

## CERTIFICATE

This is to certify that the thesis, entitled “**Effectiveness of Vedic Mathematics - Based Instruction on Achievement in Mathematics and Attitude Towards Learning Mathematics Among Primary and Upper Primary Students.**” submitted to Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for the award of **Doctor of Philosophy in Education** is a record of original research work done by **Mrs. Yogeshwari. S** during the period of her study under my supervision and guidance and the thesis has not formed the basis for the award of any Degree/Diploma/Associateship/Fellowship or other title in any other University or Institution of Higher Learning.



**Signature of the  
Head of the Department**



**Signature of the Supervisor**



**Signature of the Dean**

---

## DECLARATION

I hereby declare that the thesis, entitled “**Effectiveness of Vedic Mathematics-Based Instruction on Achievement in Mathematics and Attitude Towards Learning Mathematics Among Primary and Upper Primary Students.**” submitted to the Avinashilingam Institute for Home Science and Higher Education for Women Coimbatore, in partial fulfillment of the requirements for the award of the degree of **Doctor of Philosophy in Education** is a record of work carried out by me during the period of my study under the Supervision and Guidance of **Dr. H. Indu** Professor & Dean, School of Education, Avinashilingam Institute of Home Science and Higher Education for Women, Coimbatore. This work has not formed the basis for awarding any Degree, Diploma, Associateship, Fellowship, or other titles in this Institute or any other University or Institution of Higher Learning. It represents entirely independent work on the part of the candidate.



**Signature of the Supervisor**



**Signature of the Research Scholar**

## ACKNOWLEDGEMENT

This research work would not have been possible without the help of several individuals who in one way or another contributed and extended their valuable assistance in the preparation and completion of the study, it is a pleasure for the investigator to thank those who made it possible.

The investigator wishes to acknowledge with deep appreciation to the visionary founder and the first Chancellor of this sanctuary of knowledge **Late Padma Bhushan, Dr. T. S. Avinashilingam Ayya Avargal**, and to the **Late Padmasri Dr. (Smt.) Rajammal P. Devadas**, Former Chancellor of the University, an exceptional administrator, a profound thinker, and philosopher who brought the vision to our lives.

With utmost reverence, the investigator expresses her gratitude to the Chancellor **Dr. T. S. K. Meenakshisundaram**, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for granting permission to take up the programme offered by this prestigious institute.

The investigator expresses her sincere thanks to **Dr. (Mrs.) V. Bharathi Harishankar**, Vice Chancellor, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for all her support rendered for this study.

The investigator expresses her sincere gratitude to the Registrar (i/c) **Dr. H. Indu** of Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for granting the chance to pursue doctoral research in the field of Education.

The investigator offers her sincere thanks to **Dr. K.Sambathrani**, Controller of Examinations for her kind support and encouragement.

The investigator places on record profound thanks to **Dr. P. Lalitha**, Director, Research & Development, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for providing all the guidance step by step to carry out the research work in the realm of Education.

The investigator is grateful to **Dr. R. Vaijyanthi**, Head of the Department of Education, for providing with the studentship and resources that allowed to complete this research.

The investigator is thankful beyond words to her supervisor **Dr. H.Indu**, Professor & Dean, School of Education, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for her time, effort, and understanding in helping the investigator in her studies. Her vast wisdom and wealth of experience have inspired the investigator throughout the study. This experience has enriched the investigator's understanding of the research domain. Her encouragement and suggestions have been a great source of inspiration and owe a debt of gratitude to her for the tireless commitment and insightful feedback that enriched the investigator's research journey.

The investigator extends her abundant thanks to her **Doctoral Committee expert Dr. S. Rajaguru**, Principal (Rtd), Sri Ramakrishna Mission Vidyalaya College of Education, Coimbatore, for his constant guidance and assistance throughout the study.

The investigator expresses her sincere thanks to the **Faculty Members** of the Department of Education, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore for their guidance throughout this research work. The researcher is extremely thankful to the **library team** of Avinashilingam Institute for their sincere support and advice throughout the study.

The investigator expresses her heartfelt thanks to the principals of Saint Mary's High School, Saint Mary's Primary School, and Saint Sebastian Matric High School, and all school students, who cooperated with this study and spent their valuable time on the intervention. She would like to express her sincere thanks to her family members, colleagues, and friends for their tireless support and assistance in the successful completion of the study.

