AN EXPERIMENTAL STUDY ON THE INFLUENCE OF YOGA BASED EXERCISES FOR ENHANCING THE ACADEMIC PERFORMANCE OF SECONDARY CLASS STUDENTS IN MATHEMATICS

M. Maureen Gomez* & Dr. A. Balu**
*Ph.D. Scholar (Reg. No. R20161751),
Department of Education, Alagappa University, Karaikudi, Tamilnadu.
**Research Supervisor and Principal I/c,
Alagappa University College of Education, Karaikudi, Tamilnadu.

ABSTRACT
This research article focuses its attention on the influence of yoga based exercises on the academic performance of secondary class students in mathematics. For this, the investigator adopted experimental method of research. The investigator formed two equated groups, i.e., one control group and another for experimental group. Each group comprises of 30 students among which 8 are low, 13 are average and 9 are high achievers. The control group students were taught using traditional method of teaching and the experimental group students are taught the same syllabus with additional training on yoga based exercises. The investigator used only five yoga based exercises namely Padmasana with deep breathing technique, Sarvangasana, Paschimottanasana, Padahastasana and Halasana. From measuring the academic performance in mathematics, the investigator prepared an achievement test conprises of 100 questions covering five mathematical skills namely, Reasoning Skill, Numerical Oral Skill, Trigonometry Skill, Analytical Skill and Geometrical Skill. Mean, Standard Deviation and 't' test were used to analyze the data. The findings revealed that the experimental group students are found better in their academic performance in mathematics than their counterparts in control group.

Keywords: *Yoga Based Exercises, Academic Performance, Mathematics, Secondary Class Students.*

INTRODUCTION

Education is an important human activity, which starts from the birth of human race, and it will continue to function as long as the human race lives. The boundaries of the education are as wide as those lives. It's implications are varied. It implies that life is the object of education (Aggarwal, J.C., 1986). It should include all the factors that can develop the physical, mental, moral, cultural and spiritual aspects of human beings. Among all the aspects, there is an important aspect, i.e., academic development of human beings which helps them to be a successful man in the future.

Since mathematics is the queen of all sciences, it held a very honourable place in the curriculum at all levels of education only because of its importance and application in the development of science and technology (Courant, Richard and Robbins, Herbert, 1941). Hence, Mathematics has played an unique charm and glamour to the scientists and educationists in the search of scientific facts and figures.

The subject - mathematics - has the possibility to develop scientific as well as social progress to the recent trends. It is inevitable in the human race. Mathematics is an organized and systematized branch of science. It deals with problems solving methods. It is a study of shapes (Frank K. Lester, 2007). Hence, mathematics is defined as the science of quantity and measurement. Most of the students are find mathematics as a difficult one to learn. The

reasons may vary and depends upon the method of teaching, lack of concentration during the learning the subject, vagueness of the curriculum and so on.

YOGA

Yoga is a physical and spiritual practice originating in India. It is accessible to beginners, and most people can reap the health benefits of regularly practicing yoga. Yoga poses focus on developing a connection between the body and the breath. In addition to reducing stress levels, consistent yoga practice can improve a person's flexibility, strength, and balance.

Yoga is an ancient practice that involves physical poses, concentration, and deep breathing. A regular yoga practice can promote endurance, strength, calmness, flexibility, and well-being. Yoga is now a popular form of exercise around the world. Researchers have conducted many studies that focus on the health benefits of yoga based exercises. Some potential health benefits include maintaining a moderate weight, quitting smoking, and improving menopause symptoms. Although some advanced yoga based exercises may look intimidating, many are suitable for beginners. Most people start practicing yoga.

Benefits of Yoga

Yoga has many physical and mental benefits, as they below:

- building muscle strength
- enhancing flexibility
- promoting better breathing
- supporting heart health
- helping with treatment for addiction
- reducing stress, anxiety, depression, and chronic pain
- improving sleep
- enhancing overall well-being and quality of life (Bhole. M.V. *et al.,* 1972).

