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ANALYSIS OF VARIATION IN INTELLIGENCE QUOTIENT AFTER SUCCESSFUL COMPLETION OF CUSTOMIZED SOLUTIONS& TRAINING PROGRAMME

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Abstract:

The acceded research was conducted to confab and envisage the level of improvement in Intelligence Quotient of children after the successful consummation of customized solutions and Training Programme based on Cognitive Science Education Technology. The research was conducted in and around Chandigarh. The sample consisted of 60 school going students between 7-9 years of age from different schools. Purposive sampling was undertaken to select subjects with average performance at schools, specifically making it for students obtaining 65-70% marks in their academics in their previous session. A Pre-IQ Test was conducted to scrutinize via oversampling and a selective sample was drawn to ensure similar IQ. Efforts were made to select the sample having similar IQ at the time of Test-1. The sample was divided into two groups- Experimental Group (Group-1) and the Control Group (Group-2). Group-1 was ensured customized solutions and a Training Programme was implementated. After the successful completion of the Programme for One Year, it was discerned that group-1elevated and out-figured their counterparts in terms of Intelligence Quotient as that of group-2 remained constant.

Key Words: Intelligence Quotient, Customized solutions & Training Programme, Experimental Group, Control Group

1. Introduction:

Intelligence Quotient (IQ) is the phenomenon that involves assessment regarding one's capability to observe, analyze and interpret the circumstances (Wechsler, 1958). It's the intellectual aptitude of an individual which is measurable and can be denoted numerically. Sternberg (1985) termed Intelligence as a mental capacity that entails recognition and alteration of the surroundings in which an individual lives. The level of IQ had been a predictor of the level of academic achievement of students. But in this century, intelligence and success are not viewed the same way they were before (Goleman 1995).New theories of intelligence have been introduced and are gradually replacing the traditional theory. The child/student has become the centre of concern, not considering only his reasoning capacities, but also his creativity, emotions and interpersonal skills. The multiple intelligence theory had been introduced by Gardner (1983) and the Emotional intelligence theory by Mayer and Salovey (1990) and then Goleman (1995).Theories of intelligence are often based on psychometric data collected from individuals performing tasks perceived to measure their intellectual functioning (Weinberg, 1989). Researchers such as Thurstone (1938) and Guilford (1967) have opted for distinct mental capabilities. Gardner (1983), believed that intelligence is much more than IQ, and developed the theory of multiple intelligences by proposing eight different types of intelligences: linguistic, logical/mathematical, bodily-kinesthetic, musical, visual/spatial, intrapersonal, interpersonal, and naturalistic. Jack Naglieri, research professor at the University of Virginia says that Understanding changes in IQ also requires carefully considering how intelligence is measured. People confuse ability with knowledge. We all can study and improve our vocabulary, but I would argue that

