

Analysis of The Correlation and Causal Relationship Between Focus Factor and Achievement in Mathematics

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Abstract:

Focus Factor in humans has an initial & final value. The desired value lies between these two values. After calibrating the current cognition value, we can work to encompass the desired value. Focus Factor can be reordered by applying customized education methodology. The research was conducted in Chandigarh. The sample for the research study consisted of 100 school going students of 10th standard from different schools. Purposive sampling was undertaken to select subjects, who were then divided into two groups. The first group; Group-A was the Control Group, whereas the second group; Group-B was the Experimental Group on whom the Customized Solutions & Training Programme was implemented, to see the impact (if any) of focus factor on their mathematics marks. On the contrary, the Control group did not have access to the said programme. The marks in Mathematics in both the quarters were obtained from the respective teachers. The tool used was Cognitive Ability Test and Assessment. After the successful completion of Customized solutions & training programme for six months, it was notified that the Focus Factor of Group B increased significantly, subsequently their marks in mathematics inclined as well whereas in case of the control group, no significant change was seen in their consecutive tests.

Keywords: *Focus Factor

*Customized Solution

*Mathematics

I. INTRODUCTION

Focus Factor, an indicator for collective attention, focus & concentration in accomplishing assigned tasks. It is one of the most prominent factors to achieve success. If the focus factor is not high, even a high IQ may not beget success. It is a ratio of accuracy vs. age & time.

Table 1 Focus Factor	
Above 150	Excellent
120-150	Very Good
90-120	Good
75-90	Above Average
50-75	Average
30-50	Below Par
Below 30	Poor

In academics, attention and focus have always been the two most important factors in learning and academic achievement, specifically Mathematics. To excel in the subject, one needs to be adept in the fields of reasoning, interpretation of symbols and be well versed with the concepts and theories. The challenges of mathematics learning for today's education are that it requires disciplined study, concentration, focus and attention. To meet these challenges, learners must be focused and motivated to progress. Broussard and Garrison (2004) examined the relationship between focus and academic achievement in mathematics. Consistent with the previous studies, they

found that for a higher level of mastery, focus was related to higher math grades. The capacity to perform some complex mathematical tasks depends critically on the ability to retain task-relevant information in an accessible state over time and to selectively process information in the environment (attention). As an example, consider driving a car in an unfamiliar city. In order to get to your destination, directions have to be retained and kept in the working memory. In addition, one must be able to selectively attend to the relevant objects because there is more information in a scene than can be processed by our 2 Daryl Fougny perceptual systems. In fact, the contents of working memory and focus often overlap. Empirical work has largely focused on separate aspects of the relationship between focus and academic achievement in mathematics. Some theorists argue that attention selects the information to be encoded into Working Memory while others speak of focus in terms of post-perceptual processing limitations (Kintsch, Healy, Hegarty, Pennington, and Salthouse 1999; Miyake and Shah, 1999). While theoretical work on the relationship between focus and Working Memory has generally assumed that both constructs denote a uniform set of processes, there is strong evidence implicating non-unitary attention and Working Memory systems (Posner and Peterson, 1990; Smith and Jonides, 1999). Miyake and Shah (1999) have suggested that an understanding of the role of focus in problem solving might require a systematic mapping of the relationships between different aspects of of focus. Indeed, Awh and colleagues

