

Examining Impact of Teaching Method on Cognitive Abilities and Academic Achievement of Young Students

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Abstract: *Cognition is the thinking capacity of children. Every child has distinct cognitive abilities. The present research study was conducted on a sample of 481 students including males and females who were 8 years in age. Sample was selected from Punjab and Chandigarh. Research was conducted in order to analyse the impact of intervention program in terms of personalized teaching methods to cater to learner's needs, based on Gardner's multiple intelligences on the intelligence quotient, decision making ability, creative quotient and academic achievement of respondents in order to compare the variations in the dependent variables of subjects. Respondents were categorized into experimental and control groups. Each student was given worksheets according to his own natural learning style which was assessed during the programme. It was found that there was significant rise in these cognitive abilities and academic achievement of respondents in experimental. In contrast, insignificant changes were witnessed among their control group counterparts.*

Keywords: Intelligence quotient, decision making ability, creative quotient, academic achievement, multiple intelligences, worksheets

INTRODUCTION

Education is vast and there seems to be no end to it. The global changes are inevitable in each sector and education is no exception to it. The only limit to education is a frequent change through action research. However, the education has always been an area of interest among researchers and academicians. Along with the tedious task of educating and assessing the pupils, it has become priority to enhance their cognitive abilities. Kaur and Sansanwal (1980) found that creativity was significantly and positively related with academic achievement. Ramachandra and Katiyar (1986) observed that science students were significantly better than arts students in terms of creativity, fluency, flexibility and originality. Armstrong (1987) examined about the multiple intelligences and found ways of helping students to learn intelligently. He had given various methods and techniques to teach children efficiently based on the concepts of multiple intelligences. Mann, Harmoni and Power (1989) studied adolescent decision making in context with the development of competence. The results revealed that many adolescents at the age of 15 years show a reliable level of competence in understanding of decision making. Likewise, Runco (1991) conducted a research study to study the relationship between creative abilities and academic performance and as such found no correlation between creativity and academic performance of students. McClaskey (1995) highlighted the importance of multiple intelligences in the classroom and assessing student learning. The results indicated that there were quite higher chances of high grades when the instructions were given based on the learning nature of children and that students perform far above average as the learning

process was facilitated among students when the multiple intelligence concept was followed in the classroom. Coleman et al. (1997) carried an action research project purely based on multiple intelligences aiming at minimizing the gap between achievement levels between primary and secondary school students. The findings of the study revealed that multiple intelligences approach minimize the discrepancy between the achievement levels. Devine (1999) carried a research study to teach decision making skills to a sixth grade students. Results indicated that decision making skills can be taught and successfully learnt in a school educational environment. Snyder (1999) corroborated that majority of the students who possess good abilities in linguistic and logical intelligence have a higher probability of being successful at school level but may not excel in job world. There are some cases reported where the students had not been doing well in school but turned out to be very successful at their workplace. Du, Bouwer and Grimbeek (2001) carried a research study to examine the impact of the academic self estimation on academic achievement among students. The results revealed that the self estimation is positively related to the achievement of learners in classroom. Acharya (2002) investigated the impact of self estimation and academic achievement in primary students. Results indicated that there existed a close relationship between academic self estimation and measures of academic performance. Furnham, Chamorro-Premuzic, & McDougall (2003) studied the comparison of decision making abilities among higher secondary students. Results suggested that there was a significant difference between male and female students in their decision making abilities. Woodman and Hardy (2003)

through their research carried an analysis exploring the relative impact of self estimation upon performance. The findings suggested that self estimation is a vital factor in establishing higher achievements. Ravi and Vedapriya (2008) studied different teaching strategies based on multiple intelligences. The findings suggested that students ought to be exposed to different intelligences so that teachers can get a chance to uncover their strengths and interests which would eventually lead to a surge in academic achievement. Alias and Hafir (2009) examined the relationship between academic self estimation and cognitive performance among engineering students. The results indicated that there existed a statistically significant and positive relationship between both the factors. Bas (2016) conducted and studied the role of decision making abilities in academic achievement in mathematics. The results indicated that mathematics information processing skill, decision making skill and attitude towards mathematics had a significant contribution towards the academic achievement in mathematics. The result also recorded that gender is a significant aspect that influences the speed and perception of the factors which determine their decisions. Kornilova, Kornilov & Chumakova (2009) found gender difference as one of the major demographic factor affecting academic achievement and explored that it also affected the intelligence quotient. It was revealed that girls were better in academics while boys performed better than girls in reasoning. Likewise, Basantia and Panda (2010) also found significantly positive correlation between creativity and academic performance. Zahra, Arif and Yousuf (2010) took up a study to find the relationship between learner self estimation and academic achievement among secondary school students. Findings suggested that there

existed a positive and significant relationship between their self estimation and academic achievement.

