

# Analyzing Impact of Creative Quotient on Students' Participation and Performance in Extra-Curricular Activities

Shruti Marwaha<sup>1</sup> & Geetika Seth<sup>2</sup>

<sup>1,2</sup>Department Of Research And Development, Maxpro Intellithon Ltd, India

**Abstract :** *The in-hand research study was designed contemporaneously with the developmental aspects of Creativity that is fundamental to self-reliance, the more self-reliant a person becomes, the better the quality of his/her life, family, community and society at large. Creativity enables human beings to get the most out of life experiences and resources. Creativity produces actionable ideas, new concepts, new designs and new opportunities while innovation adds values to the new products. The research was conducted in Chandigarh. The sample for the research study consisted of 300 school going students from different schools. The subjects ranged from 3-12 years of age, divided into three groups. Pre-CSTP information was gathered to figure-out the participation of each group's subjects in extracurricular activities, sports, and distinctions. These subjects were administered Cognitive Ability Test and Assessment to track their initial level of Creative Quotient, following which Customized solutions & training programme (CSTP) was implemented for 6 months. CSTP is scientifically designed for school students to increase the learning process of the students. This programme is based on the unique learning style of each student, to elevate and reorder their cognitive abilities to desired levels. After the successful completion of the said programme, Post-CSTP information was gathered to track the same variables and it was found that after the successful completion of Customized solutions & training programme for one year, it was notified that the Creative Quotient increased in case of all the age groups. Moreover, the participation in extracurricular activities, sports and distinctions surged among all the groups.*

**Keywords-** *Creative Quotient, Customized Solutions, Extracurricular Activities, Sports, Distinctions*

## INTRODUCTION

Creativity Quotient is a measurement of creativity, expressiveness, & applied innovation. CQ plays a decisive difference between two individuals with same cognitive & gifted abilities. It's a ratio of expressiveness vs. age & time. In today's world CQ is high in demand & sometimes makes all the difference.

**Table-1: Creative Quotient**

Above 0.9	Gifted
0.8-0.9	Excellent
0.7-0.8	Very High
0.6-0.7	Above Average
0.4-0.6	Average
0.3-0.4	Below Average
0.2-0.3	Below Par
Below 0.2	Poor

Creativity is the ability to come up with new ideas through a mental process of connecting existing concepts. The ideas don't have to be revolutionary but should be new for the thinker. Another important aspect of creativity is the ability to filter solutions efficiently. To be creative is to pull existing knowledge into a new situation and quickly sort through potential outcomes. Existing knowledge is something that anyone above a certain threshold on the IQ scale can amass. Creativity is connecting things. Intelligence is the ability to gather knowledge and effectively use it. Creativity is the ability to go beyond the intelligence frame and capitalize on seemingly random connections of concepts. Expert creative don't need to be more intelligent than the average person. Creativity is also defined as coming up with something that is both novel and useful. Intelligence itself is not a unitary construct, it has a tripartite structure mirroring that of creativity. Creativity is a concept of individual differences which is intended to explain why some people have higher potential to provide new solutions to old

problems than others. It leads us to change the way we think about things and is conceived as the driving force that moves civilization forward (Hennessey & Amabile, 2010). Creativity is usually examined at different conceptual levels. One of the most general distinctions to be made is the one between creative potential as opposed to creative achievement (Eysenck, 1995). Creative potential refers to the individual's ability to generate something novel and useful (Sternberg & Lubart, 1999) and reflects a normally distributed trait (Eysenck, 1995). In turn, creative achievement refers to the actual realization of this potential in terms of real-life accomplishments (Carson, Peterson, & Higgins, 2005). Creativity is the ability to make or bring to existence something new, whether a new solution to a problem, a new method or device or a new artistic object or form. Penick (1992) described creativity as a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements and disharmonies as well as identifying, searching for solutions, making guesses or formulation of hypotheses, and possibly modifying and restating them, and experimenting to find results and finally communicating the results. Nwazuo, Olatoye and Oyundoyin (2002) argued that environment where a child finds himself/herself could foster or inhibit creativity. Though a child may have the innate or genetic ability for creativity, yet parents and teachers have roles to play to enhance and foster the creative traits. Dingedine (2003) asserted that family support, availability of learning materials and social pressures are some of the factors that influence the development of creativity. From these findings, it is clear that if teaching, assessment and social environment do not support creative thinking, the innate tendency in learners to be creative may be subdued. According to Akinboye (2003), without creativity, a person is not able to access the fullness of information and resources available but is locked up in old habits, structures, patterns, concepts and perceptions. This is why creativity, generative perception, constructive and design thinking plus innovation should form the basis of any education for sustainable development. Creativity is the confluence of intellectual activity, knowledge, motivation, thinking styles, personality and environment. Creativity should be related to intellectual activity and knowledge. Creativity is a basic tool for progress in any society or community. It is so important that any area of development must not lose sight of it. The conditions of modern day living characterized by complexity and interdependence, technological and communication advances, as well as rising expectations call for

