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BRAIN BASED LEARNING PROGRAMME FOR ENHANCING STUDENTS' ACADEMIC ACHIEVEMENT AND RETENTION IN MATHEMATICS

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Abstract

The present study investigate the implementation of Brain Based Learning Programme for enhancing students' academic achievement and retention in mathematics. A total number of 40 students studying in 9th class participated in the study. Random sampling technique was used to select the sample. The study was experimental in nature. Data was collected by administering achievement test in Mathematics. Data was analyzed quantitatively using the SPSS. Independent t test was conducted to compare mean gain scores of experimental and control groups on the variables of academic achievement and retention in mathematics. The study revealed that Brain based learning programme has drawn great impact in enhancing academic achievement and retention in mathematics of students.

Index Terms: Academic Achievement in Mathematics, Brain Based Learning Programme

INTRODUCTION

The contribution of evolving technology has led to an increase in the significance of mathematics in both daily and professional life. The quality standards of our social and personal lives are directly influenced by our level of mathematics knowledge and proficiency. Mathematics is mainly challenging as it requires a level of accurate, clear thinking and problem-solving abilities which are quite different from other subjects. Learning mathematics is different from learning other subjects because math follows an ordered learning pattern. Many students face problems in understanding and retaining of a concept in mathematics. The following are the main causes of this problem: the abstract and hierarchical structure of mathematics, the learning strategies, methodologies and the challenges in learning mathematics. Mathematical skills like problem-solving and reading comprehension are quite diverse and require a variety of cerebral pathways to function properly. So, this brain-based learning strategy may be beneficial.

Brain-based learning refers to learning in accordance with how the brain is biologically programmed to learn. It is concentrated on fully appreciating how the brain functions and using that understanding to enhance learning ability. When used in mathematics training, brain-based learning may have two notable effects on students and the learning process. Firstly students comprehend the concept of how learning occurs because they actively participate in the learning process. Secondly they realize that learning depends on their capacity to channelize their knowledge rather than focusing on grades they get in their exams.

The brain-based learning programme in mathematics teaching has been taken into consideration by researchers in an effort to draw out issues with understanding mathematics and to have joyful learning in a fear-free environment. This programme may aid students in improving achievement and retention in mathematics, and ultimately, the educational process will become enjoyable and interesting to reach mastery level in mathematics. Success in mathematics is central to a good education. The better educated a society, the more successful the society.

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STATEMENT OF PROBLEM

"Brain based learning programme for enhancing students' academic achievement and retention in mathematics"

Hypothesis

1. There will be no significant difference in academic achievement in mathematics of 9th class students taught through Brain Based Learning Programme and Conventional Method.
2. There will be no significant difference between post test scores and retention test scores of achievement in mathematics of experimental group.

Methodology

In the present study, pre-test-post-test experimental and control group design was used. There was one experimental group and one control group. There were 20 students in each group. The groups were assessed before and after the treatment. The treatment was given to Experimental group according to brain based learning programme and control group according to conventional method of teaching respectively for 16 sessions of 40 minutes each.

Tools Used

- An Achievement Test in Mathematics for 9th Class.
- Lesson Plans based on Brain Based Learning Programme.

SAMPLE OF STUDY

The sample of 40 students studying in IX class was selected by random sampling technique from a CBSE school located in Fazilka district, Punjab.

PROCEDURE OF DATA COLLECTION

In the first phase after selecting the sample for experimental and control group, Mathematics Achievement Test was taken. The groups were matched on the basis of pre-test scores.

In the second phase self made Lesson Plans of subject mathematics, based on the principles of Brain Based Learning Programme and Conventional Method was taught to the experimental group and control group respectively for 16 sessions.

In the third phase investigator re-administered the achievement test to see the effect of Brain Based Learning Programme. This will provide the scores of post-test.
In the fourth phase after a gap of two months investigator re-administered the achievement test to see the retention effect.

