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Research Paper

Analysis of Educational Intervention on Cognitive Abilities and Academic Achievement of 7 year old Students in Punjab and Chandigarh

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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 480 students including males and females who were 7 years in age. Sample was selected from Punjab and Chandigarh. Research was conducted in order to analyse the impact of intervention program based on Gardner's multiple intelligences on the focus factor, 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.

Cognitive development is an important assert of every child. It enables the children to think and understand. Education ought to become student centered so as to ensure the better understanding of the content. There are numerous studies that suggest positive associations between cognition and academic achievement. Das and Cummins (1978) conducted a research study to find the correlation between cognition and academic achievement of 9th and 11th grade students. The findings suggested that there was significant positive correlation between multiple intelligences and academic achievement of the respondents. Similar findings were notified and suggested by Clark (1979). Asha (1980) formulated a study to find out the correlation between creativity and academic performance among students. The results of the study depicted that there was a significantly positive relationship between creativity and academic performance scores of students. Gardner (1983) had

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mentioned that intelligence is not a unitary factor but rather comprises of nine multiple intelligences each of which is a distinct module in the brain and operates more independently of others. According to him, all students are intelligent in varied ways. Teachers ought to recognize, understand, and nurture the dominant intelligence profile of students so that they can explore academic achievement up to their potential. Kundu (1987) found that science students were more creative than arts students. Blythe and Gardner (1990) proposed a systemized process to implement multiple intelligences theory oriented instructional strategies for the schools. They stressed on the urgency and significance of implementing this new method in classrooms and challenged the issues in the conventional methods generally adopted in classrooms. The results suggested the significance of the implementation of multiple intelligences theory oriented instructional strategies in schools to ameliorate the academic achievement among students. Nwazuoke and Okechukwu (1992) investigated the impact of gender on creative thinking including fluency, originality, flexibility, and elaboration. The results indicated that creativity scores were not different for boys and girls. In the same context, Cropley (1999) narrated that novelty, effectiveness and ethicality ought to be three characteristics of a creative product. Novelty refers to a creative product, course of action, or idea necessarily departs from the familiar. Effectiveness means that it achieves a desired end. Ethicality includes humane element in the creative product. Goodnough (2000) studied cognition and creativity in relation to academic achievement among students of senior secondary school and notified that cognition was significantly and positively correlated with scholastic achievement. There is a direct relation between self-estimation level and achievement of an individual. In an ideal situation, if one has perfect estimation of himself, his achievements are above expected. In contrast, those who underestimate or overestimate themselves, they generally lag behind. Kobal and Musek (2001) conducted a research study to find the relationship between academic achievement and self-estimation level. The results proved significant relationship between academic achievement and self-estimation level of students. Nguyen (2002) had taken up a study of the differential impact of multiple intelligences based curriculum on students' performance. The findings of the study revealed that there was no difference between multiple intelligences curriculum and traditional teaching system. Wright (2004) had studied the effectiveness of team teaching based on multiple intelligences. The research was carried out for 8th standard students for the subject Marathi. It was found to be effective. Sax (2004) indicated that there were differences in the pace of brain development of boys and girls. Girls develop at a fast pace and generally perform better in academics as compared to boys. Similar results had been recorded by Furnham, Wytykowska and Petrides (2005). Moreover, Ucak, Bag and Usak (2006) conducted a research study in order to improve academic reading achievement of student through the use of multiple intelligence teaching strategies. The results verified that the respondents who were exposed to multiple intelligence intervention had shown an uplift in their academic reading achievement. Deary, Strand, Smith and Fernandes (2007) carried a research study and found that most of the girls had better academic attainment as compared to the boys of same age and grade. Sellars (2008) carried a research study and promoted systematic approach to teaching using multiple intelligences in classroom. He maintained that the academic achievement improves by teaching according to the development of each intelligence area possessed by students. Subramanyam and Rao (2008) conducted a research and suggested that there was a significant difference in regard to the effect of gender on and academic achievement of students belonging to same age group. Rampersad and Patel (2014) through his study found significant relationship between creativity and academic performance. Ahvan and Pour (2016) investigated the relationship between the multiple intelligences and the academic performance achievement levels of high school students based

on Gardner's multiple intelligences theory. It was ascertained that multiple intelligences like visual-spatial, verbal-linguistic and interpersonal are statistically significant and are able to predict academic performance achievement. Cecily and Jebaraj (2017) has applied the theory of multiple intelligences particularly useful for student projects that resulted in enhanced learning.

METHODOLOGY

The research study was conducted on a sample of 480 students including 236 males and 244 females. All the students were 7 years of age. 137 females hailed from Punjab and 107 belonged to Chandigarh. Among males, 137 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 focus factor, 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
7 years	480	Males	236	Punjab	137	67	70
				Chandigarh	99	53	46
		Females	244	Punjab	137	67	70
				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 were insignificant differences found between the FF 1 in Chandigarh and Punjab. Similarly in case of FF 2, there was insignificant difference in Chandigarh but in Punjab the difference was significant. Further, significant differences were recorded in their FF 3, FF 4 and FF 5. In case of females, insignificant difference was found between FF 1 in Chandigarh as well as Punjab while in all other subgroups, the difference was significant. The mean value ranged from 66.21 to 94.56 in experiment group while it ranged from 66.68 to 75.34 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 86.98 to 117.5 in experiment group while it ranged from 85.85 to 88.97 in control group. The mean value of experiment group was higher than the control group in all the tests.