YOGA BASED EXERCISES

In the present study, the investigator took only five yoga based exercises (asanas) that promotes concentration of the students during learning the subject mathematics. They are Padmasana with deep breathing technique, Sarvangasana, Paschimottanasana, Padahastasana and Halasana (Krishna A. 2017). The procedure for doing these exercises (asanas) are described as follows:

1. Padmasana

Padmasana is a simple posture that reduces muscle tension and calms the mind. This asana makes more mindful and improves brain functioning. It also relaxes the people's body and mind. The students should start by sitting down on the floor with their back straight and legs extended in front of them. Now, they should bend their left knee and place their left toes on their right thigh. They should bend their right knee and place the right toes on their left thigh. The soles of their feet should face upward. They should keep their palms on their knees and close their eyes. After that, they should take deep breaths.

During breathing, the students can close their right nostril with their right thumb and inhale the air very slowly through their left nostril. Then with the little and ring fingers of their right hands close their left nostril. Retain breath as long as the students can. Then exhale very slowly after removing their fingers. This constitutes one cycle. Again, the students should inhale through their right nostril, retain the breath and exhale through their left nostril. This ends for one cycle. The students can do 20 cycles in the morning and 20 cycles in the evening.

2. Sarvangasana

Sarvangasana improves focus and concentration of the students. As per the yoga, sarvangasana engages all the chakras and organs of the students. It is one of the oldest and most therapeutic yoga poses. It nourishes their brain and keeps it healthy. The students should start by lying down on the floor on their back and keep their feet together and their hands on the sides. Now, they should raise their feet up until it is at a 90° angle with the body. They should bend their elbows and place their palms under their waists, lifting the waist and taking the legs further. Their legs and body should be in a straight line, and hold this position for couple of minutes and then return to the original position.

3. Paschimottanasana

Paschimottanasana is one of the best poses to increase concentration. It calms the mind and improves the memory of the students. This asana is good for the sympathetic nervous system. It also cures headaches. The students should sit down on the floor with their legs extended forward and their hands on the side. Their back should be straight and feet should be together. Now, they should lift their arms up and bend forward from their hips. They should bend until their head touches their knees and their chests are on their thighs. They should try to touch their toes. They should hold this position for a couple of minutes and return to the original position.

4. Padahastasana

Padahastasana energizes the nervous system. It also improves the blood flow to the brain, improving the memory and brain power. The students should stand straight with their hands on the side and feet together. Now, they should lift up their hands and bend forward from the hips. They should try to place their palms under their feet. They should hold this position for about a minute and return to the original position.

5. Halasana

Halasana reduces stress and calms the mind. It is a great pose for the nervous system. The students should begin by lying down on the floor on their back with their feet together and their hands on the side. Now, they should raise their legs until it is at a 90° angle with their body. They should bend their elbows and place their palms under their waist. With this support, they should raise their legs further and bring it over their head for a 180° angle. They should touch their toes on the floor, and hold this position for a couple of seconds and return to the original position.

NEED AND SIGNIFICANCE OF THE STUDY

Several studies revealed varied internal as well as external factors that may cause number of problems in learning the subject - mathematics. The parents often find fault with the teachers teaching mathematics for the poor performance of their wards. Moreover, the personal guidance needed for learning mathematics is not available for most of the students who really aspire for a better performance.

However, it is obvious that the learner is the only responsible for his inability to learn the subject mathematics. The prime concern is that the lack of concentration or attention on the part of the learner in learning the mathematical concepts. The bundle of mathematical skills cannot just be mastered by means of passive learning. There may be required an active participation in learn those skills, the ability to grasp the teachers' instructions, the ability to remember, retrieve as and when the needs arise, and applying the learnt skills, the spirit of challenge to face the new problems etc.

The failure on the part of the learner to maintain a solid mind, clear thinking and direction are the major causes for not being competent. In short, the lack of solid mind, unambiguous thinking and poor concentration are the reasons for not being successful in learning mathematics. Therefore, the investigator would like to develop a booster programme comprises of a series of yoga based exercises that may tune up the younger generation by improving their concentration. The investigator also believes that by implementing the booster programme may certainly develop the required mathematical skills among the learners. The present central government instructs the education department of all over the country incorporating the yoga based exercises in the school curriculum. Thus it has prompted the investigator to take up an experimental study to study the effect of booster programme on the academic performance of secondary class students in mathematics.