DATA ANALYSIS AND RESULTS

Table 1. Matching of Experimental Group (Group taught through Brain Based Learning Programme) and Control Group (Group taught through Conventional Method) on the basis of Academic Achievement (Pre-Test) in Mathematics

Groups	N	Mean	S.D.	SEM	t-value	p-value
Control Group / Traditional Method	20	29.75	7.025	1.571	0.169	0.867
Experimental Group / Brain Based Learning Programme	20	29.40	6.073	1.358		

N.S. means non-significant

Table 1. and Histograms shown in Figure 1 reveals that mean scores of the control group in Mathematics Academic Achievement pre test is 29.75 and standard deviation for the same is 7.025 whereas mean scores of the experimental group in Mathematics Academic Achievement pre test is 29.40 and standard deviation for the same is 6.073. The t-value came out to be 0.169 and p-value came out to be 0.867 which is non-significant at 0.05 level of significance. So there exists no significant difference in both the groups with respect to Academic Achievement (Pre-test) in Mathematics and both the groups were thus matched on the basis of Academic Achievement.

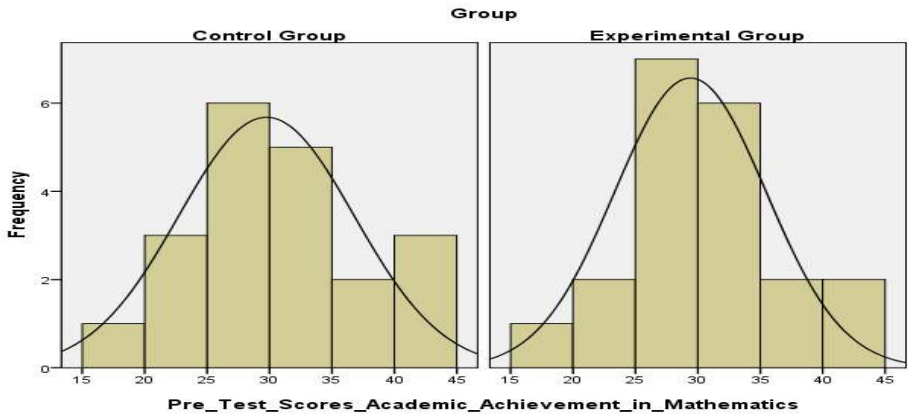

Figure 1 : Histogram showing Pre Test Scores of Academic Achievement in Mathematics for Control Group and Experimental Group

The relative effectiveness of two methods of teaching mathematics i.e. Brain Based Learning Programme and Conventional Method of teaching mathematics in terms of academic achievement in mathematics was determined on the basis of gain scores (the difference in post-test scores and pre-test scores) and also retention in mathematics was determined on the basis of scores (the difference in delayed post-test scores and post-test scores). Appropriate statistical techniques were employed to test various hypotheses pertaining to the study.

H.1 There will be no significant difference between academic achievement in mathematics of IX grade students taught through Brain Based Learning Programme and Conventional Method.

To find out the significance of difference in the academic achievement in mathematics of class IX students taught through Brain Based Learning Programme and Conventional method, t-test was employed on gain scores (= Post-test scores - Pre-test scores).

The summary of t-test employed on the gain scores of academic achievement of class IX students taught through Brain Based Learning Programme and Conventional Method is presented in Table 2.

Table 2. Showing t-test on Gain Scores of Academic Achievement in Mathematics of class IX Students taught through Brain Based Learning Programme and Conventional Method

Groups	N	Mean	S.D.	SEM	t-value	p-value
Control Group / Conventional Method	20	6.55	2.605	0.583	17.405	0.00
Experimental Group/Brain Based Learning Programme	20	20.70	2.536	0.567		

Table 2. and Boxplot shown in Figure 2. reveals that mean gain scores of the control group in Mathematics Academic Achievement is 6.55 and standard deviation for the same is 2.605 whereas mean gain scores of the experimental group in Mathematics Academic Achievement is 20.70 and standard deviation for the same is 2.536. The t-value came out to be 17.405 and p-value came out to be 0.0 which is significant at 0.05 level of significance. So there exists significant difference in both the groups with respect to Academic Achievement in Mathematics. Hence hypothesis stating "There will be no significant difference between academic achievement in mathematics of IX grade students taught through Brain Based Learning Programme and Conventional Method." is rejected. Students taught through Brain Based Learning Programme achieved higher than the students taught through Conventional Method. The above result is also matched with the findings of Awolola and Adejare (2011), Le Roux (2015), Godse (2016), Sumantri and Asriyadin (2017), Widiasih and Suparta (2018).