doesn't make us any smarter. The best way to measure intelligence is to measure those abilities that underlie the acquisition of knowledgeseparately from the knowledge we have. Richard Nisbett, professor of psychology at the University of Michigan endorses that IQ can change over time. Basically, people are gaining in modern industrialized societies. IQ's are increasing three points per decade. In fact, there was an 18-point increase between 1947 and 2002. So the average IQ of a 20yearold in 1947 was lower than the average IQ of a 20-year-old in 2002. Stephen Ceci, professor of developmental psychology at the Cornell University further corroborates that IQ is variable and there's plenty of evidence documenting this. An article in November in the journal 'Nature' by Price and her colleagues is one example. It had 33 adolescents, who were 12 to 16yearsold when the study started. Price and her team gave them IQ tests, tracked them for four years, and then gave them IQ tests again. The fluctuations in IQ were enormous. I'm not talking about a couple points, but 20-plus IQ points, one way or another. These changes in IQ scores were not random — they tracked well with structural and functional brain imaging. Suppose the adolescent's verbal IQ really went up during that time; it was verbal areas of the brain that changed. There are quite a large number of other studies showing IQ can change. Many of the changes in IQ are correlated to changes in schooling. One way that a school increases IQ is to teach children to "taxonimize," or group things systematically rather than thematically. This kind of thinking is rewarded on many IQ tests. There are also a number of studies showing that the brain changes after several kinds of regimen. London Taxi drivers whose brains are scanned before and after they start drivingand learning to navigate London's maze of streets, show changes in the brain as they use more navigational skills. Even young adults who take a juggling course show brain changes. If put all together, the evidence is quite compelling; life experiences and school-related experiences change both, the brain and IQ. This is true of adults and children. Alan S. Kaufman, clinical professor of psychology at the Yale University School of Medicine: There's no such thing as "an" IQ. You have an IQ at a given point in time, the same has built-in error. It's like stepping on a scale to determine how much you weigh. Research during the past decade, uses various neurotech. techniques (aka, brain fitness programs) have suggested that it is possible to 'fine-tune' your neural efficiency or mental horsepower. Your cognitive functions can be made to work more efficientlyand in a more synchronized manner so that you can change your IQ score. Individuals can change IQ scores. Assome abilities (e.g., fluid reasoning and crystallized intelligence, or verbal abilities) become more stable over time, while others are less stable (e.g., short-term memory and cognitive processing speed). Throughout the history of psychology, no question has been so persistent or so resistant to resolution as that of the relative roles of nature and nurture in causing individual and group differences in cognitive ability (Degler, 1991; Loehlin, Lindzey, & Spuhler, 1975). This scientific debate goes back to the mid-19th century (e.g., Galton, 1869; Nott & Glidden, 1854). Starting with the widespread use of standardized mental tests in World War I, average ethnic and racial group differences were found. Especially vexing has been the causeof the 15-point Black–White IQ difference in the United States. In 1969, the Harvard Educational Review published Arthur Jensen's lengthy article, "How Much Can We Boost IQ and School Achievement?" Jensen concluded that IQ tests measure socially relevant general ability.Individual differences in IQ have a high heritability & compensatory educational programs have proved generally ineffective in raising the IQ or school achievement of individuals or groups.

Customized Solutions & Training Programme:

Customized solutions &training programmes are scientifically designed for school students, namely; The Backbencher, Super-skills, Master-class and i-class. The Programme is designed to increase the learning process of students. It is based on the unique learning style of each student, to record and elevate 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 each 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 the teacher's and parent'scommand over the students thereby aiding in a drastic increase in student academic performance.

2. Method:

The research was conducted in Chandigarh where the sample consisted of 60 school going students between 7-9 years of age from different schools. Purposive sampling was undertaken to select subjects with average performance at schools, specifically making it for students obtaining 65-70% marks in their academics in their previous session. As the sampling was purposive in terms of the academic achievement and general intelligence scrutinized through their teachers on basis of school performance and anecdotal records. A Pre-IQ Test was conducted to scrutinize via oversampling and a selective sample was drawn to ensure similar IQ. Efforts were made to select the sample having similar IQ at the time of Test-1. The sample was divided into two groups. The first group, Group-1 was the Experimental Group, on whom the Customized Solutions & Training Programme was implemented. On the contrary, the Control group did not have access to the said programme. The Groups were compared in four phases and the data collected was analysed as per the set 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 IQ factor has been emphasized.

EXPERIMENTAL GROUP	TIMELINE	CONTROL GROUP
TEST T-1		TEST T-1
CUSTOMIZED SOLUTIONS- 3 MONTHS		N/A
TRACKER TEST-A		TRACKER TEST-A
CUSTOMIZED SOLUTIONS- 3 MONTHS		N/A
TRACKER TEST-B		TRACKER TEST-B
CUSTOMIZED SOLUTIONS- 3 MONTHS		N/A
TRACKER TEST-C		TRACKER TEST-C
CUSTOMIZED SOLUTIONS- 3 MONTHS	1Year	N/A
TEST T-2		TEST T-2

Figure 1:Methodology

2.1 Participants:

Purposive sampling was undertaken to select subjects both males as well as females from 6 different schools aging between 7-9 years. The sample was divided into two groups. The first group (Group-1) was the Experimental Group, on whom the Customized solutions &training programme was implemented. On the contrary, 'the Control Group (Group-2) did not have access to the said programme.