METHODOLOGY

The research study was conducted on a sample of 481 students including 235 males and 246 females. All the students were 8 years of age. 139 females hailed from Punjab and 107 belonged to Chandigarh. Among males, 136 were selected from Punjab whereas 99 from Chandigarh. Research was conducted in order to analyse the impact of intervention program among respondents of experimental group. Respondents were categorised on the basis of gender and eventually into experimental and control group. In this way the sample was minutely categorised. The experimental group refers to the group under study which receives the intervention during the course of study. The purpose of having the experimental group in the present research study was basically to find out the variation and changes in the dependent variables precisely intelligence quotient, decision making ability, creative quotient and academic achievement before, during and after the implementation of intervention program. Intervention included worksheets based on Gardner's multiple intelligences. Each student was given worksheets according to his own natural learning style which was assessed during the programme. The control group refers to the group under study which is refrained from the provision of any intervention during the course of study. The purpose of having the control group in the present research study was to compare the variations in the dependent variables of its subjects with that of the changes in the dependent variables of their experimental group counterparts.

Table 1: Sample Selection

Age	Total Sample	Gender	N	Place	n	Experimental Group	Control Group
8 years	481	Male	235	Punjab	136	67	69
				Chandigarh	99	54	45
		Female	246	Punjab	139	68	71
				Chandigarh	107	56	51

At the initial stage, rapport was built with the all the respondents following which they consent was taken. The respondents were encouraged to participate actively and the entire process was explained to them. On the first day of the programme, all the respondents were assessed prior to the intervention, this pre assessment was termed as TA-1. After the first intervention, the respondents in the experimental group were given customized tasksheets for three months. Students were to attempt two tasksheets daily on regular basis. These tasksheets were different for students with different dominant multiple intelligence which was assessed in TA-1. In this way, the respondents in experimental group received sheets based on their respective intelligences. However, the subjects in the control group were not given any such worksheets and were thus excluded from the intervention programme. After three months, TA-2 was conducted on respondents

of both the experimental as well as the control group. After this, subjects in experimental group were given tasksheets for next three months while no intervention was given to control group. After this, TA-3 was conducted following which experimental group received next three months' tasksheets. Later TA-4 was conducted and three months' tasksheets were given to experimental group. After this, TA-5 was conducted at the final level. In this way, five assessments were conducted in all, on all the respondents but the worksheets were given only to the subjects in experimental group. The entire programme was taken up in around 12 months.

RESULTS

There was insignificant difference between males of experimental and control group in IQ 1 in Punjab as well as Chandigarh. However, in case of their IQ 2, the

difference was significant in Chandigarh while insignificant in Punjab. Eventually in case of their IQ 3, IQ 4 and IQ 5, the difference was statistically significant. Similarly among females except IQ3, other cases recorded insignificant difference. Among females, the difference was statistically significant in IQ 3, IQ 4 and IQ 5 while in previous two tests, the difference was

insignificant. The mean values were higher in experimental group as compared to control group among males whereas in case of females, higher values were recorded in control group in first two tests while in the later three tests, the experimental group had the higher values.