Table 2: Details of FF

7	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**				
FF1	Ch	Ex	53	74.22	14.25	Ch	M	53	74.22*	14.25	Ex	Ch	53	74.22*	14.25
		Co	46	73.77	13.47		F	56	90.85	20.12		Pb	67	66.21	7.69
	Pb	Ex	67	66.21	7.69	Pb	M	67	66.21*	7.69	Co	Ch	46	73.77*	13.47
		Co	70	67.28	8.94		F	67	86.98	13.54		Pb	70	67.28	8.94
FF2	Ch	Ex	53	78.48	14.21	Ch	M	53	78.48*	14.21	Ex	Ch	53	78.48*	14.21
		Co	46	73.61	13.55		F	56	96.33	20.72		Pb	67	70.60	7.77
	Pb	Ex	67	70.60*	7.77	Pb	M	67	70.60*	7.77	Co	Ch	46	73.61*	13.55
		Co	70	66.97	8.99		F	67	92.51	14.16		Pb	70	66.97	8.99
FF3	Ch	Ex	53	82.74*	14.19	Ch	M	53	82.74*	14.19	Ex	Ch	53	82.74*	14.19
		Co	46	73.45	13.65		F	56	101.8	21.37		Pb	67	74.99	7.86
	Pb	Ex	67	74.99*	7.86	Pb	M	67	74.99*	7.86	Co	Ch	46	73.45*	13.65
		Co	70	66.68	9.10		F	67	98.03	14.83		Pb	70	66.68	9.10
FF4	Ch	Ex	53	90.04*	15.00	Ch	M	53	90.04*	15.00	Ex	Ch	53	90.04*	15.00
		Co	46	73.86	13.69		F	56	110.9	22.98		Pb	67	82.24	9.05
	Pb	Ex	67	82.24*	9.05	Pb	M	67	82.24*	9.05	Co	Ch	46	73.86*	13.69
		Co	70	67.01	9.19		F	67	107.3	16.02		Pb	70	67.01	9.19
FF5	Ch	Ex	53	94.56*	15.62	Ch	M	53	94.56*	15.62	Ex	Ch	53	94.56*	15.62
		Co	46	75.34	14.04		F	56	117.5	24.46		Pb	67	86.54	9.66
	Pb	Ex	67	86.54*	9.66	Pb	M	67	86.54*	9.66	Co	Ch	46	75.34*	14.04
		Co	70	68.34	9.38		F	67	114.0	17.02		Pb	70	68.34	9.38
Exp. and Control Group, Female						**Gender wise, Control**					**Area wise, Female**				
FF1	Ch	Ex	56	90.85	20.12	Ch	M	46	73.77*	13.47	Ex	Ch	56	90.85	20.12
		Co	51	85.85	16.11		F	51	85.85	16.11		Pb	67	86.98	13.54
	Pb	Ex	67	86.98	13.54	Pb	M	70	67.28*	8.94	Co	Ch	51	85.85	16.11
		Co	70	86.46	17.44		F	70	86.46	17.44		Pb	70	86.46	17.44

7	Place	Gp	N	Mean	SD	Place	M/F	N	Mean	SD	Gp	Place	N	Mean	SD
FF2	Ch	Ex	56	96.33*	20.72	Ch	M	46	73.61*	13.55	Ex	Ch	56	96.33	20.72
		Co	51	86.04	16.11		F	51	86.04	16.11		Pb	67	92.51	14.16
	Pb	Ex	67	92.51*	14.16	Pb	M	70	66.97*	8.99	Co	Ch	51	86.04	16.11
		Co	70	86.65	17.44		F	70	86.65	17.44		Pb	70	86.65	17.44
FF3	Ch	Ex	56	101.8*	21.37	Ch	M	46	73.45*	13.65	Ex	Ch	56	101.8	21.37
		Co	51	86.25	16.08		F	51	86.25	16.08		Pb	67	98.03	14.83
	Pb	Ex	67	98.03*	14.83	Pb	M	70	66.68*	9.10	Co	Ch	51	86.25	16.08
		Co	70	86.84	17.42		F	70	86.84	17.42		Pb	70	86.84	17.42
FF4	Ch	Ex	56	110.9*	22.98	Ch	M	46	73.86*	13.69	Ex	Ch	56	110.9	22.98
		Co	51	86.79	16.28		F	51	86.79	16.28		Pb	67	107.3	16.02
	Pb	Ex	67	107.3*	16.02	Pb	M	70	67.01*	9.19	Co	Ch	51	86.79	16.28
		Co	70	87.23	17.50		F	70	87.23	17.50		Pb	70	87.23	17.50
FF5	Ch	Ex	56	117.5*	24.46	Ch	M	46	75.34*	14.04	Ex	Ch	56	117.5	24.46
		Co	51	88.50	16.68		F	51	88.50	16.68		Pb	67	114.0	17.02
	Pb	Ex	67	114.0*	17.02	Pb	M	70	68.34*	9.38	Co	Ch	51	88.50	16.68
		Co	70	88.97	17.89		F	70	88.97	17.89		Pb	70	88.97	17.89