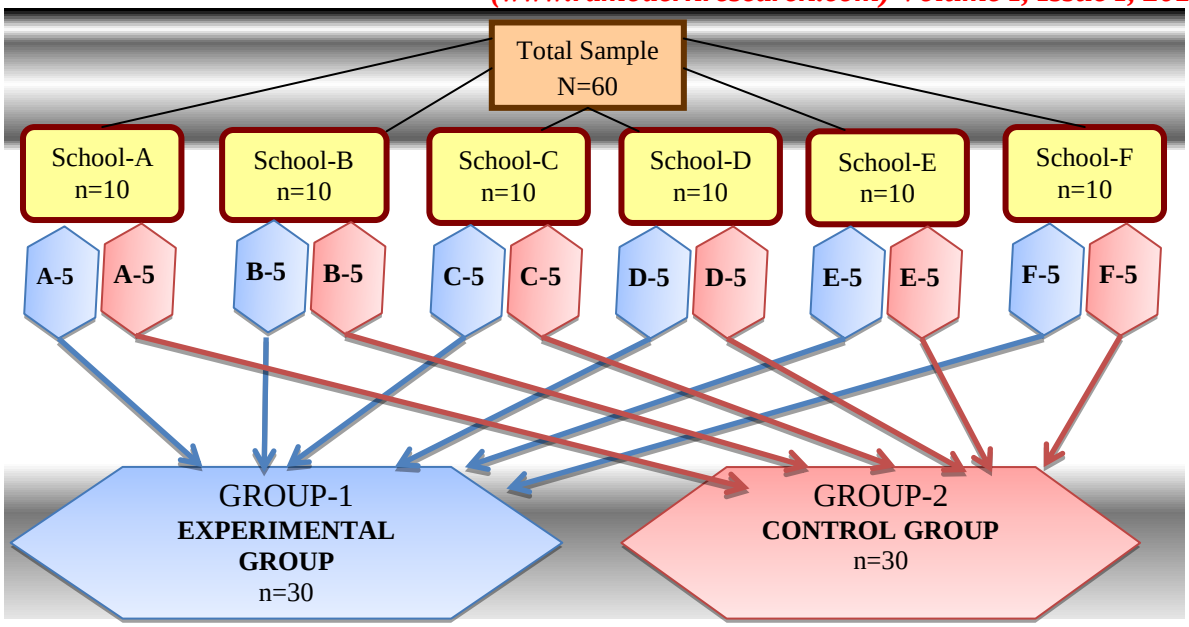

Figure 2: Sampling (Purposive via Oversampling)

2.2 Phases of Study: The Groups were compared in four phases.

Phase I: Intelligence Quotient of 'Experimental Group (Group-1) was compared with that of the Control Group (Group-2) in Test-1

Phase II: Intelligence Quotient of Control Group(Group-2) was compared in their Test-1 and Test-2

Phase III: Intelligence Quotient of Experimental Group(Group-1) was compared in their Test-1 and Test-2

Phase IV: Intelligence Quotient of Experimental Group(Group-1) was compared with that of the Control Group (Group-2) in Test-2

2.3 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 Table1

Table 1: Statistical tools used for analysis of data

S.No	Statistical Tools	Formula	Purpose
1.	Mean (x)	X = ΣX/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.)	0 = ✓Σ x ⁄ N WhereX = Deviation from actual mean, X = mean. X = variable. N = number of samples.	To find out deviation from the main scores of the variables.
3.	Standard error of mean (S.E)	S.E = 0/n Where 0 = 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 = (x1-x2) / S ✓n1n2/n1 + n2 where x1 = mean of 1st sample x2 = mean of second sample S = combine S.D. n1 = number of observations in 1st sample. n2 = number of observations in 2nd 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.