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have suggested that the interaction of attention and solving Mathematical issues depends on what stage of attention is engaged and what type of information is maintained. (Awh, Vogel and Oh, 2006). There is evidence that focus can affect early perceptual processing (Cherry, 1953; Mangun and Hillyard, 1991) as well as evidence that attention affects only later processing stages (Osman and Moore, 1993). The strong support for both early and late selection has led to the proposal that there may be more than one form of attentional selection (Allport, 1993; Lavie, Hirst, de Fockert and Viding, 2004, Luck and Vecera, 2002; Posner and Peterson, 1990). One detailed and influential taxonomy of attention has been developed by Posner and colleagues (Fan, McCandliss, Sommer, Raz, and Posner, 2002; Fan, McCandliss, Fossella, Flombaum and Posner, 2005; Posner and Boies, 1971; Posner and Peterson, 1990). Education plays the role of a weapon that helps the individuals to struggle and conquer the battle of life. With the help of education person knows about himself as well as knows about his own existence and is well aware that the world doesn't revolve around him but that he is a part of it. Education enables the individuals to distinguish between right and wrong. From a historical point of view, education has been a very essential part of different civilizations. There are three levels of education system in Pakistan. Primary Education is the foundation of education system. It is as important for an individual's academic life as roots are important for a tree. Strong basis at this level helps the individual throughout his/her academic career. Secondary education is the second level of education which is the midpoint between the primary and higher education. It is the most crucial stage of a student's life. At this stage they take decisions for their future lives either to continue their studies or to join workforce. Higher education is the third level of education. Higher education provides talented and able individuals who contribute a lot toward the progress and development of their country. All the levels are important but it is evident that secondary level education is an important stage in academic life. Secondary school is an important stage in the maturity and in the world of work, as some students start to earn their livelihood after the completion of secondary school education. Students are thinking about themselves, their capabilities and also about what they will do after the completion of their education. They are assessing their strengths, aptitude, skills and abilities. At this stage every student wants acknowledgment and acceptance from their parents, teachers and peer. They need guidance from their teachers and parents to make decision about them. Secondary school level age is the age of adolescence. As adolescence, is a time of growth and change, students need guidance from their parents and teachers. Adolescents face unique and diverse challenges, both personally and developmentally, that impact their academic achievement. At this stage students confront with lot of excitement, frustration, disappointment and hope. It is the time when students have a lot of dreams for their future. Secondary school teachers enhance the learning process and promote academic achievement. School counseling programs and the individual focus are essential for students to achieve optimal personal growth and to become productive members of the Society. During adolescence individuals confront many psychological, physical and emotional problems that inhibit their learning and affect their academic achievement.

Focus is one of the significant factors that can affect the academic achievement of students. Focus is usually considered as the ability to focus mentally in a singular direction for a specified length of time during which other objects of interest or focus can be put aside. It is an interactive process in which the person attending interacts with the object of focus in such a way that there is a mutual interchange. Focus requires a certain degree of interest coupled with enough interactive reciprocity so that interest and focus are maintained over time. Although the act of focusing the mind can be considered to be a mental skill, it is the elements of interest, interaction, and involvement that are the emotional elements of the process without which focus could not be sustained (Frazier, 1999). Focus is one of the important phenomena in educational psychology. No one can deny the importance of focus. It is the ability to choose from the many competing stimuli that surround us. Focus is essential condition for learning the task at hand. Focus is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalization, concentration, of consciousness is of its essence. It implies withdrawal from some things in order to deal effectively with others, and is a condition which has a real opposite in the confused, dazed, scatterbrained state which in French is called *distracted*. Focus plays a key role in our daily activities. It is the important characteristic of human nature that their focus is always shifting and changing according to their needs and interests. Focus directs human energies and enables them to respond to some stimuli and ignore others. It makes individuals attentive to concentrate on one's efforts in a certain direction so that things and ideas they attend to are relevant to their needs and purposes. It increases individual's efficiency and helps them to get ready to meet any situation and helps individuals in remembering and recalling things. It also improves individuals sensory discrimination as a result make fine distinctions in perceiving things which otherwise would have ignored. Academic achievement is determined by a variety of factors including educational opportunity, socio-economic status (SES), social aptitudes, personality traits, and cognitive skills (see, for example, Brooks-Gunn and Duncan, 1997, Wentzel, 1991 and Wentzel and Caldwell, 2006). Among the latter, the ability to focus on the task at hand and ignore distraction, also termed selective attention, appears to have reverberating effects on several domains important to academic foundations, including language, literacy, and mathematics. While it is important to recognize that many factors determine academic achievement. Focus refers to the processes that allow an individual to select and focus on particular input for further processing while simultaneously suppressing irrelevant or distracting information. The competing information can occur both externally, as in extraneous auditory or visual stimulation in the environment, or internally, as in distracting thoughts or habitual responses which get in the way of performing the task at hand. As most studies in the literature have focused on the filtering of external information, this review will focus primarily on the ability, when presented with a complex environment, to select the relevant dimensions for the task at hand and respond appropriately. The contribution of different cognitive abilities to academic performance in children surviving cerebral insult can guide the choice of interventions

