, 1965; Marjoribanks, 1976; Mayhon, 1966; Tanpraphat, 1976). A longitudinal study of students from the 7th to the 11th grade in West Germany showed that not only was the correlation between creativity test scores and school grades actually negative in the case of physics (-.12), but it did not go beyond .26 even for art (Sierwald, 1989). Another study showed that IQ is related more to basic forms of achievement while creativity is to more higher forms of achievement involving verbal

expression (Smith, 1971; Shin & Jacobs, 1973). This indicates a possibility that relationships between creativity and intelligence could vary with age and difference in academic settings depending on the kind of curriculum a student gets enrolled into.

Relationship between Creativity and Intelligence

A major question which persists is to what extent is intelligence related to creativity. Guilford was one of the first researchers to develop taxonomy of human abilities that subsumed creative thinking as a part of intelligence (Batey & Furnham, 2006). Guilford's structure-of-intellect (SOI) model (1967a) proposes three main components; of which "divergent production/divergent thinking" (DT) component represented creativity. On this ground, he developed a creativity test (Guilford's Alternative Uses Task), which is a quantitative measure assessing creativity in terms of fluency, flexibility, originality and elaboration. However, DT was seen as an insufficient ability for creative achievement (Guilford, 1950). Many early investigations into the relationship between creativity and intelligence suggested that the two concepts are not the same. The most intelligent individuals were not found to be the most creative, and correlations between creativity and IQ were fairly low. Dearborn's (1898) Harvard study employing inkblots showed that intellectuals hardly gave imaginative responses. Thus, it can be implied that intelligence serves as a foundation for creativity, providing the individual with a basic understanding of rules to solve problems in a socially appropriate manner. However, the way in which the individual solves the problem would be the product of his or her creativity.

Role of Personality in Academic Achievement

Traditional theorists maintain that only intelligence is enough to predict AA but such theories do not account for how the personality traits of an individual interact with the cognitive abilities and the environment to influence the overall academic learning (Boyle, 1990).

The concept of stable traits served as an important step towards understanding personality as contributing to one's intelligence and it has been asserted that there could be a common trait which facilitates intelligence for acquiring knowledge. Most of these studies have relied on one of the culturally robust models of personality. The fifth factor in the Five-Factor model (Costa & McCrae, 1992a), i.e., 'openness to experience,' is related to an individual's vocabulary and education (Eysenck & Eysenck, 1985). It is indeed, a fact that curious and imaginative men are better educated than others since they explore opportunities and thus utilise their intellectual capacities in an efficient manner (Digman, 1990). Conscientiousness (C) has been consistently found to predict academic success right from childhood to adulthood (Chamorro-Premuzic & Furnham, 2003). It is associated with personal attributes necessary for academic pursuits, like dutifulness, competency and achievement-striving. Self-discipline, a trait closely related to C, has been shown to predict school performance more strongly than intelligence among school girls (Duckworth & Seligman, 2005). Neuroticism (N) was found to be negatively correlated with academic performance among university students (Leith & Davis, 1972). In response to the growing competition in the educational environment, students tend to become more anxious

which affects the quality of their performance. Openness to experience (O) also reflects openness to learning opportunities, resulting in a positive correlation with scholastic achievement (Ackerman & Heggstad, 1997). It may also have positive effects precisely when students are engaged in creative and artistic activities (Chamorro-Premuzic & Furnham, 2003). The effect of Extraversion (E) on academic success is largely age-dependent, with initial facilitation towards success during elementary school but debilitating academic success later in high school and college (Zeidner, 2009). The relation between Agreeableness (A) and academic attainment is negligible, since the traits closely associated to A, like compliance and altruism, fall more towards social adjustment thus likely to be more instrumental in a cooperative classroom setting. (Shiner, Masten & Roberts, 2003).