3. Results and Discussion:

Phase I

Table:2 Difference in the Mean Standard deviation, standard error, t-values and level of Significance of Intelligence Quotient between Group-1& Group-2 in T-1

IQ		MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Test-1	G1	111	2.5	0.456	1.2497	0.2164	Not statistically significant
	G2	112	3.6	0.657			

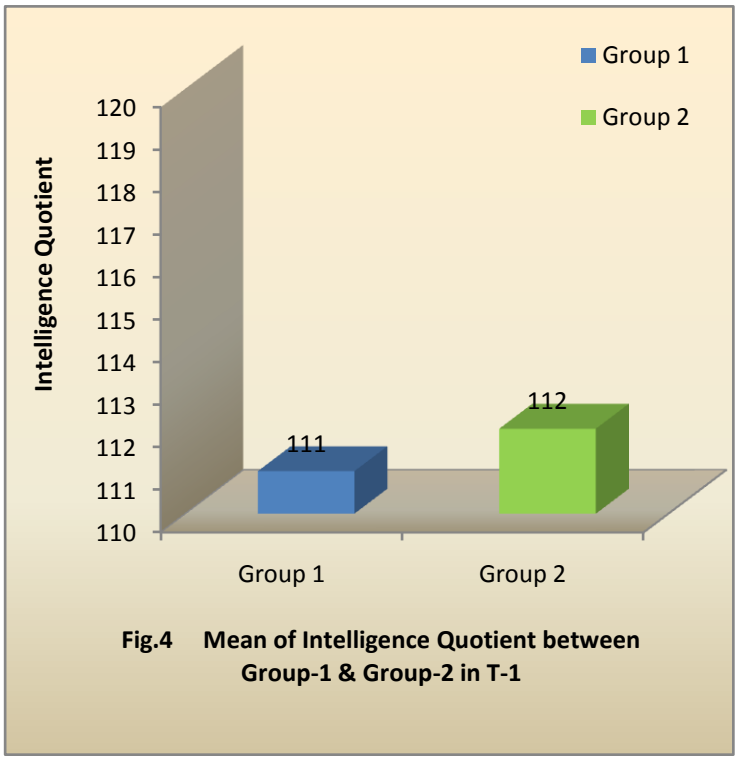

Fig.4 Mean of Intelligence Quotient between Group-1 & Group-2 in T-1

As the sampling was purposive in terms of the academic achievement and general intelligence scrutinized through their teachers on basis of school performance and anecdotal records.A Pre-IQ Test was conducted to scrutinize via oversampling and the selective sample was drawn to ensure similar IQ. Efforts were made to select the sample having similar IQ at the time of Test-1. There was found an insignificant difference in the Intelligence Quotient of Group-1 and Control Group(Group-2) in Test. It was witnessed that the experimental group had a slightly lower mean of IQ as compared to the other group.

Phase II

Table 3: Difference in the Mean Standard deviation, standard error, t-values and level of Significance of Test T-1& T-2 of Group-2 in terms of Intelligence Quotient

IQ		MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Group-2	T1	112	3.6	0.657	0.0000	1	Not statistically significant
	T2	112	4.2	0.767			