Table3: Comparison of FF

Male								
Place	**Chandigarh**				**Punjab**			
Group	Ex		Co		Ex		Co	
FF	Mean	SD	Mean	SD	Mean	SD	Mean	SD
FF1	74.22*	14.25	73.77	13.47	66.21*	7.69	67.29	8.94
FF2	78.48*	14.21	73.61	13.55	70.60*	7.77	66.98	8.99
FF3	82.74*	14.19	73.46	13.65	74.99*	7.86	66.69	9.10
FF4	90.04*	15.00	73.86	13.69	82.24*	9.05	67.02	9.19
FF5	94.56*	15.62	75.34	14.04	86.54*	9.66	68.34	9.38
	Female							
FF1	90.85*	20.12	85.86	16.11	86.98*	13.54	86.47	17.44
FF2	96.33*	20.72	86.05	16.11	92.51*	14.16	86.65	17.44
FF3	101.8*	21.37	86.26	16.08	98.03*	14.83	86.85	17.42
FF4	110.9*	22.98	86.79	16.28	107.3*	16.02	87.24	17.50
FF5	117.5*	24.46	88.50	16.68	114.0*	17.02	88.97	17.89

Fig.1 Mean differece in Focus Factor of respondents in 5 tests
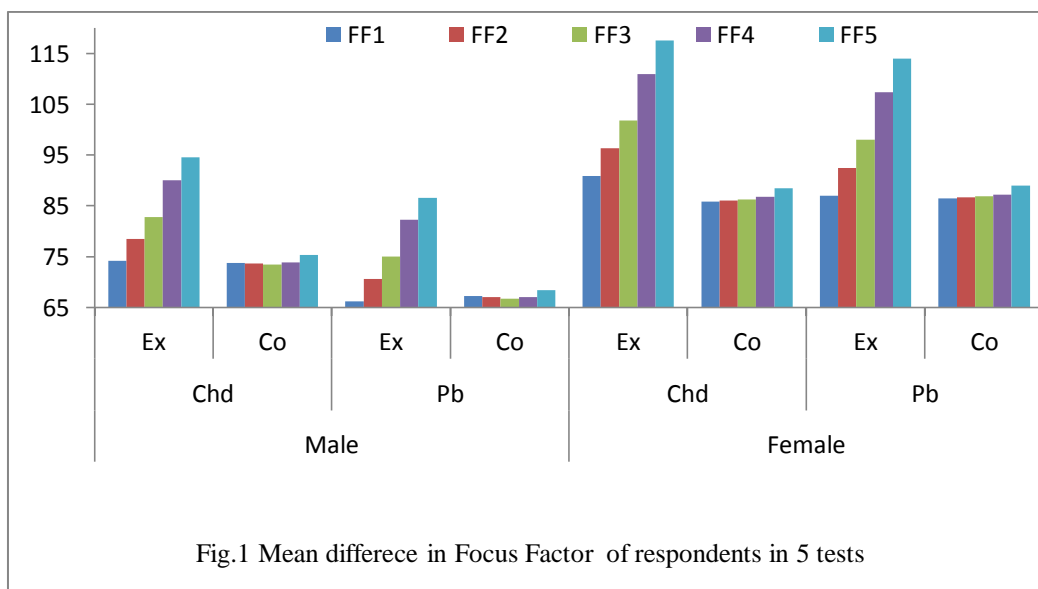
When the FF of respondents in experiment group was compared gender wise, it was found that there existed significant differences between the FF of males and females in Chandigarh as well as Punjab in all the five tests. The same trend followed in control group. Females had higher values as compared to males. The mean values among males ranged from 66.21 to 94.56 and among females ranged from 86.98 to 117.5. In control group, females had higher values as compared to males. The mean values among males ranged from 66.68 to 75.34 and among females ranged from 85.85 to 88.97. In the same way, when the males were compared place wise, it was recorded that there was insignificant difference between the FF of males in Chandigarh and Punjab in experiment as well as control group. However, among females of the difference was insignificant in all the sub groups when compared area wise. The mean of FF varied from 73.45 to 94.56 in Chandigarh while in Punjab it varied from 66.21 to 86.54. In case of females, the mean of FF varied from 85.85 to 117.5 in Chandigarh while in Punjab it varied from 86.46 to 114.

Table 4: Details of DMA

7	Place	Gp	N	Mean	SD	Place	M/F	N	Mean	SD	Gp	Place	N	Mean	SD
Exp. and Control Group,						**Gender wise, Experiment**					**Area wise, Male**				
DMA1	Ch	E	53	0.37	0.08	Ch	M	53	0.37*	0.08	Ex	C	53	0.37*	0.08
		C	46	0.37	0.08		F	56	0.48	0.14		P	67	0.33	0.05
	Pb	E	67	0.33	0.05	Pb	M	67	0.33*	0.05	Co	C	46	0.37*	0.08
		C	70	0.34	0.06		F	67	0.45	0.09		P	70	0.34	0.06
DMA2	Ch	E	53	0.61*	0.14	Ch	M	53	0.61*	0.14	Ex	C	53	0.61*	0.14
		C	46	0.46	0.11		F	56	0.77	0.21		P	67	0.55	0.08
	Pb	E	67	0.55*	0.08	Pb	M	67	0.55*	0.08	Co	C	46	0.46*	0.11
		C	70	0.42	0.08		F	67	0.73	0.14		P	70	0.42	0.08
DMA3	Ch	E	53	0.71*	0.14	Ch	M	53	0.71*	0.14	Ex	C	53	0.71*	0.14
		C	46	0.50	0.12		F	56	0.92	0.26		P	67	0.64	0.10
	Pb	E	67	0.64*	0.10	Pb	M	67	0.64*	0.10	Co	C	46	0.50*	0.12
		C	70	0.46	0.09		F	67	0.88	0.17		P	70	0.46	0.09