TITLE OF THE STUDY

AN EXPERIMENTAL STUDY ON THE INFLUENCE OF YOGA BASED EXERCISES FOR ENHANCING THE ACADEMIC PERFORMANCE OF SECONDARY CLASS STUDENTS IN MATHEMATICS

DEFINITION OF THE KEY TERMS

Yoga Based Exercises

By 'Yoga Based Exercises', the investigator means the physical exercises developed by yogic experts that may promote physical and mental stamina of the performers of the exercises. In the present study, the investigator refers only five yoga based exercises such as Padmasana with deep breathing technique, Sarvangasana, Paschimottanasana, Padahastasana and Halasana.

Academic Performance in Mathematics

By this, the investigator means the marks obtained on the tests comprising the different mathematical skills to be prepared and validated by the investigator.

Secondary Class Students

By 'Secondary Class Students', the investigator means the student studying standards IX and X in the high schools and higher secondary schools in Ramanathapuram District.

OBJECTIVES

1. There is no significant difference between the mean gain scores of control group and experimental group students in their academic performance in mathematics.
2. There is no significant difference between the mean gain scores of control group and experimental group low achieving students in their academic performance in mathematics.
3. There is no significant difference between the mean gain scores of control group and experimental group average achieving students in their academic performance in mathematics.
4. There is no significant difference between the mean gain scores of control group and experimental group high achieving students in their academic performance in mathematics.

METHOD AND PROCEDURE

The investigator adopted experimental method of research. She formed two equated groups, i.e., one control group and another for experimental group. Each group comprises of 30 students among which 8 are low, 13 are average and 9 are high achievers. The control group students were taught using traditional method of teaching and the experimental group students are taught the same syllabus with additional training on yoga based exercises. The investigator used only five yoga based exercises namely Padmasana with deep breathing technique, Sarvangasana, Paschimottanasana, Padahastasana and Halasana. From measuring the academic performance in mathematics, the investigator prepared an achievement test conprises of 100 questions covering five mathematical skills namely, Reasoning Skill, Numerical Oral Skill, Trigonometry Skill, Analytical Skill and Geometrical Skill. Mean, Standard Deviation and 't' test were used to analyze the data.

ANALYSIS AND FINDINGS

1. There is no significant difference between the mean gain scores of control group and experimental group students in their academic performance in mathematics.

Table - 1: Difference between the Mean Gain Scores of Control Group and Experimental Group Students in their Academic Performance in Mathematics

Skills	Group	N	Mean	SD	Calculated 't' Value	Table Value	Remark
Reasoning	Control	30	8.30	2.70	7.99	2.00	S
	Experiment	30	13.33	2.14			
Numerical	Control	30	8.30	2.80	10.72	2.00	S
	Experiment	30	14.40	1.38			
Trigonometry	Control	30	8.57	2.71	8.19	2.00	S
	Experiment	30	13.47	1.84			

Skills	Group	N	Mean	SD	Calculated 't' Value	Table Value	Remark
Analytical	Control	30	7.80	2.79	10.73	2.00	S
	Experiment	30	14.03	1.53			
Geometrical	Control	30	7.93	2.43	11.56	2.00	S
	Experiment	30	14.63	2.04			
Total	Control	30	40.90	13.93	9.76	2.00	S
	Experiment	30	69.87	8.38			

From the above table, it is found that the calculated 't' values are greater than the table value at 5% level of significance, the null hypothesis is rejected. Hence, there is significant difference between the mean gain scores of control group and experimental group students in their academic performance in mathematics. While comparing the scores, the gain scores of experimental group students are better performance than their counterparts.

2. There is no significant difference between the mean gain scores of control group and experimental group low achieving students in their academic performance in mathematics.

Table - 2: Difference between the Mean Gain Scores of Control Group and Experimental Group Low Achieving Students in their Academic Performance in Mathematics

Skills	Group	N	Mean	SD	Calculated 't' Value	Table Value	Remark
Reasoning	Control	8	5.75	1.25	8.90	2.15	S
	Experiment	8	10.88	1.04			
Numerical	Control	8	5.25	1.39	8.67	2.15	S
	Experiment	8	12.25	1.81			
Trigonometry	Control	8	6.50	0.93	6.35	2.15	S
	Experiment	8	11.88	2.21			
Analytical	Control	8	5.38	1.19	11.93	2.15	S
	Experiment	8	13.75	1.59			
Geometrical	Control	8	5.50	0.32	8.60	2.15	S
	Experiment	8	11.63	1.99			
Total	Control	8	28.38	0.68	15.07	2.15	S
	Experiment	8	60.38	5.97			

From the above table, it is found that the calculated 't' values are greater than the table value at 5% level of significance, the null hypothesis is rejected. Hence, there is significant difference between the mean gain scores of control group and experimental group low achieving students in their academic performance in mathematics. While comparing the scores, the gain scores of experimental group low achieving students are better than their counterparts.