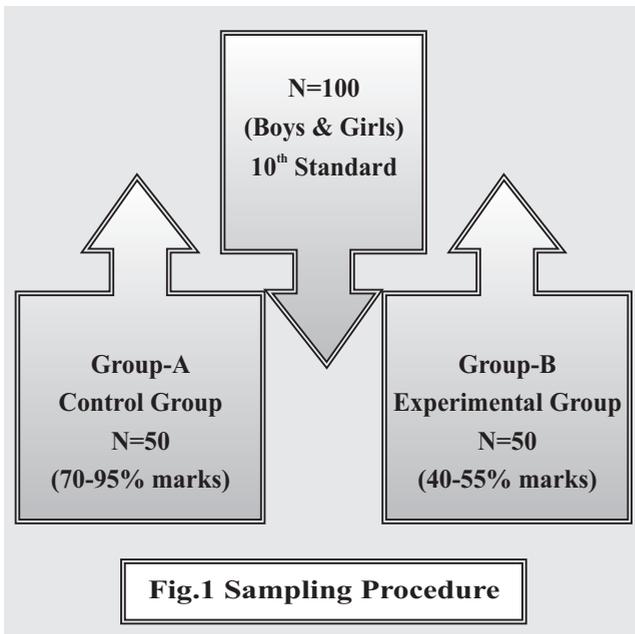
to improve cognitive and academic outcomes. Academic performance, especially in Mathematics, is strongly associated with the “Focus Factor” which captures most of the variation in the individual specific cognitive outcome measures.

II. 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.

III. METHOD

The research was conducted in Chandigarh. The sample for the research study consisted of 100 school going students of 10th standard from different schools. Purposive sampling was undertaken to select subjects, who were then divided into two groups.



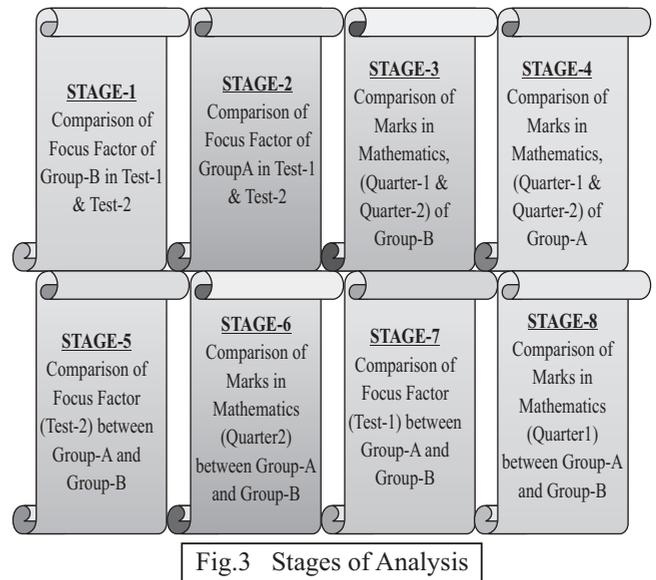
The first group; Group-A was the Control Group, whereas the second group; Group-B was the Experimental Group on whom the Customized Solutions & Training Programme was implemented, to see the impact (if any) of focus factor on their mathematics marks. On the contrary, the Control group did not have access to the said programme. The data collected was analysed as per the set methodology.

GROUP-A	GROUP-B
N=50	N=50
CONTROL GROUP	EXPERIMENTAL GROUP
70-95% MARKS	40-55% MARKS
TEST-1	TEST-1
NA	CUSTOMIZED SOLUTIONS & TRAINING PROGRAMME (FOR 6 MONTHS)
TEST-2	TEST-2

Fig.2 Methodology

The marks in Mathematics in both the quarters were obtained from the respective teachers. 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 ‘Focus Factor’ has been emphasized. The study reflected the correlation between the Focus Factor and academic achievement in mathematics.