Table 2: Details of intelligence quotient

	Place	Gp	n	Mean	SD	Place	M/F	n	Mean	SD	Gp	Place	n	Mean	SD
Exp. and Control Group, Male						Gender wise, Experiment					Area wise, Male				
IQ1	Ch	Ex	54	107.2	15.02	Ch	M	54	107.2	15.02	Ex	Ch	54	107.2	15.02
		Co	45	104.8	11.98		F	56	105.9	15.39		Pb	67	103.5	13.13
	Pb	Ex	67	103.5	13.13	Pb	M	67	103.5	13.13	Co	Ch	45	104.8	11.98
		Co	69	103.9	13.42		F	68	100.2	16.48		Pb	69	103.9	13.42
IQ2	Ch	Ex	54	114.5*	14.83	Ch	M	54	114.5*	14.83	Ex	Ch	54	114.5	14.83
		Co	45	105.8	11.92		F	56	106.7	14.76		Pb	67	111.0	12.98
	Pb	Ex	67	111.0	12.98	Pb	M	67	111.0*	12.98	Co	Ch	45	105.8	11.92
		Co	69	107.5	13.36		F	68	105.0	16.31		Pb	69	107.5	13.36
IQ3	Ch	Ex	54	121.8*	14.76	Ch	M	54	121.8	14.76	Ex	Ch	54	121.8	14.76
		Co	45	106.8	11.88		F	56	120.4	14.23		Pb	67	118.5	12.99
	Pb	Ex	67	118.5*	12.99	Pb	M	67	118.5	12.99	Co	Ch	45	106.8	11.88
		Co	69	106.2	13.29		F	68	114.8	16.25		Pb	69	106.2	13.29
IQ4	Ch	Ex	54	133.3*	16.14	Ch	M	54	133.3	16.14	Ex	Ch	54	133.3	16.14
		Co	45	107.6	12.04		F	56	129.3	15.12		Pb	67	130.0	14.48
	Pb	Ex	67	130.0*	14.48	Pb	M	67	130.0*	14.48	Co	Ch	45	107.6	12.04
		Co	69	106.8	13.40		F	68	124.1	17.92		Pb	69	106.8	13.40
IQ5	Ch	Ex	54	140.1*	17.01	Ch	M	54	140.1	17.01	Ex	Ch	54	140.1	17.01
		Co	45	109.9	12.28		F	56	135.4	15.66		Pb	67	136.8	15.42
	Pb	Ex	67	136.8*	15.42	Pb	M	67	136.8*	15.42	Co	Ch	45	109.9	12.28
		Co	69	109.0	13.85		F	68	130.2	18.82		Pb	69	109.0	13.85
Exp. and Control Group, Female						Gender wise, Control					Area wise, Female				
IQ1	Ch	Ex	56	105.9	15.39	Ch	M	45	104.8	11.98	Ex	Ch	56	105.9	15.39
		Co	51	106.0	18.05		F	51	106.0	18.05		Pb	68	100.2	16.48
	Pb	Ex	68	100.2	16.48	Pb	M	69	103.9	13.42	Co	Ch	51	106.0	18.05
		Co	71	102.7	15.82		F	71	102.7	15.82		Pb	71	102.7	15.82
IQ2	Ch	Ex	56	106.7	14.76	Ch	M	45	105.8	11.92	Ex	Ch	56	106.7	14.76
		Co	51	106.4	17.90		F	51	106.4	17.90		Pb	68	105.0	16.31
	Pb	Ex	68	105.0	16.31	Pb	M	69	107.5	13.36	Co	Ch	51	106.4	17.90
		Co	71	103.5	15.78		F	71	103.5	15.78		Pb	71	103.5	15.78
IQ3	Ch	Ex	56	120.4*	14.23	Ch	M	45	106.8	11.88	Ex	Ch	56	120.4*	14.23
		Co	51	107.7	17.87		F	51	107.7	17.87		Pb	68	114.8	16.25
	Pb	Ex	68	114.8*	16.25	Pb	M	69	106.2	13.29	Co	Ch	51	107.7	17.87
		Co	71	104.4	15.71		F	71	104.4	15.71		Pb	71	104.4	15.71
IQ4	Ch	Ex	56	129.3*	15.12	Ch	M	45	107.6	12.04	Ex	Ch	56	129.3	15.12
		Co	51	108.7	18.19		F	51	108.7	18.19		Pb	68	124.1	17.92
	Pb	Ex	68	124.1*	17.92	Pb	M	69	106.8	13.40	Co	Ch	51	108.7	18.19
		Co	71	105.3	15.95		F	71	105.3	15.95		Pb	71	105.3	15.95
IQ5	Ch	Ex	56	135.4*	15.66	Ch	M	45	109.9	12.28	Ex	Ch	56	135.4	15.66
		Co	51	110.2	18.31		F	51	110.2	18.31		Pb	68	130.2	18.82
	Pb	Ex	68	130.2*	18.82	Pb	M	69	109.0	13.85	Co	Ch	51	110.2	18.31

	Co	71	107.2	16.31		F	71	107.2	16.31		Pb	71	107.2	16.31
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Table 3: Comparison of intelligence quotient

Place Group	Male							
	Chandigarh				Punjab			
	Ex		Co		Ex		Co	
IQ	Mean	SD	Mean	SD	Mean	SD	Mean	SD
IQ1	107.2*	15.02	104.88	11.98	103.5*	13.13	103.97	13.42
IQ2	114.5*	14.83	105.87	11.92	111.0*	12.98	107.59	13.36
IQ3	121.8*	14.76	106.89	11.88	118.5*	12.99	106.23	13.29
IQ4	133.3*	16.14	107.67	12.04	130.0*	14.48	106.83	13.40
IQ5	140.1*	17.01	109.92	12.28	136.8*	15.42	109.03	13.85
Female								
IQ1	105.9*	15.39	106.05	18.05	100.2*	16.48	102.71	15.82
IQ2	106.7*	14.76	106.50	17.90	105.0*	16.31	103.50	15.78
IQ3	120.4*	14.23	107.75	17.87	114.8*	16.25	104.46	15.71
IQ4	129.3*	15.12	108.74	18.19	124.1*	17.92	105.31	15.95
IQ5	135.4*	15.66	110.25	18.31	130.2*	18.82	107.21	16.31