Relationship between Personality and Intelligence

Theories proposed by influential figures like Binet (1905), Terman (1906), Wechsler (1944), Spearman (1927), Gardner (1983) and Anastasi (1992) have highlighted an intricate relationship between personality and intelligence. Yet the theories supporting intelligence as the cognitive aspect of personality have gathered much ground in the ongoing debate than the other perspectives (Eysenck & Eysenck, 1985).

Psychometric studies in intelligence saw the emergence of many landmark theories like the Cattell's 16PF model which explicitly mentions intelligence as one of the 16 basic source traits (Cattell, 1971). His structure of personality model related intelligence with radicalism and dominance, leading to success and independence across situations, eventually leading to personality formation. He also stated that crystallised and fluid ability have different roles to play in personality development. Moreover, the relation-perceiving power of intelligence directly aids certain personality developments, e.g., the growth of conscientiousness (Barratt, 1995). The above-mentioned literature is intriguing as it accounts for the interplay of a variety of variables playing a significant role in predicting academic success of a student over a period of time.

The current study thus attempts to elucidate the relationship that exists between academic achievement, intelligence, creativity and personality factors. We, therefore, hypothesised, that academic achievement would be predicted by intelligence and a personality variable like Conscientiousness along with the sub-facets of creativity in the Indian education system after controlling for the certain environmental factors (such as hours of sleep, hours of physical activity, etc.) that could confound the individual's intentional learning and work in an educational environment.

Method

Sample

Participants ($n = 113$) included undergraduate male ($n = 33$) and female ($n = 80$) students from a college in Mumbai. Participants who volunteered for the study belonged to the Arts stream ($n = 50$) and Commerce stream ($n = 63$) and ranged between 18 to 22 years of age ($M = 20$, $SD = 0.5$). Informed consent from all the participants was taken prior to administering the tests.

Material

Intelligence

A 60-item non-verbal group test called Standard Progressive Matrices (SPM; Raven et. al., 2004) was administered to measure intelligence.

Personality

A 60-item personality inventory, NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992) was administered. Responses were obtained on a 5-point Likert Scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Scores on five subscales were obtained – neuroticism, extraversion, openness, agreeableness and conscientiousness.

Creativity

Guilford's Alternative Uses Task (Guilford et.al., 1954, Guilford, 1967a, 1967b), was administered to assess Divergent Thinking. Responses were analysed to yield scores on four subscales --- fluency, flexibility, originality and elaboration.

Academic achievement

Grade point average (GPA) on a 7 point GPA scale on the most recent exam results was obtained.

Procedure

The administration of the scales was carried out in a classroom setting using pen and paper format. Participants responded to the demographic questionnaire. This was followed by administering SPM. Participants next responded to the NEO-FFI questionnaire. Creativity test was administered by instructing the participants to write as many possible uses of an object (e.g., a brick) within 5 minutes. All the tests were scored as per instructions provided in the respective manuals.

Results

The descriptive statistics for the sample are provided in Table 1. Gender differences were found on some of the variables wherein females ($n = 80$) scored higher than males ($n = 33$) on academic achievement, creativity, fluency, flexibility, elaboration, extraversion, agreeableness, and conscientiousness. The sizes of the effect for these differences ranged from moderate to large.

TABLE 1
Descriptive Statistics

Variables	Males (n=33)		Females (n=80)		Entire Sample (n=113)		t	d
	M	SD	M	SD	M	SD		
GPA	5.89	1.02	6.38	0.84	6.24	0.92	2.43*	0.55
INT	45.33	10.76	45.23	6.27	45.26	7.80	-0.05	
CRE	34.27	11.23	52.14	21.79	46.92	20.92	5.72**	0.92
F	8.18	2.69	10.69	3.64	9.96	3.57	4.04**	0.74
X	22.15	7.31	35.45	15.94	31.57	15.21	6.07**	0.95
O	1.79	1.76	1.84	2.02	1.82	1.94	0.13	
E	2.15	2.37	4.16	3.62	3.58	3.42	3.47**	0.61
NEU	39.3	7.54	41.74	7.16	37.10	4.69	1.58	
EXT	38.27	5.65	38.44	5.88	39.81	4.32	0.14	
OPN	41.7	6.54	43.9	5.76	40.75	4.22	1.68	
AGR	36.91	6.88	41.73	6.03	37.12	4.85	3.50**	0.77
CON	40.88	7.75	43.23	5.71	42.95	4.00	1.57*	0.37