increased creativity (Olatoye & Oyundoyin, 2007). As the society becomes more complex, there is a gradual increase in the awareness that yesterday's methods do not effectively solve contemporary problems of the society (Akinboye, 1985). This is why innovation and creativity are needed in nearly all the facets of the society. For the same level of education, it seems student creativity varies from country to country. Creative activities lead to innovation. While creativity is the art of producing new ideas, approach or action, innovation is the process of both generating and applying such creative ideas and converting them into novel, useful and viable products, services and business practices. Roy (1992) studied personality differentials of adolescents with scientific creativity in relation to environment with the objective to study personality differences between low and high scientifically creative adolescents in terms of Cattell's trait theory and found that typical high scientific creative adolescent were more resolved, critical, more abstract thinker, more stable emotionally, more excitable, more independent, serious and prudent, more expedient, more venturesome, more tough minded, more individualistic, more self assured, self sufficient, self disciplined and more relaxed than low scientific creative adolescents. Kumari (2005) studied the relationship between creativity, intelligence, adjustment and value patterns among adolescents by taking a sample of 545 students of senior secondary classes selected through stratified random sampling technique and found that level of adjustment was significantly related to the amount of intelligence; level of adjustment increased during adolescence stage. Developing effective decision-making skills is one of the goals of guidance and counselling. The process involved are efficient evaluation of problems, list of possible solutions in term of merits and demerits, application of the most appropriate solution, acceptance of the outcomes and acting upon the outcomes.

#### **CUSTOMIZED SOLUTIONS & TRAINING PROGRAMME**

Customized solutions & training programmes are scientifically designed for school students, Namely; The Backbencher, Superskills, Masterclass, i-class. The Program is designed to increase the learning process of the students. This programme is based on the unique learning style of each student, to elevate and reorder their cognitive abilities to desired levels. As per the programme, irrespective of the number of students & with their different variety of learning styles, teachers and parents can still attend & focus

on an individual student. Every student will grasp the concept delivered by the teacher with equal understanding. One major difference between the said programme and a normal class is teacher's and parents' command over the students thereby aiding in drastic increase in student academic performance.

**METHOD**

The research was conducted in Chandigarh. The sample for the research study consisted of 300 school going students from different schools. The subjects ranged from 3-12 years of age, divided into three groups, first group consisting of subjects between 3 and 6 years, the second group including subjects aging from 6 to 9 years, and the third group including subjects between 9 and 12 years of age.

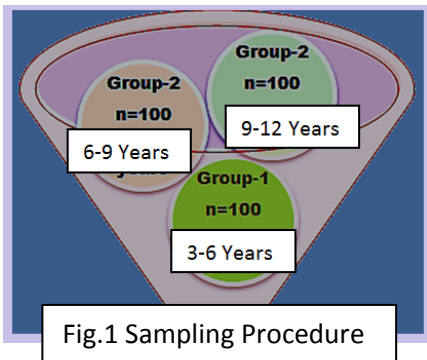


Fig.1 Sampling Procedure

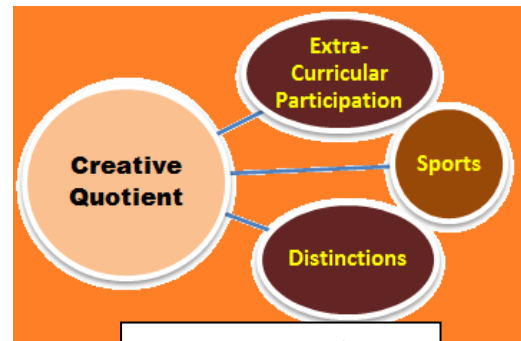


Fig.2 Variables of Study

Pre-CSTP information was gathered to figure-out the participation of each group's subjects in extracurricular activities, sports, and distinctions. These subjects were administered Cognitive Ability Test and Assessment to track their initial level of creative Quotient, following which Customized

solutions & training programme (CSTP) was implemented for 6 months. After the successful completion of the said programme, Post-CSTP information was gathered to track the same variables as per the said methodology.