When the IQ of respondents in experimental group was compared gender wise, insignificant difference was found in test 1 in Chandigarh as well as Punjab while in case of their IQ 2, significant difference was recorded. In the later tests, insignificant difference persisted except in case of IQ 4 and IQ 5 of males in Punjab. In these groups, mean values of males were found to be higher than the females. In contrast, when comparison was made between males and females in control group for both the places, no significant difference was found in any of the group. In

this group, females had higher mean values than males in Chandigarh whereas males had higher values than females in Punjab. When comparison was made between males of Chandigarh and Punjab in control as well as experimental group, no significant difference was found between their IQ for the 5 tests in any of the group. Same trend was followed in case of females except in case of their IQ 3 in experimental group. The mean values of respondents in Chandigarh were higher than Punjab.

Table 4: Details of DMA

8	Place	Gp	n	Mean	SD	Place	M/F	n	Mean	SD	Gp	Place	n	Mean	SD
Exp. and Control Group, Male						Gender wise, Experiment					Area wise, Male				
DMA1	Ch	Ex	54	0.36	0.08	Ch	M	54	0.36*	0.08	Ex	Ch	54	0.36	0.08
		Co	45	0.35	0.08		F	56	0.39	0.09		Pb	67	0.34	0.07
	Pb	Ex	67	0.34	0.07	Pb	M	67	0.34*	0.07	Co	Ch	45	0.35	0.08
		Co	69	0.37	0.08		F	68	0.37	0.09		Pb	69	0.37	0.08
DMA2	Ch	Ex	54	0.59*	0.12	Ch	M	54	0.59	0.12	Ex	Ch	54	0.59	0.12
		Co	45	0.43	0.09		F	56	0.63	0.14		Pb	67	0.57	0.12
	Pb	Ex	67	0.57*	0.12	Pb	M	67	0.57	0.12	Co	Ch	45	0.43	0.09
		Co	69	0.44	0.10		F	68	0.61	0.14		Pb	69	0.44	0.10
DMA3	Ch	Ex	54	0.67*	0.14	Ch	M	54	0.67	0.14	Ex	Ch	54	0.67	0.14
		Co	45	0.46	0.10		F	56	0.71	0.16		Pb	67	0.65	0.13
	Pb	Ex	67	0.65*	0.13	Pb	M	67	0.65	0.13	Co	Ch	45	0.46	0.10
		Co	69	0.48	0.11		F	68	0.69	0.16		Pb	69	0.48	0.11
DMA4	Ch	Ex	54	0.73*	0.15	Ch	M	54	0.73	0.15	Ex	Ch	54	0.73	0.15
		Co	45	0.46	0.10		F	56	0.76	0.17		Pb	67	0.71	0.14
	Pb	Ex	67	0.71*	0.14	Pb	M	67	0.71	0.14	Co	Ch	45	0.46	0.10
		Co	69	0.48	0.11		F	68	0.75	0.18		Pb	69	0.48	0.11
DMA5	Ch	Ex	54	0.77*	0.16	Ch	M	54	0.77	0.16	Ex	Ch	54	0.77	0.16
		Co	45	0.47	0.10		F	56	0.80	0.18		Pb	67	0.75	0.15
	Pb	Ex	67	0.75*	0.15	Pb	M	67	0.75	0.15	Co	Ch	45	0.47	0.10
		Co	69	0.49	0.11		F	68	0.79	0.19		Pb	69	0.49	0.11
Exp. and Control Group, Female						Gender wise, Control					Area wise, Female				