7	Place	Gp	N	Mean	SD	Place	M/F	N	Mean	SD	Gp	Place	N	Mean	SD
DMA4	Ch	E	53	0.77*	0.15	Ch	M	53	0.77*	0.15	Ex	C	53	0.77*	0.15
		C	46	0.50	0.12		F	56	1.00	0.28		P	67	0.70	0.11
	Pb	E	67	0.70*	0.11	Pb	M	67	0.70*	0.11	Co	C	46	0.50*	0.12
		C	70	0.46	0.09		F	67	0.96	0.19		P	70	0.46	0.09
DMA5	Ch	E	53	0.81*	0.16	Ch	M	53	0.81*	0.16	Ex	C	53	0.81*	0.16
		C	46	0.51	0.12		F	56	1.06	0.30		P	67	0.74	0.12
	Pb	E	67	0.74*	0.12	Pb	M	67	0.74*	0.12	Co	C	46	0.51*	0.12
		C	70	0.47	0.09		F	67	1.02	0.20		P	70	0.47	0.09
Exp. and Control Group, Female						**Gender wise, Control**					**Area wise, Female**				
DMA1	Ch	E	56	0.48	0.14	Ch	M	46	0.37*	0.08	Ex	C	56	0.48	0.14
		C	51	0.45	0.11		F	51	0.45	0.11		P	67	0.45	0.09
	Pb	E	67	0.45	0.09	Pb	M	70	0.34*	0.06	Co	C	51	0.45	0.11
		C	70	0.45	0.12		F	70	0.45	0.12		P	70	0.45	0.12
DMA2	Ch	E	56	0.77*	0.21	Ch	M	46	0.46*	0.11	Ex	C	56	0.77	0.21
		C	51	0.57	0.14		F	51	0.57	0.14		P	67	0.73	0.14
	Pb	E	67	0.73*	0.14	Pb	M	70	0.42*	0.08	Co	C	51	0.57	0.14
		C	70	0.59	0.16		F	70	0.59	0.16		P	70	0.59	0.16
DMA3	Ch	E	56	0.92*	0.26	Ch	M	46	0.50*	0.12	Ex	C	56	0.92	0.26
		C	51	0.63	0.16		F	51	0.63	0.16		P	67	0.88	0.17
	Pb	E	67	0.88*	0.17	Pb	M	70	0.46*	0.09	Co	C	51	0.63	0.16
		C	70	0.65	0.18		F	70	0.65	0.18		P	70	0.65	0.18
DMA4	Ch	E	56	1.00*	0.28	Ch	M	46	0.50*	0.12	Ex	C	56	1.00	0.28
		C	51	0.63	0.16		F	51	0.63	0.16		P	67	0.96	0.19
	Pb	E	67	0.96*	0.19	Pb	M	70	0.46*	0.09	Co	C	51	0.63	0.16
		C	70	0.65	0.18		F	70	0.65	0.18		P	70	0.65	0.18
DMA5	Ch	E	56	1.06*	0.30	Ch	M	46	0.51*	0.12	Ex	C	56	1.06	0.30
		C	51	0.64	0.17		F	51	0.64	0.17		P	67	1.02	0.20
	Pb	E	67	1.02*	0.20	Pb	M	70	0.47*	0.09	Co	C	51	0.64	0.17
		C	70	0.66	0.18		F	70	0.66	0.18		P	70	0.66	0.18