Random sampling n=100	
Pre--CSTP information	Extra-Curricular Participation
	Sports
	Distinction
Test-1	Creative Quotient
<b>Customized solutions &amp; training programme for one year</b>	
Post-CSTP information	Extra-Curricular Participation
	Sports
	Distinction
Test-2	Creative Quotient
Statistical Analysis	

Fig.3 Methodology

The tool used was Cognitive Ability Test and Assessment. This test helps to numerically measure cognitive ability factors (like Focus, Decision Making Ability, Creativity, Dynamic IQ) termed as natural ingredients for success in life in general. In this research, the 'Creative Quotient' has been emphasized.

**STATISTICAL ANALYSIS**

Once the data was obtained, it was coded, tabulated and analyzed, keeping in mind the objectives of the study. Appropriate statistical tools were used to draw

meaningful inferences. The statistical tools used in the present study are given in the table below;

Table 2 Statistical tools used for analysis of data

S.No.	Statistical tools	Formula	Purpose
1.	Mean (x)	$X = \Sigma X/N$ where, X = Variable N = No. of sample	To find out the average scores of variable used in the study.
2	Standard Deviation (S.D.)	$\sigma = \sqrt{\Sigma x^2 / N}$ Where X = Deviation from actual mean X = mean. X = variable. N = number of samples.	To find out deviation from the mean scores of the variables.
3.	Standard error of mean (S.E)	S.E = $\sigma/n$ Where $\sigma$ = S.D. n= number of observations	To find out the degree to which the mean is affected by the error of measurement and sampling.
4.	't' test	$t = \frac{(x_1 - x_2) / S}{\sqrt{n_1 n_2 / (n_1 + n_2)}}$ where x1 = mean of 1 <sup>st</sup> sample x2 = mean of second sample S = combine S.D. n1 = number of observations in 1 <sup>st</sup> sample. n2 = number of observations in 2 <sup>nd</sup> sample	To compare the average score of any two groups or to find out whether the mean of the two samples vary significantly from each other.

**RESULTS AND DISCUSSION**

**Group-1**

Table 3: Number of Students (3-6 Years) according to CQ Range in Test-1 & Test-2

3-6 Years	Gifted	Excellent	Very High	Above Average	Average	Below Average	Below Par	Poor
	Above 0.9	0.8-0.9	0.7-0.8	0.6-0.7	0.4-0.6	0.3-0.4	0.2-0.3	Below 0.2
Test-1	0	0	1	9	24	46	12	8
Test-2	4	8	18	35	26	7	2	0

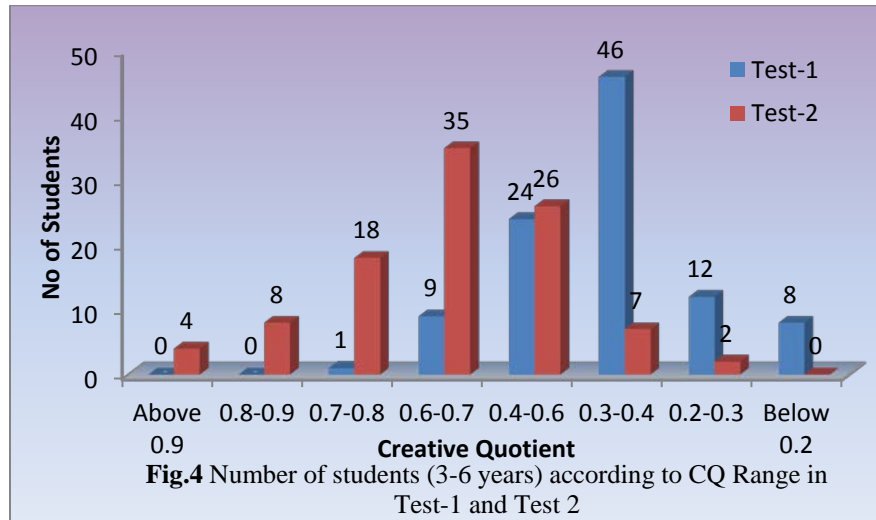
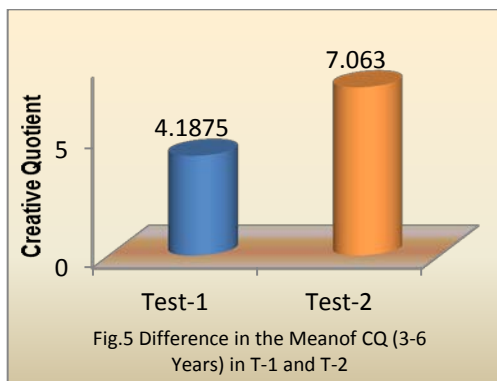
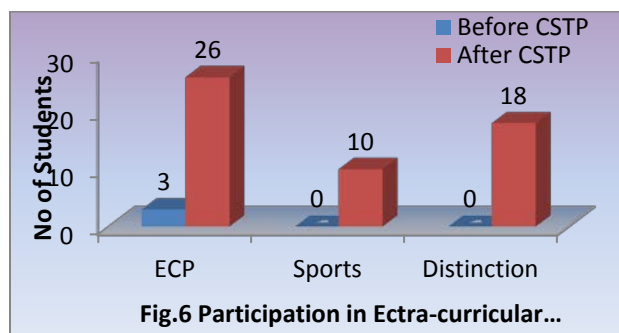