DMA1	Ch	Ex	56	0.39	0.09	Ch	M	45	0.35	0.08	Ex	Ch	56	0.39	0.09
		Co	51	0.39	0.09		F	51	0.39	0.09		Pb	68	0.37	0.09
	Pb	Ex	68	0.37	0.09	Pb	M	69	0.37	0.08	Co	Ch	51	0.39	0.09
		Co	71	0.38	0.09		F	71	0.38	0.09		Pb	71	0.38	0.09
DMA2	Ch	Ex	56	0.63*	0.14	Ch	M	45	0.43	0.09	Ex	Ch	56	0.63	0.14
		Co	51	0.44	0.11		F	51	0.44	0.11		Pb	68	0.61	0.14
	Pb	Ex	68	0.61*	0.14	Pb	M	69	0.44	0.10	Co	Ch	51	0.44	0.11
		Co	71	0.44	0.12		F	71	0.44	0.12		Pb	71	0.44	0.12
DMA3	Ch	Ex	56	0.71*	0.16	Ch	M	45	0.46	0.10	Ex	Ch	56	0.71	0.16
		Co	51	0.46	0.13		F	51	0.46	0.13		Pb	68	0.69	0.16
	Pb	Ex	68	0.69*	0.16	Pb	M	69	0.48	0.11	Co	Ch	51	0.46	0.13
		Co	71	0.47	0.13		F	71	0.47	0.13		Pb	71	0.47	0.13
DMA4	Ch	Ex	56	0.76*	0.17	Ch	M	45	0.46	0.10	Ex	Ch	56	0.76	0.17
		Co	51	0.47	0.13		F	51	0.47	0.13		Pb	68	0.75	0.18
	Pb	Ex	68	0.75*	0.18	Pb	M	69	0.48	0.11	Co	Ch	51	0.47	0.13
		Co	71	0.48	0.13		F	71	0.48	0.13		Pb	71	0.48	0.13
DMA5	Ch	Ex	56	0.80*	0.18	Ch	M	45	0.47	0.10	Ex	Ch	56	0.80	0.18
		Co	51	0.48	0.13		F	51	0.48	0.13		Pb	68	0.79	0.19
	Pb	Ex	68	0.79*	0.19	Pb	M	69	0.49	0.11	Co	Ch	51	0.48	0.13
		Co	71	0.49	0.14		F	71	0.49	0.14		Pb	71	0.49	0.14

Table 5: Comparison of DMA

Place	Male								
	Chandigarh				Punjab				
	Ex		Co		Ex		Co		
DMA	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
DMA1	0.36*	0.08	0.36	0.08	0.34*	0.07	0.37	0.08	
DMA2	0.59*	0.12	0.43	0.09	0.57*	0.12	0.45	0.10	
DMA3	0.67*	0.14	0.47	0.10	0.65*	0.13	0.49	0.11	
DMA4	0.73*	0.15	0.47	0.10	0.71*	0.14	0.49	0.11	
DMA5	0.77*	0.16	0.48	0.10	0.75*	0.15	0.50	0.11	
Place	Female								
	DMA1	0.39*	0.09	0.39	0.09	0.37*	0.09	0.38	0.09
	DMA2	0.63*	0.14	0.44	0.11	0.61*	0.14	0.45	0.12
	DMA3	0.71*	0.16	0.47	0.13	0.69*	0.16	0.48	0.13
	DMA4	0.76*	0.17	0.47	0.13	0.75*	0.18	0.48	0.13
	DMA5	0.80*	0.18	0.48	0.13	0.79*	0.19	0.49	0.14

There was insignificant difference between males of experiment and control group in DMA 1 in Punjab as well as Chandigarh. However, in case of their DMA 2, DMA 3, DMA 4 and DMA 5, the difference was statistically significant. Similarly among females except DMA 1, other cases recorded significant difference. The mean value ranged from 0.34 to 0.77 in experiment group while it ranged from 0.35 to 0.49 in control group. The mean value of experiment group was lower than the control group in all the tests. Among females, the mean value ranged from 0.37 to 0.8 in experiment group while it ranged from 0.38 to 0.49 in control group. The mean value of experiment group was lower than the control group in all the tests. When the DMA of respondents in experiment group was compared gender wise, significant difference was found in test 1 in Chandigarh as well as Punjab while in all other cases, insignificant difference

was recorded. When comparison was made between males and females of in control group in both the places, no significant difference was found in any of the groups. Females had higher values as compared to males. The mean values among males ranged from 0.34 to 0.77 and among females ranged from 0.37 to 0.8. In control group, females had higher values as compared to males. The mean values among males ranged from 0.35 to 0.49 and among females ranged from 0.38 to 0.49. When comparison was made between males of Chandigarh and Punjab in control as well as experiment group, no significant difference was found between their DMA of the 5 tests in any of the groups. Same trend was followed in case of females. The mean of DMA varied from 0.35 to 0.77 in Chandigarh while in Punjab it varied from 0.34 to 0.75. In case of females, the mean of DMA varied

from 0.39 to 0.8 in Chandigarh while in Punjab it varied from 0.37 to 0.79.