Note: GPA = Grade Point Average; INT = Intelligence; CRE = Creativity; F = Fluency; X = Flexibility; O = Originality; E = Elaboration; NEU = Neuroticism; EXT = Extraversion; OPN = Openness; AGR = Agreeableness; CON = Conscientiousness (* $p < .05$, ** $p < .01$).

Table 2 presents the correlations amongst the variables in the study. Elaboration and academic achievement show a significant correlation ($r = 0.23$, $p < 0.05$). The correlations between openness and creativity subscales although low in magnitude indicate some association between them.

TABLE 2

Bivariate Correlations among the Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12
GPA	-											
INT	0.15	-										
CRE	0.12	0.12	-									
F	0.03	0.12	0.85**	-								
X	0.09	0.10	0.97**	0.79**	-							
O	0.10	0.02	0.54**	0.45**	0.39**	-						
E	0.23*	0.15	0.60**	0.35**	0.45**	0.53**	-					
NEU	0.07	0.00	0.09	0.05	0.12	-0.03	-0.02	-				
EXT	-0.05	-0.02	0.18	0.20*	0.17	0.01	0.12	-0.22*	-			
OPN	0.07	0.13	0.35**	0.25**	0.31**	0.22*	0.37**	0.11	0.11	-		
AGR	-0.16	0.14	0.15	0.07	0.17	-0.01	0.12	0.12	0.07	0.15	-	
CON	-0.04	-0.07	0.04	0.05	0.03	0.09	0.05	-0.21*	0.10	0.01	-0.06	-

Note: GPA = Grade Point Average; INT = Intelligence; F = Fluency; CRE = Creativity; X = Flexibility; O = Originality; E = Elaboration; NEU = Neuroticism; EXT = Extraversion; OPN = Openness; AGR = Agreeableness; CON = Conscientiousness (* $p < .05$, ** $p < .01$).

Our hypothesis that AA will be predicted by Intelligence (INT) and Conscientiousness (CON) was tested using regression analysis (Table 3). The first model tested this hypothesis and was found to be insignificant ($R^2 = 0.005$, $F(2,110) = 1.282$, $p < n.s.$). A second hierarchical regression tested if AA can be predicted by fluency (F) which is the verbal component of creativity, controlling for INT and CON. The second model was also found to be insignificant ($R^2 = -.0004$, $F(3,109) = 0.891$, $p = n.s.$). A third model added neuroticism along with the previous predictors to predict AA. This model also yielded insignificant results ($R^2 = -.0008$, $F(4,108) = 0.545$, $p = n.s.$). A fourth model looked at Elaboration (E) subscale of creativity and Agreeableness (AGR) as predictors for AA, with E predicting AA better than AGR ($R^2 = 0.055$, $F(2,110) = 4.295$, $p = 0.01$). Out of all the predictors, only E was a significant predictor of AA. Altogether, 5.5 per cent of the variability in AA was predicted by knowing the scores on these predictor variables. The statistics for the regression analysis can be found in Table 3.

TABLE 3
Summary of Hierarchical Regression Analysis for Variables Predicting Academic Achievement (AA) ($N = 113$)

Variable	Model 1			Model 2			Model 3			Model 4		
	B	SE B	β	B	SE B	B	B	SE B	β	B	SE B	β
INT	0.017	0.011	1.550	0.017	0.011	1.508	0.017	0.011	1.522			
CON	-0.004	0.013	-0.291	-0.004	0.014	-0.300	-0.002	0.014	-0.134			
F				0.005	0.025	0.189	0.003	0.025	0.142			
NEU							0.009	0.012	0.727			
E										0.058*	0.025	2.34
AGR										-0.025	0.018	-1.444
R^2	0.005			-0.004			-0.008			0.055		
F for change in R^2	1.282			0.859			0.545			4.291		

Note: GPA = Grade Point Average; INT = Intelligence; F = Fluency; NEU = Neuroticism; CON = Conscientiousness; E = Elaboration; AGR = Agreeableness (* $p < .05$, ** $p < .01$).

