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Effective impact of whole brain development among the abacus learners of younger generation

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Abstract
Abacus is the binary method understandable by brain. It develops certain characteristics, which are suitable for the training of the learner´s mind such as simplicity, accuracy, precision, originality. The abacus learners are trained to co-ordinate visual, auditory and sensory inputs and solve problems by analyzing the separately. Constant abacus users help to explore confidence in one`s metal faculties, intelligence and problem solving abilities. Understanding mathematics by using abacus fosters an ability to think laterally. In this study a comparative study is done on age group of 4- 7 years (Group B) and 8-12 years (Group A) for the development of different skills such as concentration, memory, visual aspects, retention and recall, grasping power etc. By graphical study it is clear that group B are more superior than Group A.

Keywords: abacus, visualization, dictation, concentration and skill development

1. Introduction
Recently in increasing innovations fields of technological development and also in day-to-day life, there is a considerable amount of dependence on Mathematics which is the basis of all such developments. Actually it is the binary method understandable by brain. The fundamental process of addition, subtraction and counting are all mathematical in nature and every one of us uses them in day-to-day life. Abacus develops certain characteristics, which are suitable for the training of the learner´s mind such as simplicity, accuracy, precision, originality. The abacus learners are trained to co-ordinate visual, auditory and sensory inputs and solve problems by analyzing the separately [1]. Constant abacus users help to explore confidence in one`s metal faculties, intelligence and problem solving abilities. Understanding mathematics by using abacus fosters an ability to think laterally.

Abacus is a calculating instrument & a mechanical aid which is performed by moving beads along rods, using both hands. The movement of the beads done by the left hands stimulates the right part of brain and the vice versa occurs. The action of the right hand helps in developing the logical thinking and language function of the left hemisphere and the action of the left hand in developing creative, imaginary and 3- dimensional skills of right brain. Since the right & left hemisphere transmit messages to each other and functions the whole brain [2, 3, 4]. That is why it is Abacus is known as complete brain development program. Learning is accession of the information whereas memory is the retention and storage of the information which is recalled and used for further learning. So learning leads to memory and learning becomes better by association with memory. The abacus learners are trained to coordinate visual, auditory and sensory inputs and solve problems by analyzing these repeatedly. Though number of studies has proved the influence of abacus in improving mathematical skills, its influence on memory and over all learning ability has not been evaluated so far. Abacus is practical, useful in solving mathematical problems and especially is very handy in overall development. At the end of the training, Abacus learners try to solve mathematical problems without physically using the hands and abacus beads but by visualization of beads by the brain. Abacus helps in co-ordination of sight, sound and finger movements which induces increase in the synaptic connections [1, 5]. The abacus learner tries to coordinate visual, auditory and sensory inputs, analyses the problems and solves them [6, 7, 11].

2. AIM
Comparative study of the effectiveness of the abacus in the whole brain development in the form of concentration, memory, visual aspects, retention and recall, grasping power of two different groups one of 4-8 years and the other age group of 9-12years students.

3. Methods and Materials
A group of 20 students of age 4-7 years (below 8) and group of 8 to 12 years (above 8) were collected each from two centres of Bhusawal during Dec2016 to Oct 2017. The children enrolled belong to the upper middle class families with 45% parent's graduates. Before staring Tests for IQ were done using Binet Kamet Scale and students with average IQ were included in the study. The children included in the study had undergone 1 to 4 level of training. Each level consisted of 3 months, in which the children had classes once a week (Sunday). Alternate days in summer holidays were conducted. Each class extended for a period of two hour. After every level there was a break of one week during which the children were asked to practice abacus at home before they pass on to

the next level. In level I children were taught addition and subtraction with the introduction use of abacus using two digit sums. This level helps in creating concentration and mutual use of both the brains by using both hands. In level II, the students visualize the abacus and perform their calculation starting from simple sums to more complicated sums on abacus. This level helps in creating visual concepts, problem solving capacity. In III level, sums become more complex using 3digits, 4to 5 in a row on abacus, visualization of 1-2 digits, 4-6 rows along with multiplication introduction. This level helps in more grasping with retention and recall, sharp memory. At level IV students increase their complexity in abacus calculation, more visualization in multiplication, also division in included [9, 10, 11, 12]. Nearly all the skill get sharpen in this level with the problem solving capacity. Moreover more interest is developed in mathematics.