Table 6: Details of CQ

8	Place	Gp	n	Mean	SD	Place	M/F	n	Mean	SD	Gp	Place	n	Mean	SD
Exp. and Control Group, Male						Gender wise, Experiment					Area wise, Male				
CQ1	Ch	Ex	54	0.52*	0.07	Ch	M	54	0.52	0.07	Ex	Ch	54	0.52	0.07
		Co	45	0.38	0.06		F	56	0.54	0.07		Pb	67	0.54	0.06
	Pb	Ex	67	0.54*	0.06	Pb	M	67	0.54	0.06	Co	Ch	45	0.38	0.06
		Co	69	0.39	0.05		F	68	0.55	0.07		Pb	69	0.39	0.05
CQ2	Ch	Ex	54	0.63*	0.09	Ch	M	54	0.63	0.09	Ex	Ch	54	0.63	0.09
		Co	45	0.42	0.06		F	56	0.65	0.09		Pb	67	0.66	0.07
	Pb	Ex	67	0.66*	0.07	Pb	M	67	0.66	0.07	Co	Ch	45	0.42	0.06
		Co	69	0.43	0.06		F	68	0.67	0.09		Pb	69	0.43	0.06
CQ3	Ch	Ex	54	0.67*	0.10	Ch	M	54	0.67	0.10	Ex	Ch	54	0.67	0.10
		Co	45	0.45	0.07		F	56	0.69	0.09		Pb	67	0.70	0.08
	Pb	Ex	67	0.70*	0.08	Pb	M	67	0.70	0.08	Co	Ch	45	0.45	0.07
		Co	69	0.46	0.06		F	68	0.71	0.09		Pb	69	0.46	0.06
CQ4	Ch	Ex	54	0.71*	0.10	Ch	M	54	0.71	0.10	Ex	Ch	54	0.71	0.10
		Co	45	0.48	0.07		F	56	0.73	0.10		Pb	67	0.74	0.08
	Pb	Ex	67	0.74*	0.08	Pb	M	67	0.74	0.08	Co	Ch	45	0.48	0.07
		Co	69	0.49	0.07		F	68	0.75	0.10		Pb	69	0.49	0.07
CQ5	Ch	Ex	54	0.78*	0.11	Ch	M	54	0.78	0.11	Ex	Ch	54	0.78	0.11
		Co	45	0.17	0.20		F	56	0.81	0.11		Pb	67	0.81	0.09
	Pb	Ex	67	0.81*	0.09	Pb	M	67	0.81	0.09	Co	Ch	45	0.17	0.20
		Co	69	0.19	0.21		F	68	0.83	0.11		Pb	69	0.19	0.21
Exp. and Control Group, Female						Gender wise, Control					Area wise, Female				
CQ1	Ch	Ex	56	0.54*	0.07	Ch	M	45	0.38	0.06	Ex	Ch	56	0.54	0.07
		Co	51	0.38	0.05		F	51	0.38	0.05		Pb	68	0.55	0.07
	Pb	Ex	68	0.55*	0.07	Pb	M	69	0.39	0.05	Co	Ch	51	0.38	0.05
		Co	71	0.38	0.05		F	71	0.38	0.05		Pb	71	0.38	0.05
CQ2	Ch	Ex	56	0.65*	0.09	Ch	M	45	0.42	0.06	Ex	Ch	56	0.65	0.09
		Co	51	0.42	0.05		F	51	0.42	0.05		Pb	68	0.67	0.09
	Pb	Ex	68	0.67*	0.09	Pb	M	69	0.43	0.06	Co	Ch	51	0.42	0.05
		Co	71	0.42	0.05		F	71	0.42	0.05		Pb	71	0.42	0.05
CQ3	Ch	Ex	56	0.69*	0.09	Ch	M	45	0.45	0.07	Ex	Ch	56	0.69	0.09
		Co	51	0.45	0.06		F	51	0.45	0.06		Pb	68	0.71	0.09
	Pb	Ex	68	0.71*	0.09	Pb	M	69	0.46	0.06	Co	Ch	51	0.45	0.06
		Co	71	0.45	0.06		F	71	0.45	0.06		Pb	71	0.45	0.06
CQ4	Ch	Ex	56	0.73*	0.10	Ch	M	45	0.48	0.07	Ex	Ch	56	0.73	0.10
		Co	51	0.48	0.06		F	51	0.48	0.06		Pb	68	0.75	0.10
	Pb	Ex	68	0.75*	0.10	Pb	M	69	0.49	0.07	Co	Ch	51	0.48	0.06
		Co	71	0.48	0.06		F	71	0.48	0.06		Pb	71	0.48	0.06
CQ5	Ch	Ex	56	0.81*	0.11	Ch	M	45	0.17*	0.20	Ex	Ch	56	0.81	0.11
		Co	51	0.26	0.22		F	51	0.26	0.22		Pb	68	0.83	0.11
	Pb	Ex	68	0.83*	0.11	Pb	M	69	0.19	0.21	Co	Ch	51	0.26	0.22
		Co	71	0.26	0.22		F	71	0.26	0.22		Pb	71	0.26	0.22