Table.4 Difference in the Mean, Standard deviation, Standard error, t-values and level of Significance of Creativity Quotient in Test-1 and Test-2

3-6 Years	N	MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Test-1	100	4.1875	0.85	0.085	29.15	<0.0001	Extremely Statistically Significant
Test-2	100	7.063	0.50	0.05			



3-6 Years	ECP	Sports	Distinction
Before CSTP	3	0	0
After CSTP	26	10	18

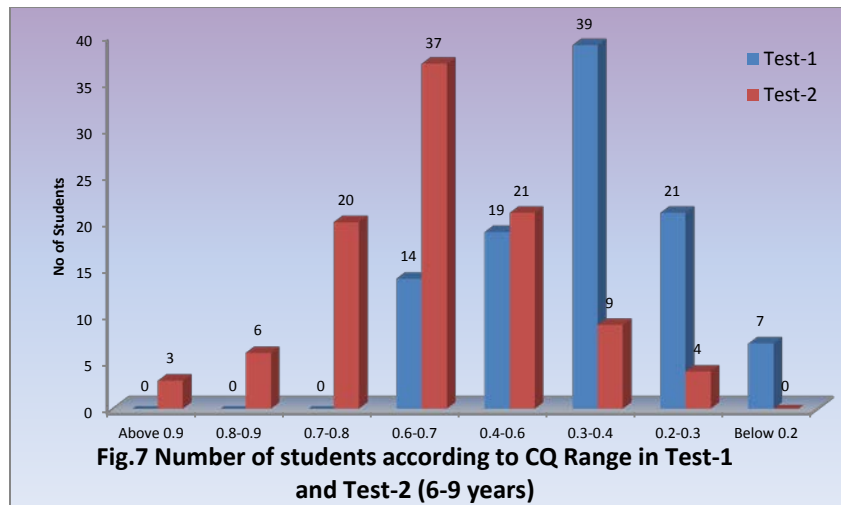


An extremely significant drift towards higher level of Creative Quotient was recorded after the completion of CSTP among 3-9 year olds. It is noticed that after the implementation of the said programme, more subjects participated in extracurricular activities and a comparatively higher number of them got distinctions.

**Group-2**

**Table 6:** Number of Students (6-9 Years) according to CQ Range in Test-1 & Test-2

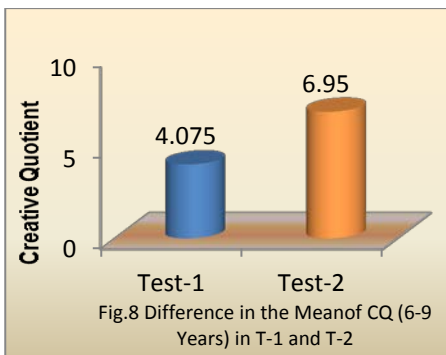
6-9 Years	Gifted	Excellent	Very High	Above Average	Average	Below Average	Below Par	Poor
	Above 0.9	0.8-0.9	0.7-0.8	0.6-0.7	0.4-0.6	0.3-0.4	0.2-0.3	Below 0.2
Test-1	0	0	0	14	19	39	21	7
Test-2	3	6	20	37	21	9	4	0