3. There is no significant difference between the mean gain scores of control group and experimental group average achieving students in their academic performance in mathematics.

Table - 3: Difference between the Mean Gain Scores of Control Group and Experimental Group Average Achieving Students in their Academic Performance in Mathematics

Skills	Group	N	Mean	SD	Calculated 't' Value	Table Value	Remark
Reasoning	Control	13	7.00	0.46	10.93	2.06	S
	Experiment	13	13.00	1.93			
Numerical	Control	13	7.38	0.38	23.07	2.06	S
	Experiment	13	15.08	1.14			
Trigonometry	Control	13	6.85	0.36	12.13	2.06	S
	Experiment	13	13.46	1.93			
Analytical	Control	13	6.38	0.79	29.86	2.06	S
	Experiment	13	13.54	0.34			
Geometrical	Control	13	6.77	0.52	64.83	2.06	S
	Experiment	13	16.31	0.09			
Total	Control	13	34.38	2.26	20.78	2.06	S
	Experiment	13	71.38	6.01			

From the above table, it is found that the calculated 't' values are greater than the table value at 5% level of significance, the null hypothesis is rejected. Hence, there is significant difference between the mean gain scores of control group and experimental group average achieving students in their academic performance in mathematics. While comparing the scores, the gain scores of experimental group average achieving students are better performance than their counterparts.

4. There is no significant difference between the mean gain scores of control group and experimental group high achieving students in their academic performance in mathematics.

Table - 4: Difference between the Mean Gain Scores of Control Group and Experimental Group High Achieving Students in their Academic Performance in Mathematics

Skills	Group	N	Mean	SD	Calculated 't' Value	Table Value	Remark
Reasoning	Control	9	12.78	0.85	11.17	2.12	S
	Experiment	9	16.00	0.18			
Numerical	Control	9	12.22	1.58	5.91	2.12	S
	Experiment	9	15.33	0.06			
Trigonometry	Control	9	13.00	0.41	10.82	2.12	S
	Experiment	9	14.89	0.33			
Analytical	Control	9	12.11	1.36	3.17	2.12	S
	Experiment	9	15.00	2.37			
Geometrical	Control	9	11.78	0.77	6.13	2.12	S
	Experiment	9	14.89	1.31			
Total	Control	9	61.89	3.64	6.09	2.12	S
	Experiment	9	76.11	5.98			

From the above table, it is found that the calculated 't' values are greater than the table value at 5% level of significance, the null hypothesis is rejected. Hence, there is significant difference between the mean gain scores of control group and experimental group high achieving students in their academic performance in mathematics. While comparing the scores, the gain scores of experimental group high achieving students are better performance than their counterparts.

CONCLUSION

From the findings of the present investigation, it is concluded that the experimental group students are found better in their academic performance in mathematics than their counterparts in control group. The reason is obvious that the experimentation process may have a significant influence on the development of certain concentration among the students of the experimental group in their mathematical learning due to periodical performance of the chosen yoga based exercises. So, the chosen variable - yoga based exercises - has its own significant impact on the development of academic performance in mathematics during the experimental period. Hence, it is the liability of the educational administrators, teachers and the parents to put forth their timeless efforts by providing these yoga based exercises to the younger generation for strengthening their concentration skill to make their learning more and more meaningful.

REFERENCES

1. Aggarwal, J.C 1986. The Progress of Education in Free India. New Delhi: Arya book Depot.
2. Courant, Richard and Robbins, Herbert. 1941. What is Mathematics? New York: Oxford University Press.
3. Frank K. Lester. 2007. Second Handbook of Research on Mathematics Teaching and Learning. New York: Information Age Publishing Inc.
4. Bhole. M.V. *et al.*, 1972. Effect of Yoga training on vital capacity and breath holding time. Yoga Mimas XIV: 3 and 4.
5. Krishna A. 2017. Effect of Selected Physical Exercise and Yogic Exercises on Physiological variables among the School Boys. Unpublished Ph.D. Dissertation.