Table 7: Comparison of CQ

Male								
Place	Chandigarh				Punjab			
Group	Ex		Co		Ex		Co	
CQ	Mean	SD	Mean	SD	Mean	SD	Mean	SD
CQ1	0.52*	0.07	0.38	0.06	0.54*	0.06	0.39	0.05
CQ2	0.63*	0.09	0.42	0.06	0.66*	0.07	0.44	0.06
CQ3	0.67*	0.10	0.45	0.07	0.70*	0.08	0.47	0.06
CQ4	0.71*	0.10	0.48	0.07	0.74*	0.08	0.50	0.07
CQ5	0.78*	0.11	0.17	0.20	0.81*	0.09	0.20	0.21
Female								
CQ1	0.54*	0.07	0.39	0.05	0.55*	0.07	0.38	0.05
CQ2	0.65*	0.09	0.43	0.05	0.67*	0.09	0.43	0.05
CQ3	0.69*	0.09	0.46	0.06	0.71*	0.09	0.46	0.06
CQ4	0.73*	0.10	0.49	0.06	0.75*	0.10	0.49	0.06
CQ5	0.81*	0.11	0.27	0.22	0.83*	0.11	0.27	0.22

Among males, there were significant differences found between the CQ of experiment and control group in Chandigarh as well as Punjab. The same trend was witnessed in case of females. The mean value ranged from 0.52 to 0.81 in experiment group while it ranged from 0.17 to 0.49 in control group. The mean value of experiment group was higher than the control group in all the tests. Among females, the mean value ranged from 0.54 to 0.83 in experiment group while it ranged from 0.26 to 0.48 in control group. The mean value of experiment group was higher than the control group in all the tests. When the CQ of respondents in experiment group was compared gender wise, it was found that there existed significant difference between the CQ 5 of males

and females of control group in Punjab. Females had higher values as compared to males. The mean values among males ranged from 0.52 to 0.81 and among females ranged from 0.54 to 0.83. In control group, females had higher values as compared to males. The mean values among males ranged from 0.17 to 0.49 and among females ranged from 0.26 to 0.48. It was recorded that there was insignificant difference between the CQ of both the genders in Chandigarh and Punjab in experiment as well as control group. The mean of CQ varied from 0.17 to 0.78 in Chandigarh while in Punjab it varied from 0.19 to 0.81. In case of females, the mean of CQ varied from 0.26 to 0.81 in Chandigarh while in Punjab it varied from 0.26 to 0.83.

Table 8: Details of marks

8	Place	Gp	N	Mean	SD	Place	M/F	N	Mean	SD	Gp	Place	N	Mean	SD
Exp. and Control Group, Male						Gender wise, Experiment					Area wise, Female				
M1	Ch	Ex	54	58.30	7.45	Ch	M	54	58.30	7.45	Ex	Ch	54	58.30	7.45
		Co	45	57.03	5.97		F	56	57.29	7.65		Pb	67	56.46	6.61
	Pb	Ex	67	56.46	6.61	Pb	M	67	56.46	6.61	Co	Ch	45	57.03	5.97
		Co	69	56.42	6.69		F	68	58.79	8.30		Pb	69	56.42	6.69
M2	Ch	Ex	54	66.27*	9.10	Ch	M	54	66.27	9.10	Ex	Ch	54	66.27	9.10
		Co	45	59.19	7.33		F	56	64.64	8.38		Pb	67	65.59	8.48
	Pb	Ex	67	65.59*	8.48	Pb	M	67	65.59*	8.48	Co	Ch	45	59.19	7.33
		Co	69	59.38	7.48		F	68	69.62	10.95		Pb	69	59.38	7.48
Exp. and Control Group, Female						Gender wise, Control					Area wise, Male				
M1	Ch	Ex	56	57.29	7.65	Ch	M	45	57.03	5.97	Ex	Ch	56	57.29	7.65
		Co	51	57.37	9.09		F	51	57.37	9.09		Pb	68	58.79	8.30
	Pb	Ex	68	58.79*	8.30	Pb	M	69	56.42	6.69	Co	Ch	51	57.37	9.09
		Co	71	55.65	7.94		F	71	55.65	7.94		Pb	71	55.65	7.94
M2	Ch	Ex	56	64.64*	8.38	Ch	M	45	59.19	7.33	Ex	Ch	56	64.64*	8.38
		Co	51	58.07	9.62		F	51	58.07	9.62		Pb	68	69.62	10.95
	Pb	Ex	68	69.62*	10.95	Pb	M	69	59.38	7.48	Co	Ch	51	58.07	9.62
		Co	71	56.79	8.84		F	71	56.79	8.84		Pb	71	56.79	8.84