Table 5: Comparison of DMA

|	**Male**							
Place	**Chandigarh**				**Punjab**			
Group	**Ex**		**Co**		**Ex**		**Co**	
DMA	Mean	SD	Mean	SD	Mean	SD	Mean	SD
DMA1	0.37*	0.08	0.37	0.08	0.33*	0.05	0.34	0.06
DMA2	0.61*	0.14	0.46	0.11	0.55*	0.08	0.42	0.08
DMA3	0.71*	0.14	0.50	0.12	0.64*	0.10	0.46	0.09
DMA4	0.77*	0.15	0.51	0.12	0.70*	0.11	0.47	0.09
DMA5	0.81*	0.16	0.52	0.12	0.74*	0.12	0.47	0.09
	Female							
DMA1	0.48*	0.14	0.45	0.11	0.45*	0.09	0.46	0.12
DMA2	0.77*	0.21	0.58	0.14	0.73*	0.14	0.60	0.16
DMA3	0.92*	0.26	0.63	0.16	0.88*	0.17	0.65	0.18
DMA4	1.00*	0.28	0.63	0.16	0.96*	0.19	0.66	0.18
DMA5	1.06*	0.30	0.65	0.17	1.02*	0.20	0.67	0.18
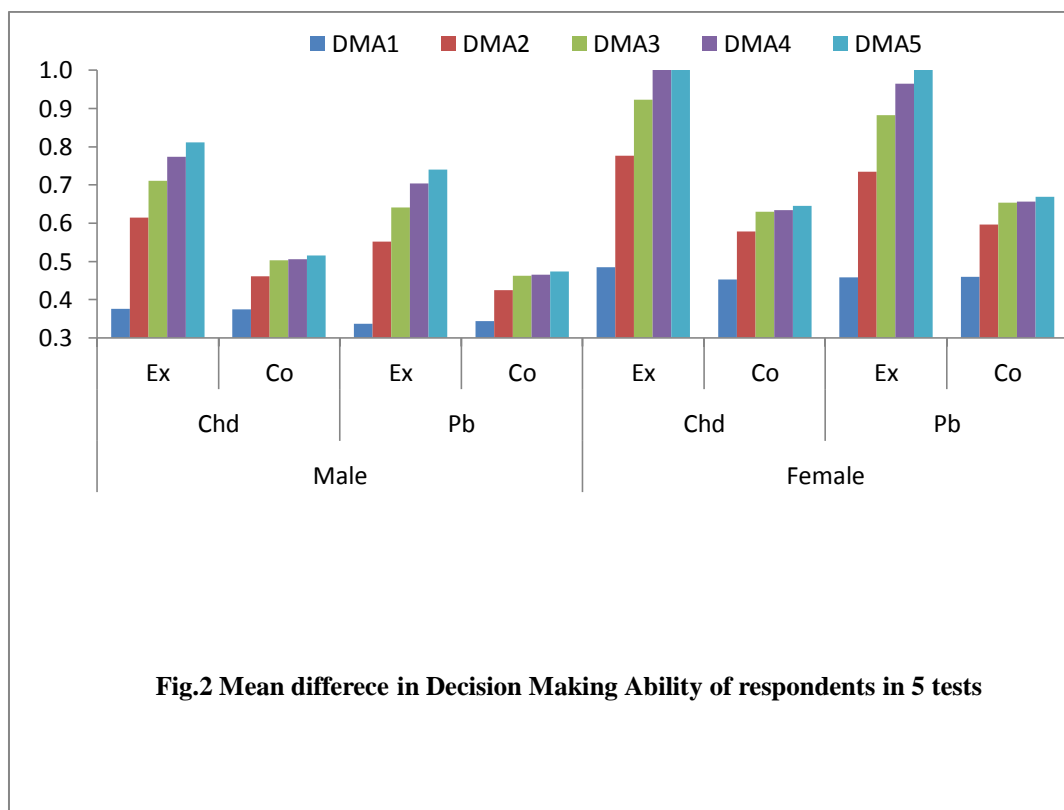
Fig.2 Mean differece in Decision Making Ability of respondents in 5 tests

There were insignificant differences found between the DMA 1 in Chandigarh and Punjab. However, significant differences were recorded in their DMA 2, DMA 3 DMA 4andDMA 5. It was witnessed that the DMA of the respondents in experiment group was higher than their control counterparts and the difference was highly significant. The mean value ranged from 0.33 to 0.81 in experiment group while it ranged from 0.34 to 0.51 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 0.45 to 1.06 in experiment group while it ranged from 0.45 to 0.66 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, it was found that there existed significant differences between the DMA of males and females in Chandigarh as well as Punjab in all the five tests. The same trend followed in control group. Females had higher values as compared to males. The mean values among males ranged from 0.33 to 0.81 and among females ranged from 0.45 to 1.06. In control group, females had higher values as compared to males. The mean values among males ranged from 0.34 to 0.51 and among females ranged from 0.45 to 0.66. In the same way, when the males were compared place wise, it was recorded that there was significant difference between the DMA of males in Chandigarh and Punjab in experiment as well as control group. However, when females of experiment group in Chandigarh and Punjab were compared, the difference was insignificant. The mean of DMA varied from 0.37 to 0.81 in Chandigarh while in Punjab it varied from 0.33 to 0.74. In case of females, the mean of DMA varied from 0.45 to 1.06 in Chandigarh while in Punjab it varied from 0.45 to 1.02.