Another regression equation, summarised in Table 4, was tested wherein elaboration (E) predicted AA. The model yielded significant results ($R^2 = 0.05$, $F(1,111) = 0.891$, $p < .05$). Only E predicted AA significantly.

TABLE 4
Summary of Simple Linear Regression Analysis for Variables Predicting Academic Achievement (AA) ($N = 113$).

Variable	B	SE B	B	t
E	0.06*	0.025	0.23	2.54

Note: $R^2 = 0.05$, (* $p < .05$, ** $p < .01$); E = Elaboration.

Discussion

The current research investigated the relationships between academic achievement (AA), intelligence, creativity and personality. The findings on gender differences are noteworthy. Females were found to be higher on variables like AA, creativity, fluency, flexibility, elaboration, neuroticism, openness, agreeableness and conscientiousness. This is indicative of some attributes which characterise females differently from males. In the Indian context, the gender roles of girls and boys are predetermined by external agents like

cultural norms, parental styles, media, and societal expectations. Girls learn to adhere to the standards of precision and socially determined righteous behaviour. This has been theorised previously in the principle of semantic congruence (Burke & Reitzes, 1981) which predicts that people with specific role identities choose role behaviours that have meanings similar to the meanings of their identities. The gender roles in an Indian context are predefined and painstakingly delineated for both the genders. Thus, the roles that we identify with, play an important part in our everyday initiatives. Another reason for these results could also be the perceived competence of the two genders, wherein boys feel that success or achievement is necessarily dependent on factors other than the academic grades; other factors may include parental investment and the normative influences on employee selection procedures. Factors like parental support and societal acceptance in their gendered self may contribute to maintaining their stable sense of self as females strive harder to gain their position in the rat race.

Girls in India are also expected to conform to the given norms of the society which drives them towards maintaining a sense of stability in their relationships, indicative of the high scores on agreeableness and conscientiousness. The high scores on elaboration and fluency are especially indicative of their strengths like detailed explanatory understanding, often masked by the perception of being gregarious. The greater form of expression in girls also fits in the general assumption of the female gender stereotype but is essentially contributing to their creative prowess. Lastly, according to Gender Similarity Hypothesis (Hyde, 2005), males and females are similar on most, however, not all psychological variables. The current study supports this theory.

The relation between AA, intelligence and the conscientiousness factor of personality has been supported by findings across different populations. Further, results revealed that E predicted AA (Table 4), meaning, the more detailed approach an individual has, he or she possesses, a greater likelihood of achieving higher AA. This indicates the emphasis laid on thinking in a more detailed manner in the Indian context.

Results also found a relationship between openness and creativity. The fifth factor of the original Five-factor model of personality has been the focal point of debate over its nomenclature with several researchers. Currently recognised as Openness to experience (McCrae & Costa, 1992a), it was also termed as Culture (Norman, 1963; Hakel, 1974) and Intellect or Intellectance (Borgatta, 1964; Digman et. al., 1981; Hogan, 1983; Peabody & Goldberg, 1989; John, 1989). The current study supports the previous findings that reiterate the relationship between personality and creativity. The openness factor in FFM includes traits like being open to trying out new activities and being flexible with thoughts and ideas. Furthermore, the extraversion factor in FFM includes traits like excitement-seeking and warmth. High scorers on both these factors are also high on creativity, which was consistent with our findings.

There is a dearth of studies investigating AA and the underlying explanations, specifically personality and creativity, in the Indian context. The Indian education will benefit immensely from understanding its students through these studies. A major limitation of the study was the sample comprising of an unequal number of females ($n = 80$) and males ($n = 33$) leading to bias with a majority of males being from the commerce stream ($n = 33$) and while a majority of females were in the arts stream ($n = 50$). Secondly, DT as a measure of creativity may not be able to assess domain-specific aspects of creativity (Baer, 1998; Kaufman & Baer, 2004; Plucker, 1998).