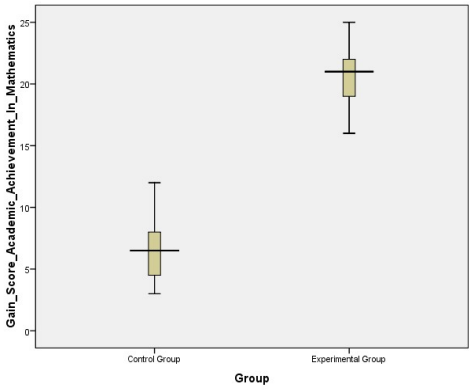

Figure 2. : Boxplot showing Gain Scores of Academic Achievement in Mathematics for Control Group and Experimental Group

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H.2 There will be no significant difference between post test scores and retention test scores of achievement in mathematics in experimental group.
To find out the significance of difference between post test and retention test of achievement in mathematics of class IX students taught through Brain Based Learning Programme, t-test was employed on the Post-test scores & retention test scores.
The summary of t-test applied on the scores of mathematics academic achievement of class 9th students taught with Brain Based Learning Programme presented in Table 3

Table 3. Showing t-test on post test scores and retention test scores of achievement in mathematics of experimental group

Groups	N	Mean	S.D.	SEM	t-value	p-value
Post Test Experimental Group	**20**	**50.10**	**6.820**	**1.525**	**0.880**	**0.384**
Retention Test Experimental Group	**20**	**48.30**	**6.097**	**1.363**		

Table 3. and Boxplot shown in figure 3 reveals that mean scores of the post test of achievement in mathematics of experimental group is 50.10 and standard deviation for the same is 6.820 whereas mean scores of the experimental group in retention test in Mathematics is 48.30 and standard deviation for the same is 6.097. The t-value came out to be 0.880 and p-value came out to be 0.384 which is insignificant at 0.05 level of significance. This means that there exists no significant difference in the performance of experimental group at the post test level and retention test level. Hence hypothesis 2 stating There will be no significant difference between post test scores and retention test scores of achievement in mathematics in experimental group is accepted.

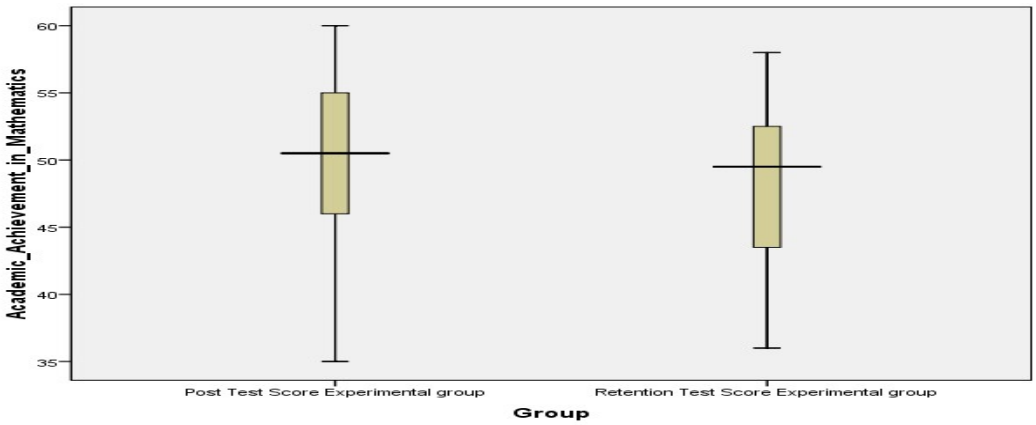

Figure 3 : Boxplot showing Post test Scores and Retention Test Scores of experimental group in Mathematics

CONCLUSION

The embodiment of the study showed that Brain based learning programme has drawn great impact in increasing academic achievement and retention in mathematics of students. It is concluded that teaching and learning need to be done in threat free and challenging environment. It is also significant to note that students' confidence to ask questions and share their thoughts improved while being taught using a brain-based learning approach. Instead of just memorising the subject, this may have helped the pupils understand it and build their critical thinking skills. Due to all of these factors, brain-based learning is an effective teaching method based on neurological patterns for getting the necessary results from students in the most efficient manner. Hence, by utilising a brain-based learning programme, educators may enhance their instruction, students can enhance their academic performance by externalising their knowledge, and eventually, society may benefit the most.