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Table 6: Details of CQ

7	Place	Gp	N	Mean	SD	Place	M/F	N	Mean	SD	Gp	Place	N	Mean	SD
Exp. and Control Group,						**Gender wise, Experiment**					**Area wise, Male**				
CQ1	Ch	E	53	0.56*	0.08	Ch	M	53	0.56	0.08	Ex	C	53	0.56	0.08
		C	46	0.38	0.05		F	56	0.54	0.08		P	67	0.56	0.07
	Pb	E	67	0.56*	0.07	Pb	M	67	0.56	0.07	Co	C	46	0.38	0.05
		C	70	0.38	0.05		F	67	0.55	0.07		P	70	0.38	0.05
CQ2	Ch	E	53	0.68*	0.09	Ch	M	53	0.68	0.09	Ex	C	53	0.68	0.09
		C	46	0.42	0.06		F	56	0.66	0.09		P	67	0.68	0.09
	Pb	E	67	0.68*	0.09	Pb	M	67	0.68	0.09	Co	C	46	0.42	0.06
		C	70	0.42	0.06		F	67	0.67	0.08		P	70	0.42	0.06
CQ3	Ch	E	53	0.72*	0.10	Ch	M	53	0.72	0.10	Ex	C	53	0.72	0.10
		C	46	0.44	0.07		F	56	0.70	0.10		P	67	0.72	0.10
	Pb	E	67	0.72*	0.10	Pb	M	67	0.72	0.10	Co	C	46	0.44	0.07
		C	70	0.45	0.07		F	67	0.71	0.08		P	70	0.45	0.07
CQ4	Ch	E	53	0.76*	0.11	Ch	M	53	0.76	0.11	Ex	C	53	0.76	0.11
		C	46	0.47	0.08		F	56	0.74	0.11		P	67	0.77	0.10
	Pb	E	67	0.77*	0.10	Pb	M	67	0.77	0.10	Co	C	46	0.47	0.08
		C	70	0.48	0.07		F	67	0.75	0.09		P	70	0.48	0.07
CQ5	Ch	E	53	0.84*	0.12	Ch	M	53	0.84	0.12	Ex	C	53	0.84	0.12
		C	46	0.16	0.21		F	56	0.81	0.12		P	67	0.85	0.11
	Pb	E	67	0.85*	0.11	Pb	M	67	0.85	0.11	Co	C	46	0.16	0.21
		C	70	0.14	0.20		F	67	0.83	0.10		P	70	0.14	0.20
Exp. and Control Group,						**Gender wise, Control**					**Area wise, Female**				
CQ1	Ch	E	56	0.54*	0.08	Ch	M	46	0.38	0.05	Ex	C	56	0.54	0.08
		C	51	0.38	0.06		F	51	0.38	0.06		P	67	0.55	0.07
	Pb	E	67	0.55*	0.07	Pb	M	70	0.38	0.05	Co	C	51	0.38	0.06
		C	70	0.39	0.05		F	70	0.39	0.05		P	70	0.39	0.05
CQ2	Ch	E	56	0.66*	0.09	Ch	M	46	0.42	0.06	Ex	C	56	0.66	0.09
		C	51	0.42	0.07		F	51	0.42	0.07		P	67	0.67	0.08
	Pb	E	67	0.67*	0.08	Pb	M	70	0.42	0.06	Co	C	51	0.42	0.07
		C	70	0.43	0.05		F	70	0.43	0.05		P	70	0.43	0.05
CQ3	Ch	E	56	0.70*	0.10	Ch	M	46	0.44	0.07	Ex	C	56	0.70	0.10
		C	51	0.45	0.07		F	51	0.45	0.07		P	67	0.71	0.08
	Pb	E	67	0.71*	0.08	Pb	M	70	0.45	0.07	Co	C	51	0.45	0.07
		C	70	0.46	0.06		F	70	0.46	0.06		P	70	0.46	0.06
CQ4	Ch	E	56	0.74*	0.11	Ch	M	46	0.47	0.08	Ex	C	56	0.74	0.11
		C	51	0.47	0.08		F	51	0.47	0.08		P	67	0.75	0.09
	Pb	E	67	0.75*	0.09	Pb	M	70	0.48	0.07	Co	C	51	0.47	0.08
		C	70	0.48	0.06		F	70	0.48	0.06		P	70	0.48	0.06
CQ5	Ch	E	56	0.81*	0.12	Ch	M	46	0.16*	0.21	Ex	C	56	0.81	0.12
		C	51	0.36	0.23		F	51	0.36	0.23		P	67	0.83	0.10
	Pb	E	67	0.83*	0.10	Pb	M	70	0.14*	0.20	Co	C	51	0.36	0.23
		C	70	0.40	0.21		F	70	0.40	0.21		P	70	0.40	0.21