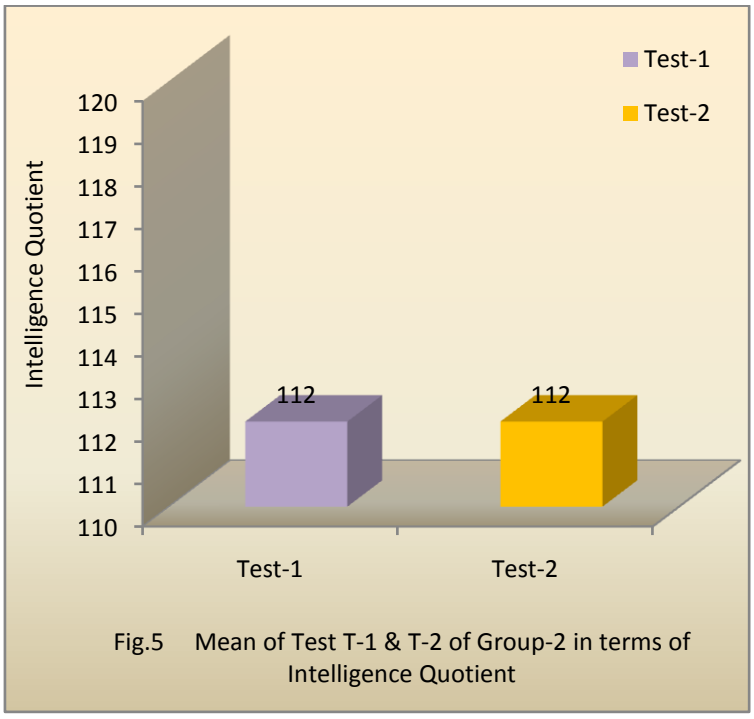

Fig.5 Mean of Test T-1 & T-2 of Group-2 in terms of Intelligence Quotient

There was an insignificant difference in the Intelligence Quotient of subjects of Control Group(Group-2) in Test-1 as compared to their IQ in Test-2 whereas the mean was found to be exactly the same. There were seen no signs of increase or decline in their IQ in the said time span.

Phase III

Table 4: Difference in the Mean Standard deviation, standard error, t-values and level of Significance of Test T-1& T-2 of Group-1in terms of Intelligence Quotient

IQ		MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Group-1	T1	111	2.5	0.4564	12.0224	<0.0001	Extremely Statistically Significant
	T2	118	1.98	0.3615			

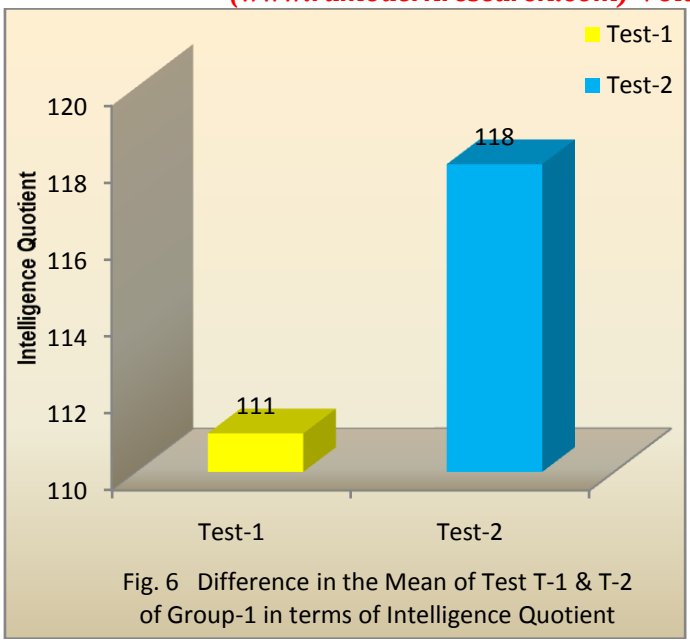

Fig. 6 Difference in the Mean of Test T-1 & T-2 of Group-1 in terms of Intelligence Quotient

Intelligence Quotient of 'Experimental Group(Group-1) was found to be significantly higher in Test-1 as compared to their IQ in Test-2. A dramatic surge was noticed in the IQ of the ExperimentalGroup (Group-1) after the successful completion of the said Programme.

Phase IV

Table5: Difference in the Mean Standard deviation, standard error, t-values and level of Significance of Intelligence Quotient between Group-1& Group-2 in T-2

IQ		MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Test-2	G1	118	1.98	0.3615	7.0776	<0.0001	Extremely Statistically Significant
	G2	112	4.2	0.7668			