**Fig.7** Number of students according to CQ Range in Test-1 and Test-2 (6-9 years)

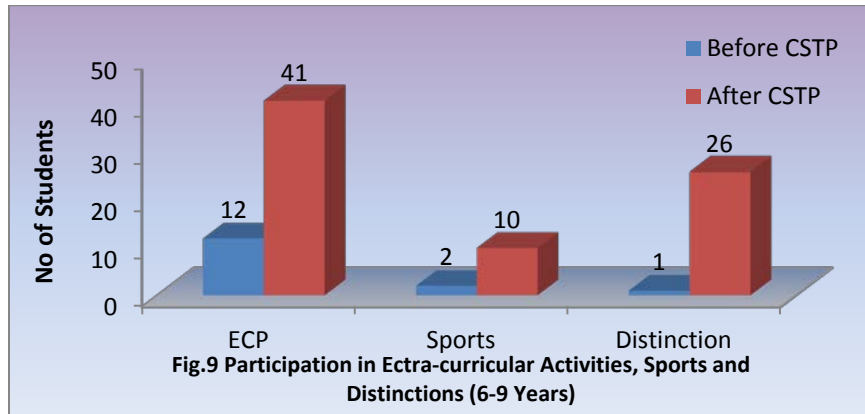
Table 7 Difference in the Mean, Standard deviation, Standard error, t-values and level of Significance of Creativity Quotient in Test-1 and Test-2

6-9 Years	N	MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Test-1	100	4.075	1.3	0.13	17.06	<0.0001	Extremely Statistically Significant
Test-2	100	6.95	1.07	0.107			



**Fig.8** Difference in the Mean of CQ (6-9 Years) in T-1 and T-2

6-9 Years	ECP	Sports	Distinction
Before CSTP	12	2	1
After CSTP	41	10	26

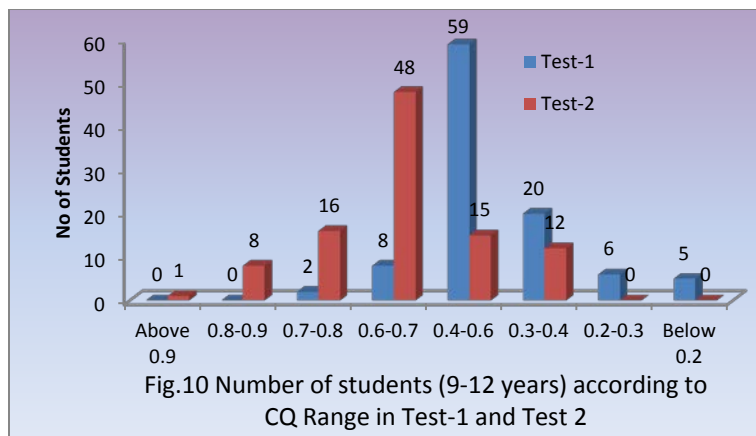


It was noticed that the Creative Quotient landed towards higher level after the completion of said programme among 6-9 year olds. It is noticed that after the implementation of the customized programme, a larger number of subjects participated in extracurricular activities and quite a greater number got distinctions.

**Group-3**

**Table 9:** Number of Students (9-12 Years) according to CQ Range in Test-1 & Test-2

9-12 Years	Gifted	Excellent	Very High	Above Average	Average	Below Average	Below Par	Poor
	Above 0.9	0.8-0.9	0.7-0.8	0.6-0.7	0.4-0.6	0.3-0.4	0.2-0.3	Below 0.2
Test-1	0	0	2	8	59	20	6	5
Test-2	1	8	16	48	15	12	0	0



**Table 10:** Difference in the Mean, Standard deviation, Standard error, t-values and level of Significance of Creativity Quotient in Test-1 and Test-2

9-12 Years	N	MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Test-1	100	4.688	2.1	0.21	10.28	<0.0001	Extremely Statistically Significant
Test-2	100	7.11	1.065	0.1065			