Future studies with a larger sample size and inclusion of more variables like motivation which are socio-culturally relevant are recommended. Secondly, the analysis of students' preferred versus their currently enrolled streams owing to the intelligence, creativity and personality traits could be studied. Thirdly, the verbal, non-verbal and performance measures of intelligence could be used so that all the aspects underlying a student's cognitive ability are considered. Lastly, the 10th and 12th grade marks could also be considered as the two are important indicators of a student's academic advancement in the Indian context. A broader scope for the assessment of AA should be examined.

The current study was an initiative to understand what leads to the AA of students in an Indian educational system. It should be noted that intelligence constitutes a major part of the student's development, yet emphasis should also be laid on the personality traits, creativity and the level of motivation.

References

- Ackerman, P. L. and Heggestad, E. D. (1997): Intelligence, Personality, and Interest: Evidence for Overlapping Traits, *Psychological Bulletin* 121: 219-45.
- Anastasi, A. (1992): What Counsellors should Know about the Use and Interpretation of Psychological Tests, *Journal of Counselling & Development*, 70(5), 610-615.
- Baer, J. (1998): The Case for Domain Specificity of Creativity, *Creativity Research Journal*, 11, 173-177.
- Barratt, E. S. (1995): History of Personality and Intelligence Theory and Research, *International Handbook of Personality and Intelligence*, pp. 3-13). Boston, MA: Springer, pp. 3-13.
- Batey, M. & Furnham, A. (2006): *Creativity, Intelligence, and Personality: A Critical Review of the Scattered Literature, Genetic, Social, and General Psychology Monographs*, 132:4, 355-429, DOI: 10.3200/MONO.132.4.355-430.
- Binet, A. & Simon, T. (1905): New Methods for the Diagnosis of the Intellectual Level of Subnormals. *L'année Psychologique*, 12, 191-244.
- Borgatta, E. E. (1964): The Structure of Personality Characteristics. *Behavioural Science*, 12, 8-17.
- Boyle, G. J. (1990): Integration of Personality and Intelligence Measurement within the Cattellian Psychometric Model. Paper presented at the Symposium on Personality and Intelligence, Fifth European Conference on Personality, University of Rome.
- Bracken, B. A. & Walker, K. C. (1997): The Utility of Intelligence Tests for Preschool Children. In D. P. Flanagan, J. L. Genshaft, & P. L. Harrison (Ed.), *Contemporary Intellectual Assessment: Theories, Tests, and Issues*. New York: Guilford Press, pp. 484-501.
- Burke, P. & Reitzes, D. (1981): The Link between Identity and Role Performance, *Social Psychology Quarterly*, 44(2), 83-92. Retrieved from <http://www.jstor.org/stable/3033704>
- Cattell, R. B. (1971): *Abilities: Their Structure, Growth, and Action*. New York: Houghton Mifflin.
- Cattell, R. B. (1987): *Intelligence: Its Structure, Growth and Action*. Amsterdam: North Holland.
- Chamorro-Premuzic, T. and Furnham, A. (2003): Personality Traits and Academic Examination Performance, *European Journal of Personality*, 17, 237-250.
- Costa, P. T. & McCrae, R. R. (1992a): *The NEO Personality Inventory (Revised) Manual*. Odessa, FL: Psychological Assessment Resources.
- Costa, P. T. & McCrae, R. R. (1992b): *Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO-FFI) Professional Manual*. Odessa, FL: PAR.
- Csikszentmihalyi, M., & Getzels, J. W. (1971): Discovery-Oriented Behaviour and the Originality of Creative Products: A Study with Artists, *Journal of Personality and Social Psychology*, 19(1), 47-52.
- Dearborn, G. V. (1898): A Study of Imagination, *American Journal of Psychology*, 5, 183-190.