4. Result and Discussion

Table 1 and 2 elaborates the statistical data of centre 1 and centre 2 respectively. In level 1 sum are done on abacus, in level II sums are solved without abacus i.e. visualizing the abacus in brain. In level III multiplication introduction occurs, whereas in level IV visualization of multiplication and division introduction takes place. Statistical summary is collected and

Table 1: Statistical summaries of Abacus students above and below students of Centre 1

Centre 1			Above 8 years					Below 8 years				
			Max	Min	Avg	Mode	Median	Max	Min	Avg	Mode	Median
Level 1	On Abacus	On Abacus	10	8	9	10	10	9	5	6	6	6
		Dictation	9	7	8	9	8	6	4	6	6	6
	Overall view		57	45	53	51	53	45	27	36	39	36
Level 2	On Abacus	On Abacus	9	7	8	8	8	10	8	9	9	9
		Dictation	8	5	7	8	7	9	7	8	9	9
	Visualization		9	4	7	8	7		9	7	9	9
	Overall view		50	36	43	42	42	56	46	52	54	52
Level 3	On Abacus	On Abacus	9	7	8	8	8	10	8	8	8	8
		Dictation	8	7	8	8	8	9	8	9	9	9
	Visualization		9	8	8	8	8		10	9	10	10
	Overall view		50	44	48	48	48	58	52	54	54	54
Level 4	On Abacus	On Abacus	8	7	7	7	7	10	8	9	9	9
		Dictation	9	7	8	8	8	10	9	10	10	10
	Visualization		8	7	8	8	8	10	10	10	10	10
	Multiplication	On Abacus	8	5	5	5	5	10	7	9	9	9
		Visualization	9	4	7	7	7	10	8	9	9	9
	Division	On Abacus	8	4	6	8	6	9	7	9	9	9
	Overall view		44	37	42	42	42	59	52	55	54	56

Table 2: Statistical summaries of Abacus students above and below students of Centre 2

Centre 2			Above 8 years					Below 8 years				
			Max	Min	Avg	Mode	Median	Max	Min	Avg	Mode	Median
Level 1	On Abacus	On Abacus	10	8	9	9	9	7	5	6	6	6
		Dictation	9	8	8	8	8	7	5	6	6	6
	Overall view		57	48	52	51	51	39	30	35	36	36
Level 2	On Abacus	On Abacus	9	7	8	8	8	9	7	8	8	8
		Dictation	9	6	7	6	7	9	7	8	8	8
	Visualization		9	5	8	8	8	10	8	9	9	9
	Overall view		52	36	45	46	46	54	46	51	52	52
Level 3	On Abacus	On Abacus	8	7	7	7	7	10	8	9	9	9
		Dictation	10	7	9	9	9	10	8	9	9	9
	Visualization		10	7	9	10	10	10	8	9	10	10
	Overall view		54	46	50	48	50	58	52	54	52	54
Level 4	On Abacus	On Abacus	10	8	9	9	9	10	8	10	10	10
		Dictation	10	8	9	9	9	10	8	9	9	9
	Visualization		10	8	9	9	9	10	8	9	9	9
	Multiplication	On Abacus	9	6	7	6	7	10	8	9	9	9
		Visualization	9	8	8	8	8	10	8	9	9	9
	Division	On Abacus	9	6	8	7	8	10	8	9	9	9
	Overall view		54	48	51	51	51	58	53	55	55	55