Table 9: Comparison of marks

Male								
Place	Chandigarh				Punjab			
Group	Ex		Co		Ex		Co	
Marks	Mean	SD	Mean	SD	Mean	SD	Mean	SD
M1	58.30*	7.45	57.04	5.97	56.46*	6.61	56.42	6.69
M2	66.27*	9.10	59.19	7.33	65.59*	8.48	59.38	7.48
Female								
Marks	Mean	SD	Mean	SD	Mean	SD	Mean	SD
M1	57.29*	7.65	57.38	9.09	58.79*	8.30	55.66	7.94
M2	64.64*	8.38	58.08	9.62	69.62*	10.95	56.79	8.84

There were insignificant differences found between the M 1 in Chandigarh and Punjab among male respondents. But in case of M 2, there was significant difference. The same trend was notified among females. The mean value ranged from 56.46 to 66.27 in experiment group while it ranged from 56.42 to 59.38 in control group. The mean value of experiment group was higher than the control group in both the tests. Among females, the mean value ranged from 57.29 to 69.62 in experiment group while it ranged from 55.65 to 58.07 in control group. The mean value of experiment group was higher than the control group in both the tests. When the marks of respondents in experiment group were compared gender wise, it was found that there existed significant differences between M 2 of males and Punjab. However, in other cases, the difference was insignificant. Females had higher values as compared to males. The mean values among males ranged from 56.46 to 66.27 and among females ranged from 57.29 to 69.62. In control group, females had lower values as compared to males. The mean values among males ranged from 56.42 to 59.38 and among females ranged from 55.65 to 58.07. There were insignificant differences between marks of respondents when compared area wise. However, significant difference was found between the marks of males in Chandigarh and Punjab among females in experiment group. The mean of marks varied from 57.03 to 66.27 in Chandigarh while in Punjab it varied from 56.42 to 65.59. In case of females, the mean of marks varied from 57.29 to 64.64 in Chandigarh while in Punjab it varied from 55.65 to 69.62.

CONCLUSION

To conclude, there was significant rise in the IQ of 8 years old male respondents of experimental groups in Chandigarh and Punjab. The mean value in Chandigarh increased from 107.20 to 140.10. In Punjab, the mean value rose from 103.50 to 136.80. Similarly, among females, significant increase was recorded. The mean value increased from 105.90 to 135.40 in experimental group of Chandigarh and it rose from 100.20 to 130.20 in Punjab. In contrast, insignificant changes were witnessed among their control group counterparts. There was significant rise in the DMA of male respondents of experiment groups in Chandigarh and Punjab. The mean value in Chandigarh increased from 0.36 to 0.77. In Punjab, the mean value rose from 0.35 to 0.76. Similarly, among females, significant increase was recorded. The mean value increased from 0.39 to 0.8 in experiment

group of Chandigarh and it rose from 0.38 to 0.79 in Punjab. In contrast, insignificant changes were witnessed among their control group counterparts. There was significant rise in the CQ of male respondents of experiment groups in Chandigarh and Punjab. The mean value in Chandigarh increased from 0.52 to 0.78. In Punjab, the mean value rose from 0.54 to 0.82. Similarly, among females, significant increase was recorded. The mean value increased from 0.54 to 0.81 in experiment group of Chandigarh and it rose from 0.55 to 0.84 in Punjab. In contrast, insignificant changes were witnessed among their control group counterparts. There was significant rise in the marks of male respondents of experiment groups in Chandigarh and Punjab. The mean value in Chandigarh increased from 58.30 to 66.27. In Punjab, the mean value rose from 56.46 to 65.59. Similarly, among females, significant increase was recorded. The mean value increased from 57.29 to 64.64 in experiment group of Chandigarh and it rose from 58.79 to 69.62 in Punjab. In contrast, insignificant changes were witnessed among their control group counterparts. Phipps (2010), Rosenthal and Jacobson (1968), Reiss et. al (1996), Rogers and Freiberg (1994), Roĸe and Kälis (2015), Saklofske et. al (2018), Salthouse and Davis (2006), Seashore et. al (1950), Sellah et. al (2018), Sinha (1970) and Sousa (2016).

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