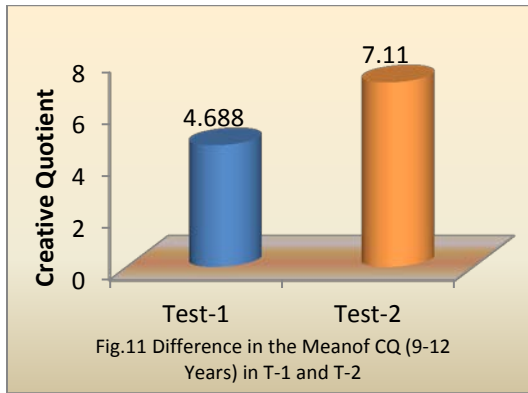


Fig.11 Difference in the Mean of CQ (9-12 Years) in T-1 and T-2

Table 11: Pre and Post CSTP Information			
9-12 Years	ECP	Sports	Distinction
Before CSTP	8	0	0
After CSTP	39	21	26

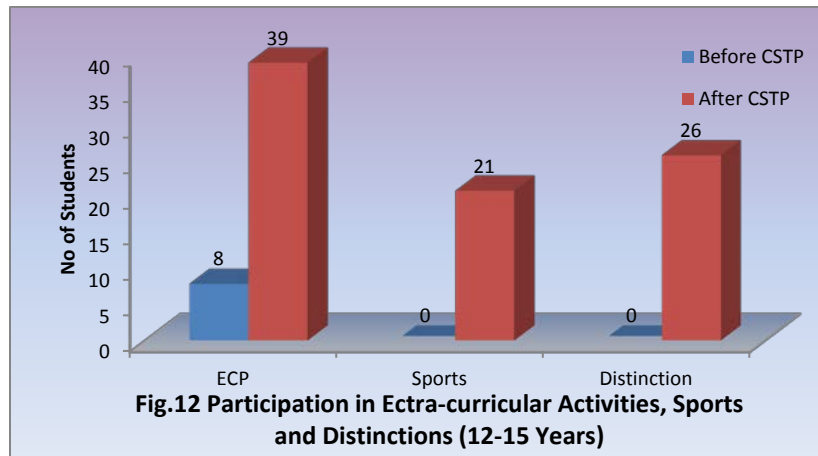


Fig.12 Participation in Extra-curricular Activities, Sports and Distinctions (12-15 Years)

It was evidently notified that the Creative Quotient of those between 9 and 12 years of age swung abruptly after the completion of the programme. Besides, a greater proportion of them participated and achieved distinctions in sports and extracurricular activities

**CONCLUSION**

It can thus be concluded that, after the successful completion of Customized solutions & training programme for one year, it was notified that the Creative Quotient increased in case of all the age groups. Moreover, the participation in extracurricular activities, sports and distinctions surged among all the groups. The participation and performance was notified to be enhanced drastically. Thus, Creative Quotient once enhanced, can beget qualitative results in performance of students. Students with higher CQ can inevitably express and perform better thereby yielding better output.

**ACKNOWLEDGEMENT**

Authors express indebtedness to the Almighty, who is the apostle of strength. Authors are inevitably grateful to the subjects and all those directly as well as indirectly involved in the auspicious research work. Genuine thanks are expressed to all the

authors/researchers whose work is referred for making the present study a real success.

**REFERENCES**

1. Amabile T.M. Social psychology of creativity: A consensual assessment technique. *Journal of Personality and Social Psychology*. 1982;43:997–1013.
2. Anwar, M. (2001). A study of relationship between creative thinking and academic achievement.
3. Barron F. D. Van Nostrand; Princeton: 1963. Creativity and psychological health.
4. Barron F. Holt, Rinehart & Winston; New York: 1969. Creative person and creative process.
5. Batey M., Chamorro-Premuzic T., Furnham A. Individual differences in ideational behavior: Can the big five and psychometric intelligence predict creativity scores? *Creativity Research Journal*. 2010;22:90–97.
6. Batey M., Furnham A. Creativity, intelligence, and personality: A critical review of the scattered literature. *Genetic*,