IV. STAGES OF ANALYSIS



V. 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)	$X = \sum X / N$ where, X = Variable N = No. of sample	To find out the average scores of variable used in the study.
2	Standard Deviation (S.D.)	$O = \sqrt{\sum x^2 / N}$ 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)	$S.E = O/n$ Where O = 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	$t = (x1-x2) / S$ $\sqrt{n1n2/(n1+n2)}$ where x1 = mean of 1 st sample x2 = mean of second sample S = combine S.D. n1 = number of observations in 1 st sample. n2 = number of observations in 2 nd 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.

VI. RESULTS AND DISCUSSION

STAGE-1

Comparison of Focus Factor of Group-B in Test-1 & Test-2

Table 3: Difference in the Mean, Standard deviation, Standard error, t-values and level of Significance of Marks in Mathematics (Quarter1) between Group-A and Group-B

Marks in Mathematics (Quarter1)	N	MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Group A	50	82.98	7.12	1.008	26.03	<0.0001	Extremely Statistically Significant
Group B	50	50.23	5.25	0.74			

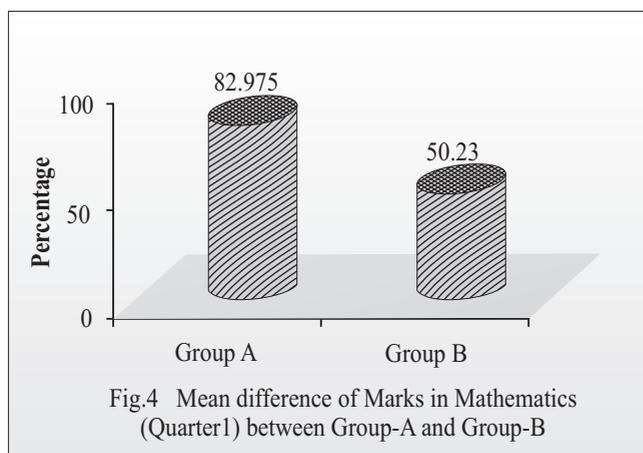


Fig.4 Mean difference of Marks in Mathematics (Quarter1) between Group-A and Group-B

A significant difference is witnessed between the percentage/marks in Mathematics as secured by Group A and Group B. Group A was found to have surpassed their counterparts in Quarter-1.

STAGE-2

Comparison of Focus Factor of Group A in Test-1 & Test-2

Table 4: Difference in the Mean, Standard deviation, Standard error, t-values and level of Significance of Focus Factor (Test-1) between Group-A and Group-B

Focus Factor in Test-1	N	MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Group A	50	85.26	26.49	3.75	10.72	<0.0001	Extremely Statistically Significant
Group B	50	44.08	13.6	1.92			

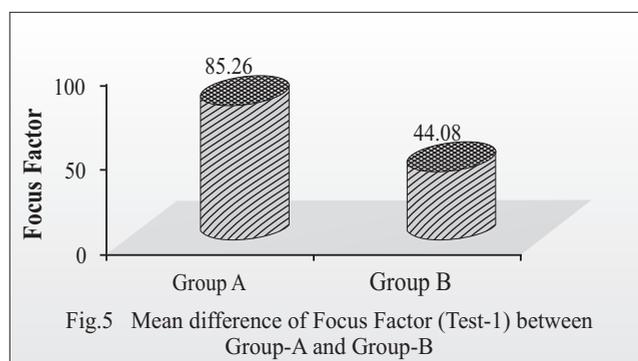


Fig.5 Mean difference of Focus Factor (Test-1) between Group-A and Group-B

A significant difference is witnessed between the Focus Factor of Group A and Group B. Group A was found to have higher Focus than their counterparts in Test-1.

STAGE-3

Comparison of Marks in Mathematics, (Quarter-1 & Quarter-2) of Group-B

Table 5: Difference in the Mean, Standard deviation, Standard error, t-values and level of Significance of Marks in Mathematics (Quarter2) between Group-A and Group-B

Marks in Mathematics (Quarter2)	N	MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Group A	50	83.208	7.29	1.03	17.9	<0.0001	Extremely Statistically Significant
Group B	50	58.515	7.67	1.08			