REFERENCES

- Adiansha, A. A., Sumantri, M. S., & Asriyadin. (2017). The effect of brain based learning model and creative thinking on the ability of mathematics concept of elementary students. American Journal of Educational Research, 5(12), 1195-1199. doi:10.12691/education-5-12-4
- Akyurek, E., & Afacan, O. (2013). Effects of brain-based learning approach on students' motivation and attitudes levels in science class. Mevlana International Journal of Education, 3(1), 104-119. doi:10.13054/mije.13.08.3.1
- Al-Balushi, K. A., & Al-Balushi, S. M. (2018). Effectiveness of brain-based learning for grade eight students' direct and postponed retention in science. International Journal of Instruction, 11(3), 525-538. doi:10.12973/iji.2018.11336a
- Altiti, M. (2014). The impact of a brain-based teaching program on imporing the achievement of 5th grade students in sciences. Journal of Islamie University, 22(1).
- Caine, R. N. & Caine, G. (2003). 12 Brain / mind learning principles in action. The fieldbook for making connections, teaching and the human brain. Corwin Press, USA.
- Callaman, R. A., & Itaas, E. C. (2020). Students' mathematics achievement in Mindanao context: A meta-analysis. Journal of Research and Advances in Mathematics Education, 5(2), 148-159. https://doi.org/10.23917/jramathedu.v5i2.10282
- Canbulat, T., & Kucukkaragoz, H. (2014). The effects of the brain based learning approach on 5th grade students academic achievement and academic selfesteem in social studies. The Western Anatolia Journal of Educational Sciences, 5(9), 13-45. Retrieved from http://dergipark.gov.tr /baebd/issue/3334/46209
- Ezenweani, U. L. (2006). Mathematics and classroom teaching. University Printing Press
- McLaren, B. M., Adams, D. M., Mayer, R. E., & Forlizzi, J. (2017). A computer-based game that promotes mathematics learning more than a conventional approach. International Journal of Game-Based Learning, 7(1), 36–56.
- Mekarina, M., & Ningsih, Y. P. (2017). The effects of brain based learning approach on motivation and students achievement in mathematics learning. Journal of Physics: Conference Series, 895, 012057. doi:10.1088/1742-6596/895/1/012057
- Moghaddam, A. N. & Araghi, S. M. (2013). Brain-based aspects of cognitive learning approaches in second language learning. English Language Teaching, 6(5), 55-61. Retrieved from https://files.eric.ed.gov/fulltext/EJ1076997.pdf

- Noureen, G., Awan, R. N., & Fatima, H. (2017). Effect of brain-based learning on academic achievement of VII graders in Mathematics. Journal of Elementary Education, 27(2), 85-97. Retrieved from https://www.researchgate.net/publication/326224183
- Pociask, A., & Settles, J. (2007). Increasing student achievement through brain-based strategies, (Unpublished master thesis). Saint Xavier University, Chicago, Illinois. Retrieved from https://files.eric.ed.gov/fulltext/ED496097.pdf
- Suarsana, I. M., Widiasih, N. P., & Suparta, I. N. (2017). The effect of brain based learning on second grade junior students' mathematics conceptual understanding on polyhedron. Journal on Mathematics Education, 9(1), 146-156. doi:10.22342/ jme.9.1.5005.145-156
- Tafti, M. A., & Kadkhodaie, M. S. (2016). The effects of brain-based training on the learning and retention of life skills in adolescents. International Journal of Behavioral Sciences, 10(4), 140-144. Retrieved from http://journals.bmsu.ac.ir/jbs/ index.php/jbs/article/view/660
- Tella, A. (2008). Teacher variables as predictors of academic achievement of primary school pupils' mathematics. International Electronic Journal of Elementary Education, 1(1), 16-33. https://doi.org/10.4314/ifep.v16i2.23806
- Zaydeh, H. A., & Al Astal, I. H. (2014). The effectiveness of brain-based learning with using computerized applications on the multiple intelligences of children living under stressful conditions in Gaza. International Journal of Computer Applications, 101 (16), 1-5. doi:10.5120/17768-7391