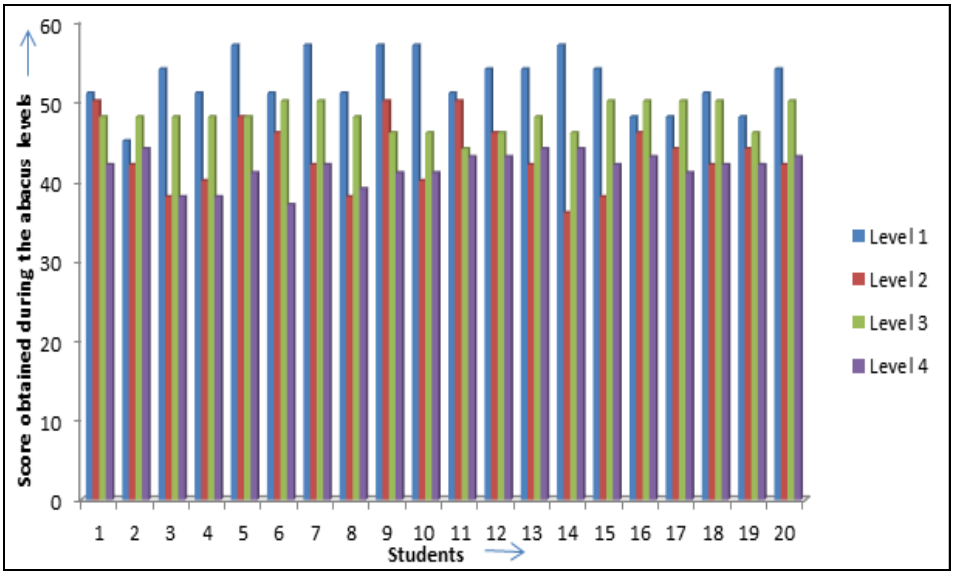

Fig 1: Graph of Abacus studying students Above 8 years of Centre 1

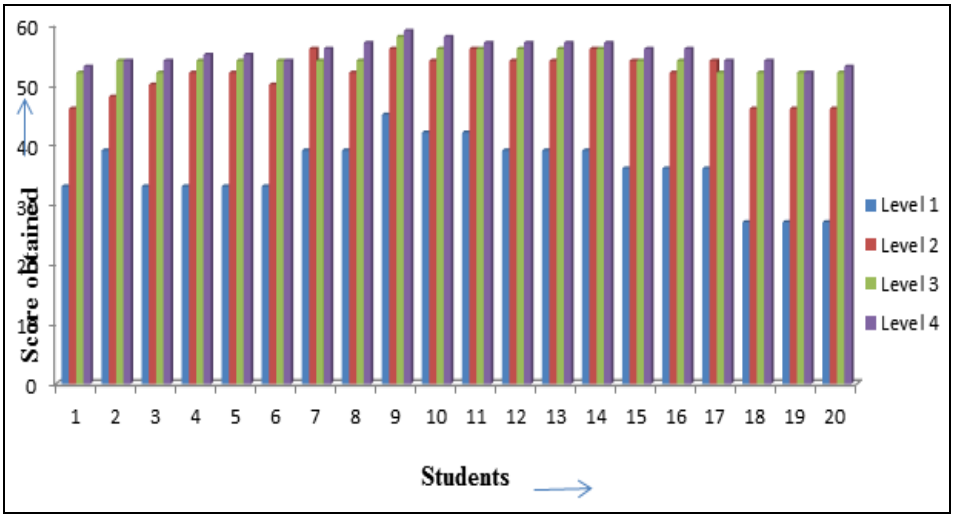

Fig 2: Graph of Abacus studying students Below 8 years of Centre 1

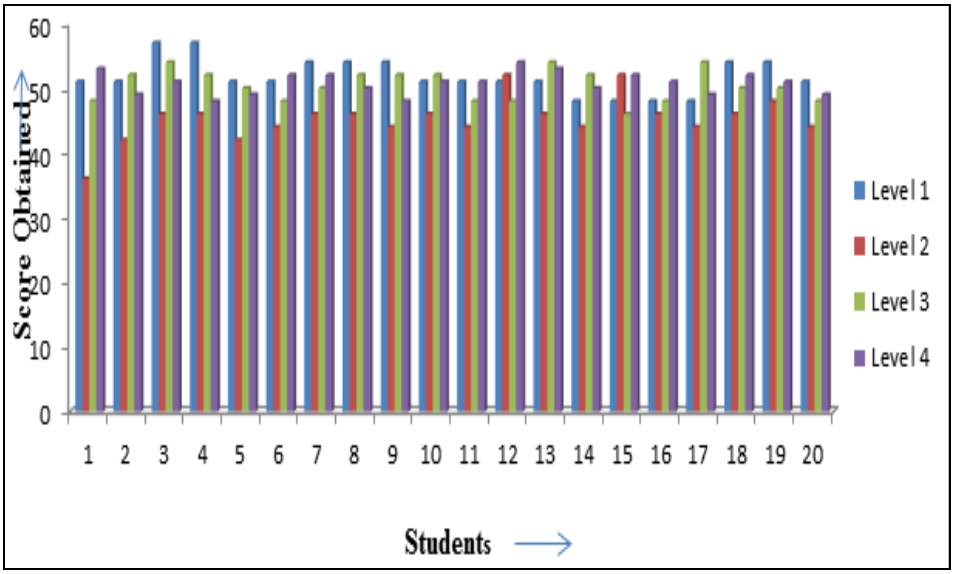

Fig 3: Graph of Abacus studying students Above 8 years of Centre 2

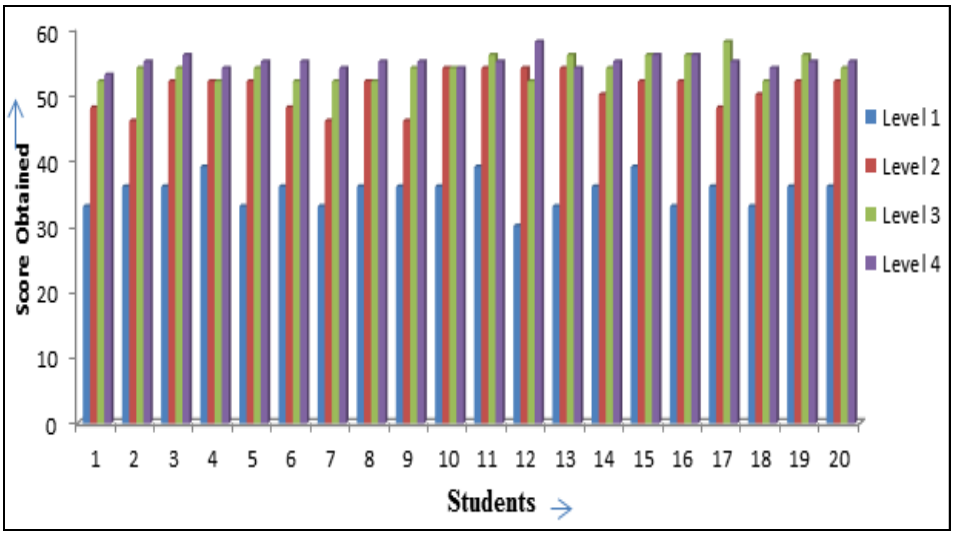

Fig 4: Graph of Abacus studying students Below 8 years of Centre 2

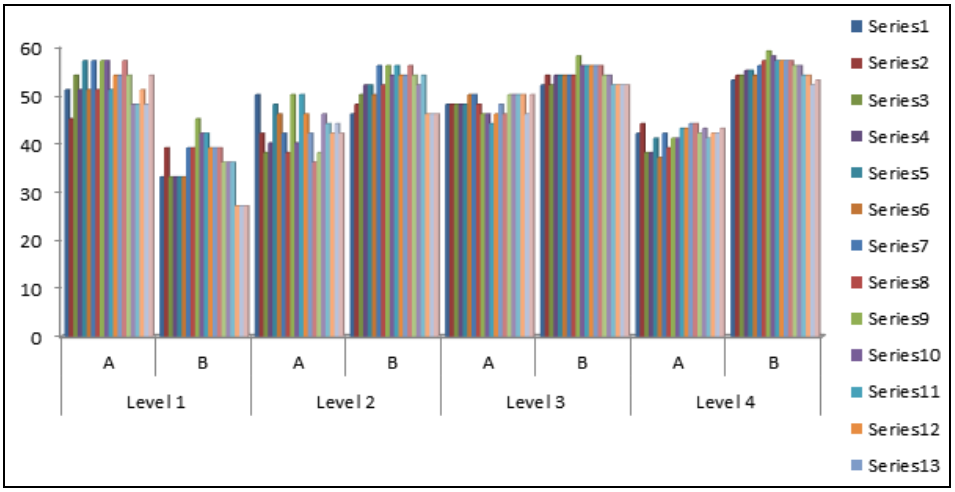

Fig 5: Comparison Chart of Above and Below Abacus students of Centre 1

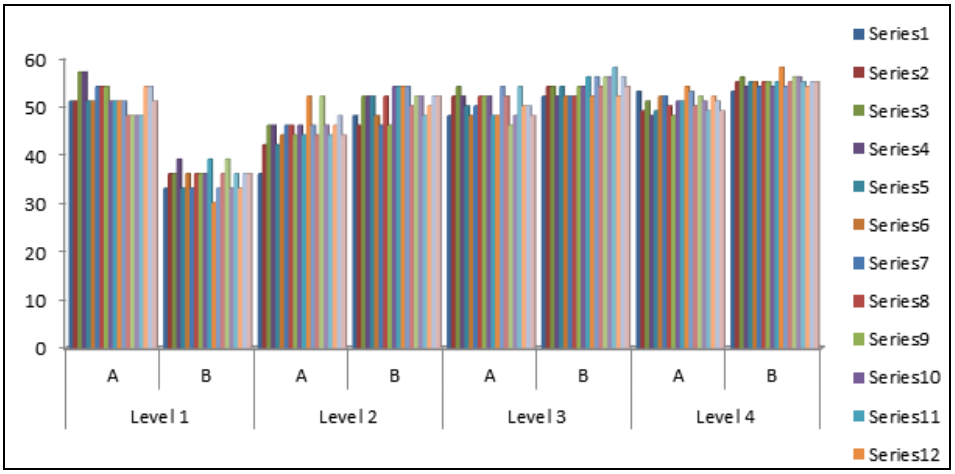

Fig 6: Comparison Chart of Above and Below Abacus students of Centre 2

Presented in form of Maximum, Minimum, Average, Mode and Median from group A (above 8years) and Group B (below 8 years). In each level the sum solving capacities are increased with the development of skills (from table and fig). As we go down in table1 and 2 in group B it increases but in group A it shows ups and down. In fig 1 to 6 blue colour represents level

1, red, green and violet colour represent level II, level III and level IV respectively. Fig 1and 2 shows the score graph of centre 1 of above and below respectively. Fig 1.3 &1.4 shows the score graph of centre 2 of above and below respectively. From the fig 1 to 4 it is clear that in level 1 group A scored more than group B. whereas in Level IV group B scored more than group A in both the centres. Fig 5 and 6 shows the comparison between the two groups centre wise. Now if we compare both the groups (A&B) it is seen that the rise is more in group B than A. From graph also it is clear that rise in level 1 is more in group A but group B shows more rise in level IV. It may be due to the age factor in group A. They perform level I more using logics than abacus. As logical calculations are created by textbooks which are not in group B. As they are small in age to start with logics. Moreover their brain is soft. Brain developing programs are more successful at the age of 4to 6. But when group B performs level II they visualize it more than group A (from Fig 5 and 6).

5. Conclusion

On the basis of above discussion we concluded that skill development takes place among the abacus learners and that too it is more in group B than group A. Group B are more superior than Group A. The skills are more developed in group B students as their brain capture more or can be easily stimulated than group B.

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