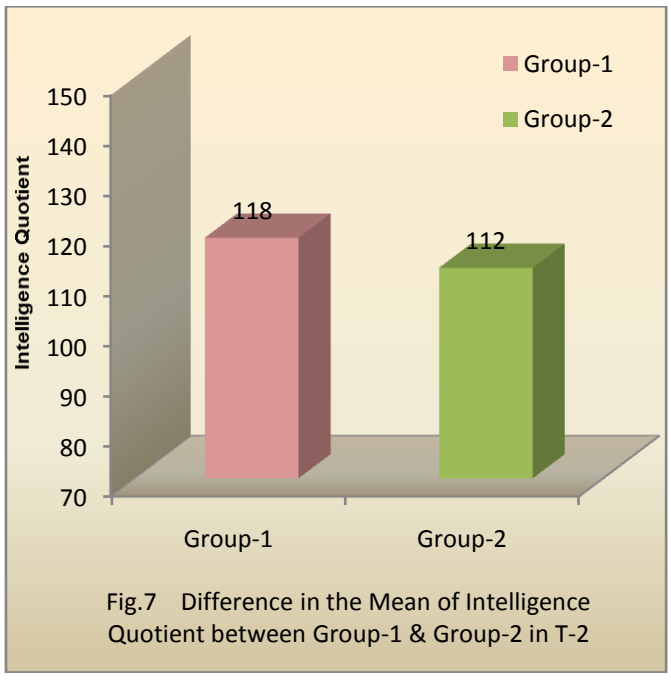

Fig.7 Difference in the Mean of Intelligence Quotient between Group-1 & Group-2 in T-2

Intelligence Quotient of 'Experimental Group' (Group-1) was notified to be significantly higher than that of the 'Control Group' (Group-2)in Test-2. As evident, the IQ of the Experimental Group swung but that of the control group remained stagnant.

4. Conclusion:

In a nutshell, after the successful completion of **C**ustomized solutions &training programme for One Year, it was noticed that the experimental group out-figured their counterparts in terms of Intelligence Quotient as that of the control group remained constant over the period of time.

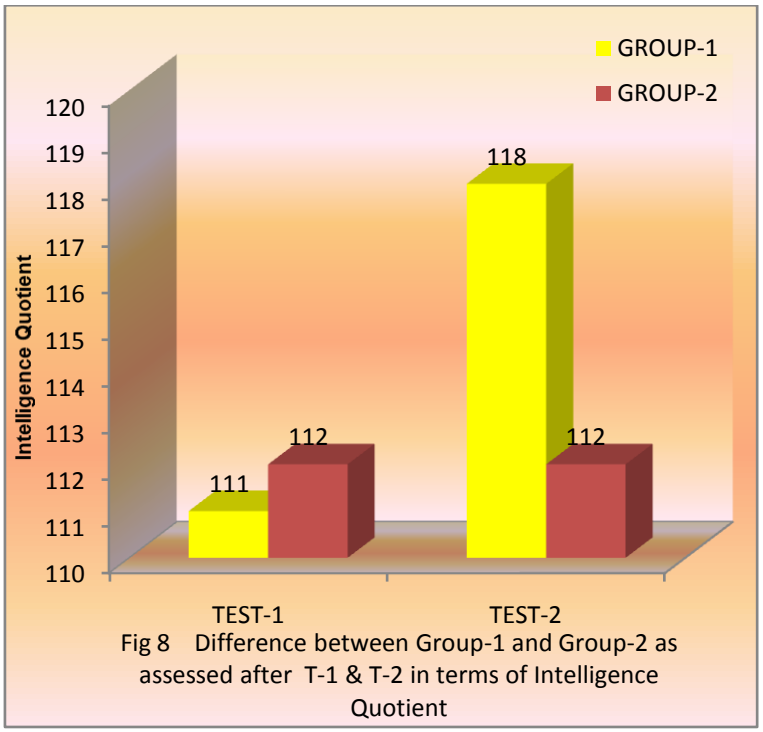

Fig 8 Difference between Group-1 and Group-2 as assessed after T-1 & T-2 in terms of Intelligence Quotient

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6. References:

1. Amsel, E., & Brock, S. (1996). The development of evidence evaluation skills. Cognitive Development, 11, 523-550.
2. Anderson JR, Bower GH. Human Associative Memory. Winston, Washington, DC, 1973.
3. Baddeley AD. Working Memory. Oxford University Press, Oxford, UK, 1986.
4. Baker, S.K., Kameenui, E.J., Simmons, D.C., Stahl, S. (1994). Beginning reading: Educational tools for diverse learners. School Psychology Review, 23, 372-391.
5. Balleine B, Dickinson A. Goal directed instrumental action: Contingency and incentive learning and their cortical substrates. Neuropharmacology 1998; 37:407-419.
6. Banich MT. Neuropsychology - The Neural Bases of Mental Function, Hougthon Mifflin Company, 1997 Bauer, P.J. (1995). Recalling past events: From infancy to early childhood. Annals of Child Development, 11, 25-71.