**Yogeshwari. S**

## LIST OF TABLES

TABLE NO	TITLE	PAGE NO
2.1	Vedic mathematics sutras and sub-sutras	29
3.1	Break-up of the final sample selected for the study	91
3.2	The content validity ratio for the package.	100
3.3	Breakup of the content and the sutras used in VMPBMO	101
4.1	Summary of the descriptive statistics of the scores of achievement test on mathematics of the control group (VIII grade)	122
4.2	Summary of the descriptive statistics of the scores of attitude towards learning mathematics of the control group (VIII grade)	124
4.3	Summary of the descriptive statistics of achievement in mathematics of the experimental group (VIII grade)	126
4.4	Summary of the descriptive statistics of the scores of attitude towards learning mathematics of the experimental group (VIII grade)	128
4.5(a)	Correlation between achievement in mathematics and attitude towards learning mathematics of VIII grade students. (pre-test scores of experimental and control group)	130
4.5 (b)	Correlation between achievement in mathematics and attitude towards learning mathematics of VIII grade students. (post-test scores of experimental and control group)	131
4.6	Significance of difference in the mean pre-test scores of achievement and attitude towards learning mathematics of control and experimental group	133
4.7	Data and results of test of significance of difference in mean pre-test and post-test scores of achievement test and attitude test of control group	134
4.8	Data and results of test of significance of difference in mean post-test and delayed post-test scores of achievement test and attitude test of control group	136

<b>TABLE NO</b>	<b>TITLE</b>	<b>PAGE NO</b>
4.9	Data and results of test of significance of difference in mean pre-test and post-test scores of achievement test and attitude test of experimental group	138
4.10	Data and results of test of significance of difference in mean post-test and delayed post-test scores of achievement test and attitude test of experimental group	140
4.11	Test of significance of difference in the mean post-test scores of achievement test and attitude test of control and experimental group	142
4.12	Test of significance of difference in the mean post-test scores of achievement test and attitude test of control and experimental group for the subsample gender	143
4.13	Test of significance of difference in the mean post-test scores of achievement test and attitude test of control and experimental group for the subsample type of school	146
4.14	Descriptive statistics of the post-test score of achievement in mathematics for learning style.	148
4.15	Significance of difference in the mean achievement score of different learning style groups	148
4.16	Summary of the descriptive statistics of the scores of achievement test on mathematics of the control group (III grade)	149
4.17	Summary of the descriptive statistics of the scores of attitude towards learning mathematics of the control group (III grade)	151
4.18	Summary of the descriptive statistics of the scores of achievement test on mathematics of the experimental group (III grade)	154
4.19	Summary of the descriptive statistics of the scores of attitude towards learning mathematics of the experimental group (III grade)	156
4.20(a)	Correlation between pre-test scores achievement in mathematics and attitude towards learning mathematics of III grade students.	158

<b>TABLE NO</b>	<b>TITLE</b>	<b>PAGE NO</b>
4.20 (b)	Correlation between achievement in mathematics and attitude towards learning mathematics of III grade students. (post-test scores of experimental and control group)	160
4.21	Test of significance of difference in the mean pre-test scores of achievement and attitude towards learning mathematics of control and experimental group	161
4.22	Data and results of test of significance of difference in mean pre-test and post-test scores of achievement test and attitude test of control group	163
4.23	Data and results of test of significance of difference in mean post-test and delayed post-test scores of achievement and attitude of control group	165
4.24	Data and results of test of significance of difference in mean pre-test and post-test scores of achievement test and attitude test of experimental group	166
4.25	Data and results of test of significance of difference in mean post-test and delayed post-test scores of achievement and attitude of experimental group	168
4.26	Test of significance of difference in the mean post-test scores of achievement test and attitude test of control and experimental group	169
4.27	Test of significance of difference in the mean post-test scores of achievement test and attitude test of control and experimental group students based on gender	171
4.28	Test of significance of difference in the mean post-test scores of achievement test and attitude test of control and experimental group for the subsample gender	172
4.29	Test of significance of difference in the mean post-test scores of achievement test and attitude test of control and experimental group for the subsample type of school	174
4.30	Descriptive statistics of the post-test score of achievement in mathematics	176

<b>TABLE NO</b>	<b>TITLE</b>	<b>PAGE NO</b>
4.31	Significance of difference in the mean achievement score of different learning style groups	176
4.32	Classification of the students based on the computational speed of the control and experimental group of eighth and third grade.	177
4.33	Comparison of mean computation speed scores of control and experimental groups for the VIII and III grade students	178
4.34	Semi-structured interview on evaluating teacher perspectives on the effectiveness of Vedic mathematics-based instruction	180
4.35	Semi-structured interview on evaluating students perspectives on the effectiveness of Vedic mathematics-based instruction	182