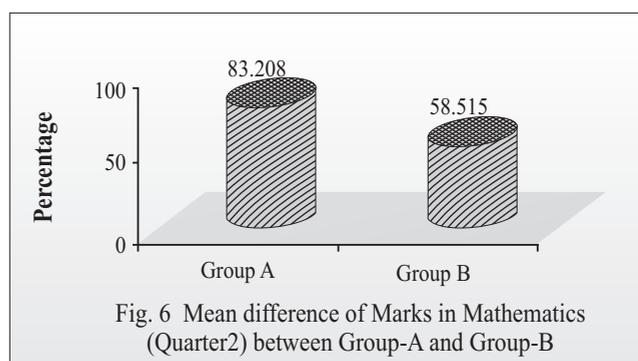


Fig. 6 Mean difference of Marks in Mathematics (Quarter2) between Group-A and Group-B

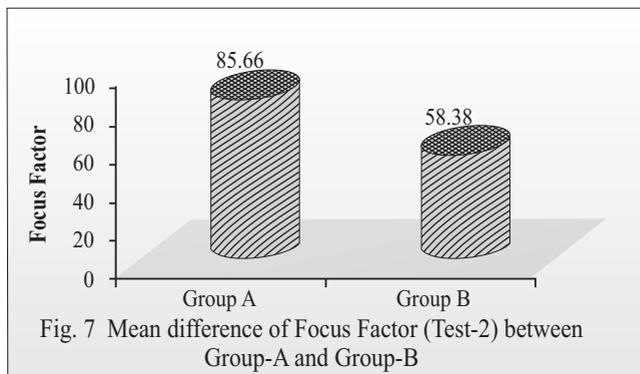
An extremely significant difference is found between the percentage/marks in Mathematics as secured by Group A and Group B. Group A was found to have surpassed their counterparts in Quarter-2

STAGE-4

Comparison of Marks in Mathematics, (Quarter-1 & Quarter-2) of Group-A

Table 6: Difference in the Mean, Standard deviation, Standard error, t-values and level of Significance of Focus Factor (Test-2) between Group-A and Group-B

Focus Factor in Test-2	N	MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Group A	50	85.66	26.30	3.72	6.62	<0.0001	Extremely Statistically Significant
Group B	50	58.38	28.11	3.98			



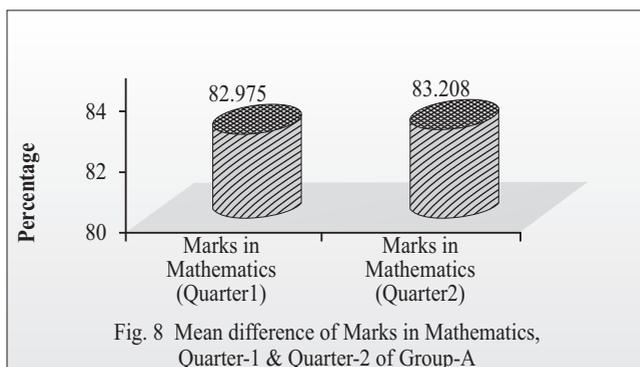
A significant difference is seen between the Focus Factor of Group A and Group B. Group A was found to have higher Focus than their counterparts in Test-2.

STAGE-5

Comparison of Focus Factor (Test-2) between Group-A and Group-B

Table 7: Difference in the Mean, Standard deviation, Standard error, t-values and level of Significance of Marks in Mathematics, Quarter-1 & Quarter-2 of Group-A

Group A	N	MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Marks in Mathematics (Quarter1)	50	82.975	7.22	1.02	2.466	0.172	Notvery Significant
Marks in Mathematics (Quarter2)	50	83.208	7.29	1.03			



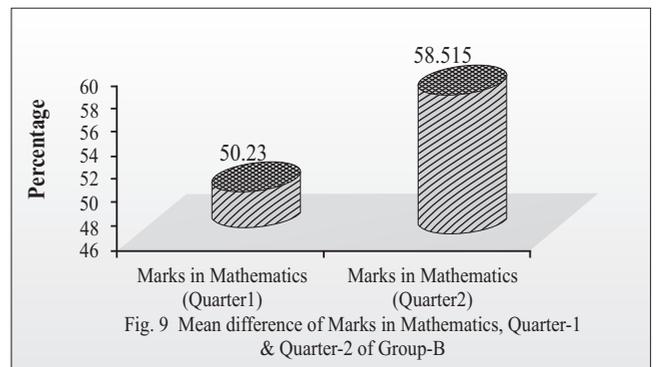
Although there was a difference in mathematicsmarks, but merely of less than even a percent between Quarter-1 and Quarter-2 in case of Group A.