7. Bauer PJ. Development of memory in early childhood. In N. Cowan (Ed.), the Development of Memory in Childhood. Hove, UK: Psychology Press, 1997, 83-111.
8. Bauer PJ, Mandler JM. One thing follows another: Effects of temporal structure on 1- to 2-year-olds' recall of events. Developmental Psychology 1989; 25:197-206.
9. Barron, R. W. (1986). Word recognition in early reading: A review of the direct and indirect access hypotheses. Cognition, 24, 93-119.
10. Beggs JM, Brown TH, Byrne JH, Crow T, LeDoux JE, LeBar K et al. 1999.
11. Bertelson, P. (1986). The onset of literacy: Luminal remarks. Cognition. Vol. 24(1-2), 1-30.
12. Blachman, B. (1984). Relationship of rapid naming ability and language analysis skills to kindergarten and first-grade reading achievement. Journal of Educational Psychology, 76, 610-622.
13. Bloom F, Nelson CA, Lazerson A. Brain, mind and behavior (3rd ed.). New York: Worth Publishers, 2001.
14. Buchner A, Wippich W. Differences and commonalities between implicit learning and implicit memory. In M. Stadler& P. Frensch (Eds.), Handbook of implicit learning London: Sage Publications, 1998, 3-46.
15. Buckner RL, Koutstaal W. Functional neuroimaging studies of encoding, priming, and explicit memory retrieval. Proceedings of the National Academy of Sciences USA 1998; 95:891-898
16. Bullock, M. & Ziegler, A. (1996). Thinking scientifically: conceptual or procedural problem? Second International Baltic Psychology Conference, Tallinn, Estonia.
17. Canfield R, Haith M. Young infant's visual expectations for symmetric and asymmetric stimulus sequences. Developmental Psychology 1991; 27:198-208.
18. Chase WG, Simon HA. Perception in chess. Cognitive Psychology 1973; 4:55-81
19. Chen, Z. &Klahr, D., (1999) All Other Things being Equal: Children's Acquisition of the Control of Variables Strategy, Child Development, 70 (5), 1098 - 1120.
20. Chen, Z. &Klahr, D., (2008) Remote Transfer of Scientific Reasoning and Problem-Solving Strategies in Children. In R. V. Kail (Ed.) Advances in Child Development and Behavior, Vol. 36. (pp. 419 – 470) Amsterdam: Elsevier
21. Chiesi, H.L., Spilich, G.J., and Voss, J.F. (1979). Acquisition of domain-related Information in relation to high and low domain knowledge. Journal of Verbal Learning and Verbal Behavior, 18, 257-274.
22. Clay, M. (1979a). Reading: The patterning of complex behavior. Auckland: Heinemann.
23. Clay, M. (1979b). The early detection of reading difficulties. Portsmouth, NH: Heinemann.
24. Clay, M. (1985). The Early Detection of Reading Difficulties. Auckland, New Zealand: Heinemann.
25. Clower WT, Alexander GE. Movement sequence-related activity reflecting numerical order of components in supplementary and pre-supplementary motor areas. Journal of Neurophysiology 1998; 80:1562-1566.
26. Cowan N. The development of memory in childhood. Hove, UK: Psychology Press, 1997
27. Dean, D., & Kuhn, D. (2007). Direct instruction vs. discovery: The long view. Science Education, 91, 384-397.
28. Dickinson, D.K. and Tabors, P.O. (1991). Early literacy: Linkages between home, School, and literacy achievement at age five. Journal of Research in Childhood Education, 6(1), 30-46.