- Social, and General Psychology Monographs. 2006;132:355–429.
7. Benedek M., Franz F., Heene M., Neubauer A.C. Differential effects of cognitive inhibition and intelligence on creativity. *Personality and Individual Differences*. 2012;53:480–485
  8. Benedek M., Könen T., Neubauer A.C. Associative abilities underlying creativity. *Psychology of Aesthetics, Creativity, and the Arts*. 2012;6:273–281.
  9. Benedek M., Mühlmann C., Jauk E., Neubauer A.C. Assessment of divergent thinking by means of the subjective top-scoring method: Effects of the number of top-ideas and time-on-task on reliability and validity. *Psychology of Aesthetics, Creativity, and the Arts*. 2013 (in press)
  10. Benedek M., Neubauer A.C. Revisiting Mednick's model on creativity-related differences in associative hierarchies. Evidence for a common path to uncommon thought. *Journal of Creative Behavior*. 2013
  11. Bucik V., Neubauer A.C. Bimodality in the Berlin model of intelligence structure (BIS): A replication study. *Personality and Individual Differences*. 1996;21:987–1005.
  12. Carrol J.B. Cambridge University Press; New York: 1993. *Human cognitive abilities: A survey of factor analytic studies*.
  13. Carson S.H., Peterson J.B., Higgins D.M. Decreased latent inhibition is associated with increased creative achievement in high-functioning individuals. *Journal of Personality and Social Psychology*. 2003;85:499–506.
  14. Carson S.H., Peterson J.B., Higgins D.M. Reliability, validity, and factor structure of the creative achievement questionnaire. *Creativity Research Journal*. 2005;17:37–50.
  15. Cho S.H., Nijenhuis J.T., van Vianen A.E., Kim H.-B., Lee K.H. The relationship between diverse components of intelligence and creativity. *The Journal of Creative Behavior*. 2010;44:125–137.
  16. Coward W.M., Sackett P.R. Linearity of ability–performance relationships: A reconfirmation. *Journal of Applied Psychology*. 1990;75:297–300.
  17. Davies R.B. Hypothesis testing when a nuisance parameter is present only under the alternative. *Biometrika*. 1987;74:33–43
  18. Eysenck H.J. Cambridge University Press; New York: 1995. *Genius: The natural history of creativity*.
  19. Feist G.J. A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review*. 1998;2:290–309.
  20. Feist G.J. The function of personality in creativity: The nature and nurture of the creative personality. In: Kaufman J.C., Sternberg R.J., editors. *The Cambridge handbook of creativity*. Cambridge University Press; New York: 2010. pp. 113–130.
  21. Fuchs-Beauchamp K.D., Karnes M.B., Johnson L.J. Creativity and intelligence in preschoolers. *Gifted Child Quarterly*. 1993;37:113–117.
  22. Getzels J.W., Jackson P.W. Wiley; New York: 1962. *Creativity and intelligence: Explorations with gifted students*.
  23. Gilhooly K.J., Fioratou E., Anthony S.H., Wynn V. Divergent thinking: Strategies and executive involvement in generating novel uses for familiar objects. *British Journal of Psychology*. 2007;98:611–625.
  24. Guilford J.P. McGraw-Hill; New York: 1967. *The nature of human intelligence*.
  25. Hennessey B.A., Amabile T.M. *Creativity. Annual Review of Psychology*. 2010;61:569–598
  26. Hocevar D. Ideational fluency as a confounding factor in the measurement of originality. *Journal of Educational Psychology*. 1979;71:191–196.
  27. Jauk E., Benedek M., & Neubauer, A. C. (under review). *The Road to Creative Achievement: A Latent Variable Model of Ability and Personality Predictors*
  28. Karwowski M., Gralowski J. Threshold hypothesis: Fact or artifact? *Thinking Skills and Creativity*. 2013;8:25–33.
  29. Kaufman J.C., Beghetto R.A. Beyond big and little: The four C model of creativity. *Review of General Psychology*. 2009;13:1–12.
  30. Kaufman J.C., Plucker J.A. Intelligence and creativity. In: Sternberg R.J., Kaufman S.B., editors. *The Cambridge handbook of intelligence*. Cambridge University Press; Cambridge: 2011. pp. 771–783.
  31. Kaufman J.C., Plucker J.A., Baer J. John Wiley & Sons Inc.; Hoboken: 2008. *Essentials of creativity assessment*.