Table 7: Comparison of CQ

Place	Chandigarh				Punjab			
Male								
Group	Ex		Co		Ex		Co	
CQ	Mean	SD	Mean	SD	Mean	SD	Mean	SD
CQ1	0.56*	0.08	0.39	0.05	0.56*	0.07	0.39	0.05
CQ2	0.68*	0.09	0.42	0.06	0.68*	0.09	0.43	0.06
CQ3	0.72*	0.10	0.45	0.07	0.72*	0.10	0.45	0.07
CQ4	0.76*	0.11	0.47	0.08	0.77*	0.10	0.48	0.07
CQ5	0.84*	0.12	0.17	0.21	0.85*	0.11	0.15	0.20
Female								
CQ1	0.54*	0.08	0.39	0.06	0.55*	0.07	0.39	0.05
CQ2	0.66*	0.09	0.43	0.07	0.67*	0.08	0.43	0.05
CQ3	0.70*	0.10	0.45	0.07	0.71*	0.08	0.46	0.06
CQ4	0.74*	0.11	0.48	0.08	0.75*	0.09	0.49	0.06
CQ5	0.81*	0.12	0.36	0.23	0.83*	0.10	0.40	0.21
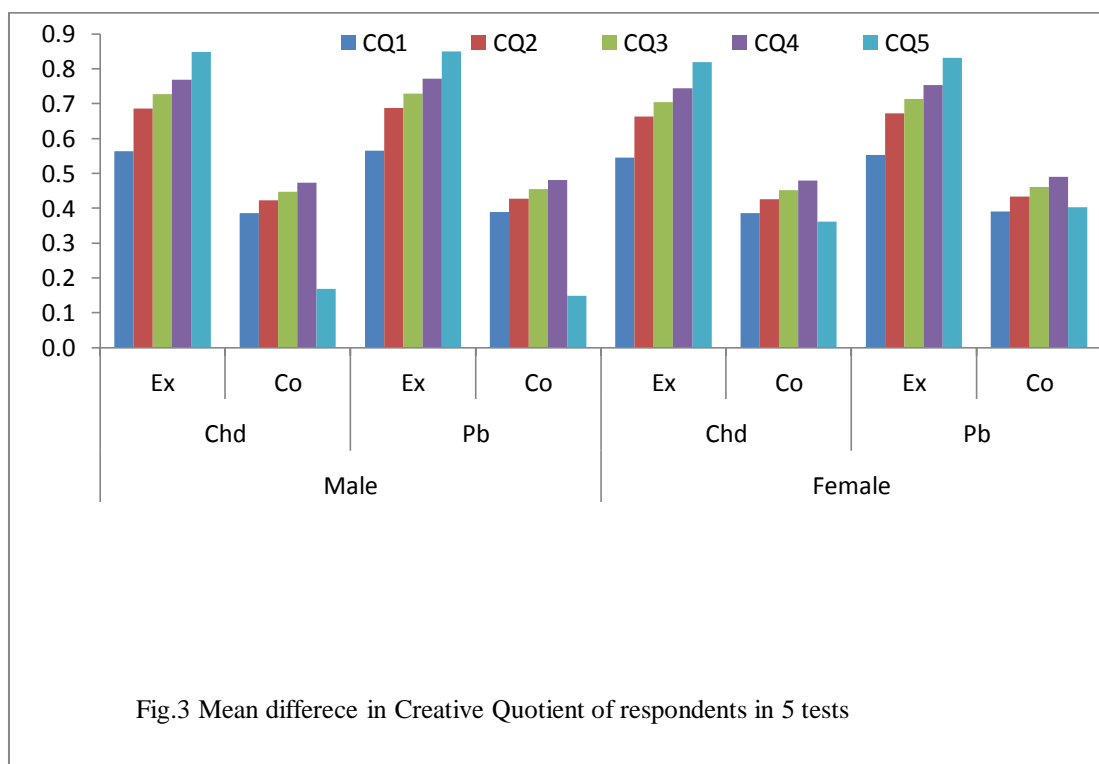
Fig.3 Mean differece in Creative Quotient of respondents in 5 tests

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 0.56 to 0.85 in experiment group while it ranged from 0.14 to 0.48 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 0.36 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 5of males and females in control group. Females had lower values as compared to males. The mean values among males ranged from 0.56 to 0.85 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 0.14 to 0.48 and among females ranged from 0.36 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 0.16 to 0.84 in Chandigarh while in Punjab it varied from 0.14 to 0.85. In case of females, the mean of CQ varied from 0.36 to 0.81 in Chandigarh while in Punjab it varied from 0.39 to 0.83.

Table 8: Details of marks

7	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	E	53	56.37	6.68	Ch	M	53	56.37*	6.68	Ex	C	53	56.37*	6.68
	Ch	C	46	56.37	6.01	Ch	F	56	59.62	5.26	Ex	P	67	50.79	2.26
	Pb	E	67	50.79	2.26	Pb	M	67	50.79*	2.26	Co	C	46	56.37*	6.01
	Pb	C	70	50.67	2.67	Pb	F	67	58.78	5.44	Co	P	70	50.67	2.67
M2	Ch	E	53	65.72*	7.78	Ch	M	53	65.72*	7.78	Ex	C	53	65.72*	7.78
	Ch	C	46	59.98	6.98	Ch	F	56	68.94	7.00	Ex	P	67	60.23	4.05
	Pb	E	67	60.23*	4.05	Pb	M	67	60.23*	4.05	Co	C	46	59.98*	6.98
	Pb	C	70	53.93	3.90	Pb	F	67	69.62	6.59	Co	P	70	53.93	3.90
Exp. and Control Group,						**Gender wise, Control**						**Area wise, Male**				
M1	Ch	E	56	59.62	5.26	Ch	M	46	56.37	6.01	Ex	C	56	59.62	5.26
	Ch	C	51	58.24	4.55	Ch	F	51	58.24	4.55	Ex	P	67	58.78	5.44
	Pb	E	67	58.78	5.44	Pb	M	70	50.67*	2.67	Co	C	51	58.24	4.55
	Pb	C	70	57.16	4.57	Pb	F	70	57.16	4.57	Co	P	70	57.16	4.57
M2	Ch	E	56	68.94*	7.00	Ch	M	46	59.98	6.98	Ex	C	56	68.94	7.00
	Ch	C	51	61.75	5.10	Ch	F	51	61.75	5.10	Ex	P	67	69.62	6.59
	Pb	E	67	69.62*	6.59	Pb	M	70	53.93*	3.90	Co	C	51	61.75	5.10
	Pb	C	70	61.14	6.21	Pb	F	70	61.14	6.21	Co	P	70	61.14	6.21

Table 9: Comparison of marks

Place	Male								
Place	**Chandigarh**				**Punjab**			
Group	**Ex**		**Co**		**Ex**		**Co**	
Marks	Mean	SD	Mean	SD	Mean	SD	Mean	SD
M1	56.37*	6.68	56.38	6.01	50.79*	2.26	50.68	2.67
M2	65.72*	7.78	59.99	6.98	60.23*	4.05	53.94	3.90
	Female							
Marks	Mean	SD	Mean	SD	Mean	SD	Mean	SD
M1	59.62*	5.26	58.24	4.55	58.78*	5.44	57.17	4.57
M2	68.94*	7.00	61.76	5.10	69.62*	6.59	61.14	6.21