- Digman, J. M. and Takemoto-Chock, N.K. (1981): Factors in the Natural Language of Personality: Re-Analysis, Comparison, and Interpretation of Six Major Studies, *Multivariate Behavioural Research*, 16(2), 149-170.
- Digman, J. M. (1990): Personality Structure: Emergence of the Five-Factor Model, *Annual Review of Psychology*, 41(1), 417-440.
- Duckworth, A. L. and Seligman, M. E. P. (2005): Self-Discipline Outdoes IQ in Predicting Academic Performance of Adolescents, *Psychological Science*, 16, 939-44.
- Edwards, M. P. & Tyler, L. E. (1965): Intelligence, Creativity, and Achievement in a Non-Selective Public Junior High School, *Journal of Educational Psychology*, 56(2), 96-99.
- Eysenck, H. J. & Eysenck, M. W. (1985): *Personality and Individual Differences: A Natural Science Approach*. New York: Plenum.
- Galton, F. (1869): *Hereditary Genius: An Inquiry into Its Laws and Consequences*, Vol. 27. Macmillan.
- Galton, F. (1962): *Hereditary Genius: An Inquiry into Its Laws and Consequences*. London: Macmillan/Fontana. (Originally published in 1869).
- Gardner, H. (1983): *Frames of Mind*. New York: Basic Books.
- Getzels, J. W. & Jackson, P. W. (1962): *Creativity and Intelligence*. New York: Wiley.
- Guilford, J. P. (1950): Creativity, *American Psychologist*, 5, 444-454.
- Guilford, J. P. (1959): Three Faces of Intellect, *American Psychologist*, 17, 459-479.
- Guilford, J. P. (1967a): The Nature of Human Intelligence. (Attention: Reference Incomplete)
- Guilford, J. P. (1967b): Creativity: Yesterday, Today and Tomorrow, *The Journal of Creative Behaviour*, 1(1), 3-14.
- Hakel, M. D. (1974): Normative Personality Factors Recovered from Ratings of Personality Descriptors: The Beholder's Eye, *Personnel Psychology*, 27(3), 409-421.
- Hargreaves, H. L. (1927): The "Faculty" of Imagination: An Enquiry Concerning the Existence of a General "Faculty," or Group Factor, of Imagination, *British Journal of Psychology Monograph Supplement*, 3, 1-74.
- Hogan, R. (1983): A Socio-Analytic Theory of Personality. In Page, M. M. (Ed.), *Personality: Current Theory & Research: Nebraska Symposium on Motivation*. Lincoln, NE University of Nebraska Press.
- Howell, D.C. (2008): *Statistical Methods for Psychology*. Belmont, CA: Wadsworth.
- Hyde, J. S. (2005): The Gender Similarities Hypothesis, *American Psychologist*, 60(6), 581.
- John O. P. (1989): Towards a Taxonomy of Personality Descriptors. In Buss, D. M. and Cantor, N. (Ed.), *Personality Psychology: Recent Trends and Emerging Directions*. New York: Springer-Verlag.
- Kaufman, J. C. & Baer, J. (2004): Hawking's Haiku, Madonna's Math: Why It's Hard to be Creative in Every Room of the House. In Sternberg, R. J., Grigorenko, E. L. & Singer, J. L. (Ed.), *Creativity: From Potential to Realisation* Washington, DC: American Psychological Association, pp 3-19.
- Kaufman, J. C. & Sternberg, R. J. (Ed.) (2006): *International Handbook of Creativity*. New York: Cambridge University Press.
- Leith, G. and Davis, T. (1972): Age Changes in the Relationship between Neuroticism and Achievement, *Research in Education*, 8, 61-69.
- Marjoribanks, K. (1976): Academic Achievement, Intelligence and Creativity: A Regression Surface Analysis, *Multivariate Behavioural Research*, 11(1), 105-118.
- Mayhon, W. G. (1966): The Relationship of Creativity to Achievement and Other Student Variables, *Dissertation Abstracts*, 27 (6A), 1713.
- McCrae, R. R. & Costa, P. T. (1987): Validation of the Five Factor Model of Personality across Instruments and Observers. *Journal of Personality and Social Psychology*, 52, 81-90.
- Norman, W. (1963): Toward an Adequate Taxonomy of Personality Attributes: Replicated Factor Structure in Peer Nomination Personality Ratings, *The Journal of Abnormal and Social Psychology*, 66(6), 574.
- Ormrod, J. E. (2008): *Educational Psychology: Developing Learners*. Upper Saddle River, N.J.: Pearson/Merrill/Prentice Hall, sixth edition, pp. 155-156.