STAGE-6

Comparison of Marks in Mathematics (Quarter2) between Group-A and Group-B

Table 8: Difference in the Mean, Standard deviation, Standard error, t-values and level of Significance of Marks in Mathematics, Quarter-1 & Quarter-2 of Group-B

Group B	N	MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Marks in Mathematics (Quarter1)	50	50.23	5.25	0.74	6.88	<0.0001	Extremely Statistically Significant
Marks in Mathematics (Quarter2)	50	58.515	7.67	1.08			



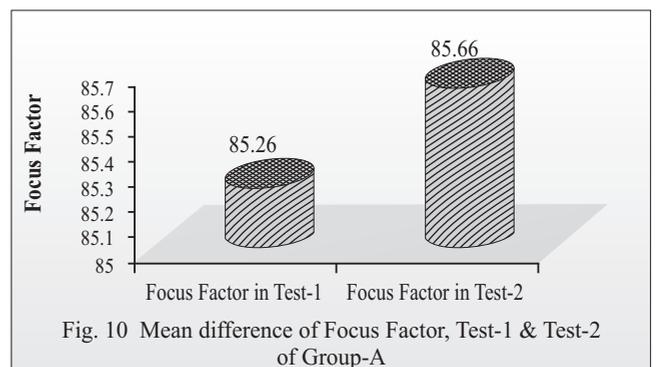
In case of Group B, there was a drastic soar in the mathematics marks in Quarter-2 as compared to their scores in Quarter-1

STAGE-7

Comparison of Focus Factor (Test-1) between Group-A and Group-B

Table 9: Difference in the Mean, Standard deviation, Standard error, t-values and level of Significance of Focus Factor, Test-1 & Test-2 of Group-A

Group A	N	MEAN	S.D.	S.E.M	t - value	P-value	Lev. of sig.
Focus Factor in Test-1	50	85.26	26.49	3.75	1.61	0.1124	Not Statistically Significant
Focus Factor in Test-2	50	85.66	26.30	3.72			



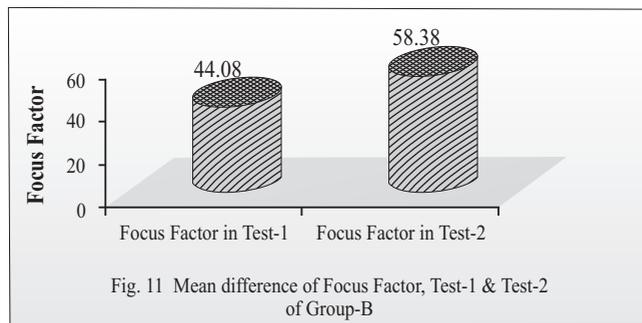
There was no significant difference noticed in Focus Factor of Group A between their consecutive tests.

STAGE-8

Comparison of Marks in Mathematics (Quarter1) between Group-A and Group-B

Table 10: Difference in the Mean, Standard deviation, Standard error, t-values and level of Significance of Focus Factor, Test-1 & Test-2 of Group-B

Group B	N	MEAN	S.D.	S.E.M	t- value	P-value	Lev. of sig.
Focus Factor in Test-1	50	44.08	13.60	1.92	3.58	0.0008	Extremely Statistically Significant
Focus Factor in Test-2	50	58.38	28.11	3.98			



There was statistically extremely significant swing in the Focus Factor of Group B between their Test-1 and Test-2.

VII. CONCLUSION

It can thus be concluded that, after the successful completion of Customized solutions & training programme for six months, it was notified that the Focus Factor increased significantly, subsequently their marks in mathematics inclined as well. On the contrary, in case of the control group, no significant change was seen over the time span in their consecutive tests. In the contemporaneous research, an extremely significant drift towards higher level of Focus Factor was recorded after the completion of six months of customized solution & training programme. To wrap up, it can be beheld that Focus Factor of the students can recuperate strikingly if they are provided required training as per their learning style.

VIII. ACKNOWLEDGEMENT

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