32. Kéri S. Solitary minds and social capital: Latent inhibition, general intellectual functions and social network size predict creative achievements. *Psychology of Aesthetics, Creativity, and the Arts*. 2011;5:215–221.
33. Kim K.H. Can only intelligent people be creative? *Journal of Secondary Gifted Education*.2005;16:57–66.
34. King L.A., Walker L.M., Broyles S.J. Creativity and the five-factor model. *Journal of Research in Personality*. 1996;30:189–203.
35. Lance C.E. Residual centering, exploratory and confirmatory moderator analysis, and decomposition of effects in path models containing interactions. *Applied Psychological Measurement*. 1988;12:163–175.
36. McGrew K. CHC theory and the human cognitive abilities project: Standing on the shoulders of the giants of psychometric intelligence research. *Intelligence*. 2009;37:1–10.
37. Michael W.B., Wright C.R. Psychometric issues in the assessment of creativity. In: Glover J.A., Ronning C.R., Reynolds C.R., editors. *Handbook of creativity*. Plenum Press; New York: 1989. pp. 33–52.
38. Mueggo V.M. Segmented: an R package to fit regression models with broken-line relationships. *R News*. 2008;8(1):20–25.
39. Nusbaum E.C., Silvia P.J. Are intelligence and creativity really so different? Fluid intelligence, executive processes, and strategy use in divergent thinking. *Intelligence*. 2011;39:36–45.
40. Park G., Lubinski D., Benbow C.P. Ability differences among people who have commensurate degrees matter for scientific creativity. *Psychological Science*. 2008;19:957–961
41. Park G., Lubinski D., Benbow C.P. Contrasting intellectual patterns predict creativity in the arts and sciences. Tracking intellectually precocious youth over 25 years. *Psychological Science*. 2007;18:948–952
42. Plucker J.A. Is the proof in the pudding? Reanalyses of Torrance's (1958 to present) longitudinal data. *Creativity Research Journal*. 1999;12:103–114.
43. Preckel F., Holling H., Wiese M. Relationship of intelligence and creativity in gifted and non-gifted students: An investigation of threshold theory. *Personality and Individual Differences*.2006;40:159–170.
44. Runco M.A. Divergent thinking, creativity, and ideation. In: Kaufman J.C., Sternberg R.J., editors. *The Cambridge handbook of creativity*. Cambridge University Press; Cambridge: 2010. pp. 413–446.
45. Runco M.A., Albert R.S. The threshold theory regarding creativity and intelligence: An empirical test with gifted and nongifted students. *Creative Child & Adult Quarterly*.1986;11:212–218.
46. Silvia P.J., Beaty R.E. Making creative metaphors: The importance of fluid intelligence for creative thought. *Intelligence*. 2012;40:343–351. (Electronic publication ahead of print)
47. Silvia P.J., Wigert B., Reiter-Palmon R., Kaufman J.C. Assessing creativity with self-report scales: A review and empirical evaluation. *Psychology of Aesthetics, Creativity, and the Arts*.2012;6:19–34.
48. Silvia P.J., Winterstein B.B., Willse J.T., Barona C.M., Cram J.T., Hess K.I. Assessing creativity with divergent thinking tasks: Exploring the reliability and validity of new subjective scoring methods. *Psychology of Aesthetics, Creativity, and the Arts*. 2008;2:68–85.
49. Simonton D.K. Oxford University Press; Oxford: 1999. *Origins of genius. Darwinian perspectives on creativity*.
50. Sligh A.C., Connors F.A., Roskos-Ewoldsen B. Relation of creativity to fluid and crystallized intelligence. *The Journal of Creative Behavior*. 2005;39:123–136.
51. Sternberg R.J., Lubart T.I. The concept of creativity: Prospects and paradigms. In: Sternberg R.J., editor. *Handbook of creativity*. Cambridge University Press; Cambridge: 1999. pp. 3–15.
52. Sternberg R.J., O'Hara L.A. Creativity and intelligence. In: Sternberg R.J., editor. *Handbook of creativity*. Cambridge University Press; Cambridge: 1999. pp. 251–272.
53. Wallach M.A., Kogan N. Holt, Rinehart and Winston; New York: 1965. *Modes of thinking in young children: A study of the creativity-intelligence distinction*.
54. Wilson R.C., Guilford J.P., Christensen P.R. The measurement of individual differences

in originality. *Psychological Bulletin*. 1953;50:362–370.

55. Yamamoto K. Achievement, intelligence, and creative thinking in fifth grade children: A correlational study. *Merrill-Palmer Quarterly*. 1966;12:233–241.

56. Yamamoto K. Threshold of intelligence in academic achievement of highly creative students. *The Journal of Experimental Education*. 1964;32:401–405.