## LIST OF FIGURES

<b>FIGURE NO</b>	<b>TITLE</b>	<b>PAGE NO</b>
2.1	Structure of attitudes tri-component model	35
2.2	Kolb's experiential learning model	38
2.3	Felder-silverman learning style model	41
3.1	Steps in the research process	86
3.2	Representation of conceptual framework	87
3.3	The details of eighth and third-grade samples	92
3.4	VMPBMO Vedic mathematics package for basic mathematical operations	98
4.1	Graphical representation of pre-test scores obtained for the achievement in mathematics of the control group	123
4.2	Graphical representation of post-test scores of achievement in mathematics of the control group	123
4.3	Histogram showing the pre-test scores of attitude of students towards learning mathematics of the control group	125
4.4	Graphical representation of post-test scores obtained as the attitude towards learning mathematics of the control group.	125
4.5	Graphical depiction of pre-test scores of achievement in mathematics of the experimental group	127
4.6	Graphical representation of post-test scores of achievement in mathematics of the experimental group	127
4.7	Graphical representation of pre-test scores of attitude towards learning mathematics of the experimental group	129
4.8	Graphical representation of post-test scores of attitude towards learning mathematics of the experimental group.	129
4.9	Correlation between post-test scores of achievement in mathematics and attitude towards learning mathematics of viii grade students	132

<b>FIGURE NO</b>	<b>TITLE</b>	<b>PAGE NO</b>
4.10	Difference in the mean pre-test and the post-test score of achievement and attitude of the control group.	135
4.11	Difference in the mean post-test and the delayed post-test score of achievement of the control group.	137
4.12	Difference in the mean pre-test and the post-test score of achievement and attitude of the experimental group.	139
4.13	Difference in the mean post-test and the delayed post-test score of attitude towards learning mathematics of the experimental group.	141
4.14	Graphical representation of difference in the mean score of achievement in mathematics of control and experimental group for the sub-sample classified based on gender	145
4.15	Graphical representation of the difference in the mean score of attitude towards learning mathematics of control and experimental group for the sub-sample –govt.-aided school.	147
4.16	Graphical representation of pre-test scores of achievement in mathematics of the control group	150
4.17	Graphical representation of post-test scores of achievement in mathematics of the control group	151
4.18	Graphical representation of pre-test scores of attitude towards learning mathematics of the control group	152
4.19	Graphical representation of post-test scores of attitude towards learning mathematics of the control group.	153
4.20	Graphical representation of pre-test scores of achievement in mathematics of the experimental group	155
4.21	Graphical representation of post-test scores of achievement in mathematics of the experimental group	155
4.22	Graphical representation of pre-test scores of attitude towards learning mathematics of the experimental group	157
4.23	Graphical representation of post-test scores of attitude towards learning mathematics of the experimental group.	157

<b>FIGURE NO</b>	<b>TITLE</b>	<b>PAGE NO</b>
4.24	Graphical representation of the correlation between attitude towards learning mathematics and achievement in mathematics of iii grade students	159
4.25	Correlation between post-test scores of achievement in mathematics and attitude towards learning mathematics of iii grade students	161
4.26	Difference in the mean pre-test and the post-test score of achievement in mathematics and attitude towards learning mathematics of the control group.	164
4.27	Difference in the mean pre-test and the post-test score of achievement in mathematics and attitude towards learning mathematics of the experimental group.	167
4.28	Graphical representation of the difference in the mean post-test scores of achievement in mathematics and attitude towards mathematics learning of control group and experimental group.	170
4.29	Graphical representation of difference in the mean score of achievement in mathematics of control and experimental group for the sub sample classified based on gender.	173
4.30	Graphical representation of difference in the mean post-test score of achievement in mathematics and attitude towards learning mathematics of control and experimental group for the sub sample –govt.-aided school.	175

## LIST OF APPENDICES

APPENDIX NO	TITLE
I	Permission letter from IHEC, Avinashilingam Institute
II	Permission letter from CEO, The Nilgiris
III	Item analysis of draft tools
IV	A. Previous knowledge test on Mathematics for grade VIII B. Achievement test on Vedic Mathematics for grade VIII C. Attitude scale in mathematics for grade VIII D. Learning style inventory for eighth and third-grade students E. Previous knowledge test on Mathematics for grade III F. Achievement test on Vedic Mathematics for grade III G. Attitude scale in mathematics for grade III
V	Vedic mathematics package for basic mathematical operations (VMPBMO)
VI	Plagiarism Report