Fig.4 Change in the Percentage of respondents in pre-test and post-test
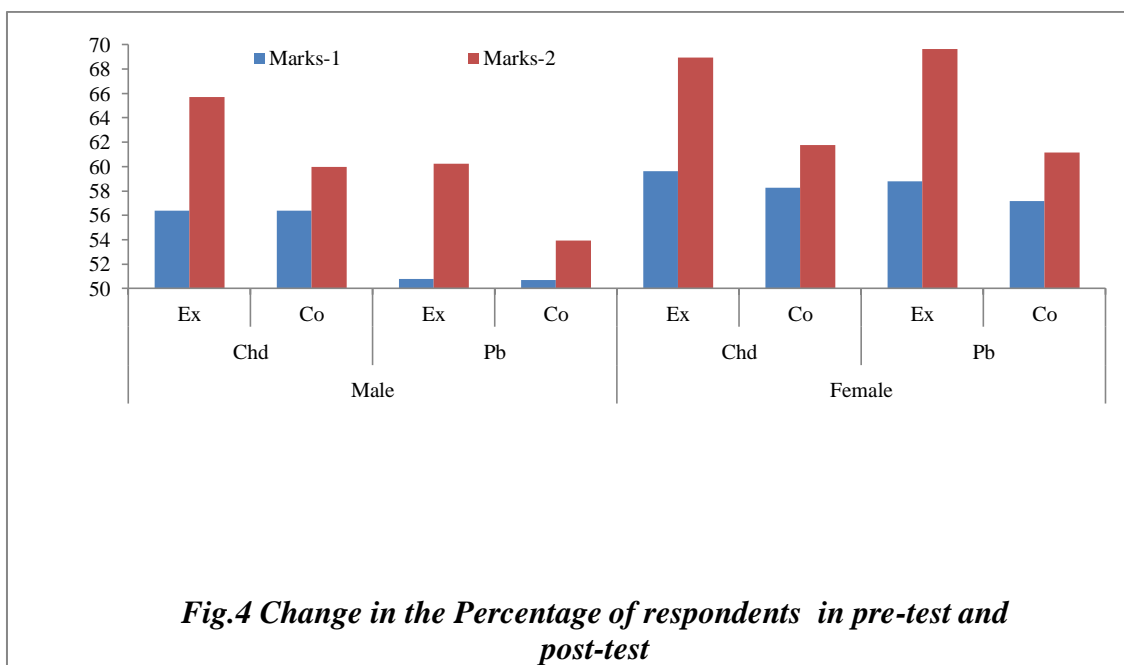
There were insignificant differences found between the M 1 in Chandigarh and Punjab among male respondents. But in case of M 2, there was significant difference. The same trend was notified among females. The mean value ranged from 50.79 to 65.72 in experiment group while it ranged from 50.67 to 59.98 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 58.78 to 69.62 in experiment group while it ranged from 57.16 to 61.75 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 the marks of males and females in Chandigarh as well as Punjab. However, in case of control group, the difference was significant in Punjab. Females had higher values as compared to males. The mean values among males ranged from 50.79 to 65.72 and among females ranged from 58.78 to 69.62. In control group, females had higher values as compared to males. The mean values among males ranged from 50.67 to 59.98 and among females ranged from 57.16 to 61.75. In the same way, when the males were compared place wise, it was recorded that there was significant difference between the marks of males in Chandigarh and Punjab in experiment as well as control group. However, when females of experiment group in Chandigarh and Punjab were compared, insignificant difference was witnessed. The mean of marks varied from 56.37 to 65.72 in Chandigarh while in Punjab it varied from 50.67 to 60.23. In case of females, the mean of marks varied from 58.24 to 68.94 in Chandigarh while in Punjab it varied from 57.16 to 69.62.

CONCLUSION

There was significant rise in the FF of male respondents of experiment groups in Chandigarh and Punjab. The mean value in Chandigarh increased from 74.22 to 94.57. In Punjab, the mean value rose from 66.21 to 86.55. Similarly, among females, significant increase was recorded. The mean value increased from 90.85 to 117.5 in experiment group of Chandigarh and it rose from 86.99 to 114.0 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 0.38 to 0.81. In Punjab, the mean value rose from 0.34 to 0.74. Similarly, among females, significant increase was recorded. The mean value increased from 0.49 to 1.06 in experiment group of Chandigarh and it rose from 0.46 to 1.03 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 0.56 to 0.85. In Punjab, the mean value rose from 0.57 to 0.85. Similarly, among females, significant increase was recorded. The mean value increased from 0.55 to 0.82 in experiment group of Chandigarh and it rose from 0.55 to 0.83 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 56.37 to 65.72. In Punjab, the mean value rose from 50.79 to 60.23. Similarly, among females, significant increase was recorded. The mean value increased from 59.62 to 68.94 in experiment group of Chandigarh and it rose from 58.78 to 69.62 in Punjab. In contrast, insignificant changes were witnessed among their control group counterparts. Spearman (1904), Stern (1914), Stern and Kluver (1925), Silver et. al (2000), Sternberg (1997) and Sternberg (2018).

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