- Peabody, D. Goldberg L. R. (1989): Some Determinants of Factor Structures from Personality Trait Descriptors, *Journal of Personality & Social Psychology*, 57, 552-567.
- Plucker, J. A. (1998): Beware of Simple Conclusions: The Case for Content Generality of Creativity, *Creativity Research Journal*, 11, 179-182.
- Raven, J., Raven, J. C. and Court, J. H. (2000, revised, updated, and extended 2004): *Manual for Raven's Progressive Matrices and Vocabulary Scales. Section 3: The Standard Progressive Matrices. Including the Parallel and Plus Version*. Elsfield Way, Oxford: Oxford Psychologists Press Ltd.
- Runco, M. A. (1991): *Divergent Thinking*. Norwood, NJ: Ablex.
- Shin, S. H. & Jacobs, S. S. (1973): An Analysis of the Interrelationships among Intelligence and Multi Levels of Creativity and Achievement, *Proceedings of the 81st Annual Convention, American Psychological Association USA*, 81, 629-630.
- Shiner, R. L., Masten, A. S. and Roberts, J. M. (2003): Childhood Personality Foreshadows Adult Personality and Life Outcomes Two Decades Later, *Journal of Personality*, 71: 1145-70.
- Sierwald, W. (1989): Kreative hochbegabung-identification, entwicklung und förderungskreativerhochbegabter [Creative Talent: Identification, Development, and Demand]. Paper presented at the Second Meeting of the Section Educational Psychology of the German Psychological Society, Munich.
- Smith, I. L. (1971): IQ, Creativity and Achievement: Interaction and Threshold. *Multivariate Behavioural Research*, 6, 51-62.
- Spearman, C. (1927): *The Abilities of Men*. London: MacMillan.
- Stankov, L. (1989): Attentional Resources and Intelligence: A Disappearing Link, *Personality and Individual Differences*, 957-968.
- Tanpraphat, A. (1976): A Study of the Relationship between Creativity, Academic Achievement, Scholastic Aptitude, Sex, and Vocational Interests of Tenth Grade Thai Students. Unpublished doctoral dissertation, University of North Colorado, Greeley.
- Terman, L. M. (1906): Genius and Stupidity: A Study of Some of the Intellectual Processes of Seven "Bright" and Seven "Stupid" Boys, *The Pedagogical Seminary*, 13(3), 307-373.
- Torrance, E. P. (1962): *Guiding Creative Talent*. Englewood Cliffs, NJ: Prentice Hall.
- Wallach, M. A. and Kogan, N. (1965): A New Look at the Creativity-Intelligence Distinction, *Journal of Personality*, 33, 348-369.
- Wallas, G. (1926): *The Art of Thought*. New York: Harcourt Brace.
- Ward, T. and Kolomyts, Y. (2010). Cognition and Creativity. *Cambridge Handbook of Creativity*, 93-112.
- Wechsler, D. (1944): *The Measurement of Adult Intelligence*. Baltimore, MD: Williams and Wilkins.
- Xiaoxia Ai (1999) Creativity and Academic Achievement: An Investigation of Gender Differences, *Creativity Research Journal*, 12:4, 329-337.
- Zeidner, M. (2009): Personality in Educational Psychology, *The Cambridge Handbook of Personality Psychology*, 733.