29. Ehrlich, M.F., Kurtz-Costes, B., &Loridant, C. (1993). Cognitive and motivational determinants of reading comprehension in good and poor readers. Journal of Reading Behavior, 25, 365-381.
30. Ehrlich, S.&Rayner, K. (1981). Contextual effects on word perception and eye movements during reading. Journal of Verbal Learning and Verbal Behavior, 20, 641-655.
31. Evans, M. A., and Carr, T. H. (1985) Cognitive abilities, conditions of learning, and the early development of reading skill. Reading Research Quarterly, 20, 327-50.
32. Fernández G, Weyerta H, Schrader-Bölsche, Tendolkar I, Genderikus GOM, Smid CT et al. Successful verbal encoding into episodic memory engages the posterior hippocampus: A parametrically analyzed functional magnetic resonance imaging study. The Journal of Neuroscience 1998; 18:1841-1847.
33. Fleischman D, Vaidya CJ, Lange KL, Gabrieli JD. A dissociation between perceptual explicit and implicit memory processes. Brain and Cognition 1997; 35:42-57.
34. Freud S. The psychopathology of everyday life (A. Tyson, Trans.). New York: Norton, 1965.
35. Gabrieli J, Fleischman D, Keane M, Reminger S, Morrel F. Double dissociation between memory systems underlying explicit and implicit memory in the human brain. Psychological Science 1995; 6:76-82.
36. Gardner, Howard. Frames of Mind, 1983
37. Gardner, Howard. The Intelligence Reframed-Multiple Intelligence for 21st Century.
38. Hayes B, Hennessy R. The nature and development of nonverbal implicit memory. Journal of Experimental and Child Psychology 1996; 63:22-43.
39. Hebb DO. The organization of behavior. New York: Wiley, 1949.
40. Howe ML, Courage ML. The emergence and early development of autobiographical memory. Psychological Review 1997; 104:499-523.
41. Jacoby L, Baker JG, Brooks LR. Episodic effects on picture identification: Implications for theories of concept learning and theories of memory. Journal of Experimental Psychology: Learning, Memory, & Cognition 1989; 15:275-281.
42. Luciana M, Nelson CA. The functional emergence of prefrontallyguided working memory systems in four-to-eight year old children. Neuropsychologia 1998; 36:272-293.
43. Lyon G. Reid, Rumsey, Judith M: Neuroimaging. A Window to Neurological Foundations of Learning and Behavior in Children. Baltimore. 1996.
44. Eysenck MW, Keane MT. Cognitive Psychology - A Student's Handbook, Psychology Press Ltd, 2000
45. Mandler J. How to build a baby: On the development of an accessible representational system. Cognitive Development 1988; 3:113-136.
46. Nanda, HK.,Marwaha, Shruti., Chawla, Pawandeep., Kaur, Baljeet. Development and Standardization of Cognitive Ability Test for Children. International Journal of Applied Research, 2015, 1(4): 69-77.
47. Nanda HK, Marwaha S, ChawlaP Development, Item Analysis, Standardization, Review and Expansion of the Cognitive Ability Test for a Wider Age Range (7-16 Years) on a Single Test. International Journal of Multidisciplinary Research and Development 2015, 334-350
48. Nanda HK, Marwaha S, Suggestive case study on evidence of effectiveness ofcustomized education training based on the outcomes of cognitive ability testing to develop high mental (cognitive) abilities & personality in students between 14-

20 year age group to achieve maximum Employability International Journal of Applied Research 2015; 1(4): 47-54
49. Nelson CA. The neurobiological basis of early memory development. In N. Cowan (Ed.), the development of memory in childhood (pp. 41–82). Hove, UK: Psychology Press, 1997
50. Nelson CA. Neural plasticity and human development: The role of early experience in sculpting memory systems. Developmental Science 2000; 3:115-130.
51. Nelson CA, Monk C. The use of event-related potentials in the study of cognitive development. In C.A. Nelson & M. Luciana (Eds.), Handbook of developmental cognitive neuroscience Cambridge, MA: MIT Press, 2001, 125-136
52. Rovee-Collier C. Development of memory in infancy. In N. Cowan (Ed.), The development of memory in childhood London: University College London Press, 1997, 5-39
53. Thomas K, Nelson C. Serial reaction time learning in pre-school and school aged children. Journal of Experimental Child Psychology 2001; 79:364-387.
54. Weldon MS, Roediger, HL, Challis BH. The properties of retrieval cues constrain the picture superiority effect. Memory & Cognition 1989; 17:95-105.