Influence of Home Environment on Academic Achievement in Mathematics

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Abstract: *This paper attempts to study the effect of home environment on the academic achievement in Mathematics of 10th standard students. This study was conducted for a sample of 1007 students belongs to two districts of Taminadu, to identify the influence of home environment that can affect students achievement. The researcher have tabulated certain data obtained from the test conducted, and suitable analysis were carried out on the same using descriptive and inferential statistics. This study reveals a positive correlation between the home environment and academic achievement of the students towards mathematics.*

Keywords: *Home Environment, Academic Achievement, Mathematics*

I. Introduction

Mathematics is a universal part of human culture. The world is becoming more and more competitive. Quality of performance has become the key factor for personal progress. Parents desire that their children climb the ladder of performance to as high a level as possible. For poor performance of students in schools, many factors such as lack of facilities in school, lack of teachers, indiscipline unfavourable home environment, low intelligence, anxiety and students' need to achieve have been found as being the causes (Cantu, 1975; Maundu, 1980; and Ndirangu, 2007).

Home environment was found to be an important factor in determining academic performance of students. From the beginning, parents have been the major persons involved in raising children in every society. That is why the family is recognized as an important agent of socialization. Adekeyi (2002) observed that it is mainly through their efforts and abilities that children are socialized to become productive citizens. So, wherever parents possess the resources and skills; and apply them effectively and joyfully in raising their children, the entire society benefits. This brings joy and pride to the nation, and encourages development and peaceful co-existence. The children themselves feel good and bring happiness to their parents and the whole community.

The home is the first place of learning for the child. The quality of home environment goes a long way in determining the eventual personality and achievement of the child. Psychologists had classified the factors that affect learning into two broad categories namely, nature and nurture. It has been discovered that the two categories play complementary roles. As nature determines the level of intelligence and inherited abilities of the child, nurture helps to maximize these innate abilities. According to Ekinne (2002), nurture involves the home, the school, the environment and peer groups to which the learner belongs. The home has far reaching influence on the child. Babara (1982) said that the child home environment influences attainment at school. Also, Touray (1982) suggested that the home environmental variables could be manipulated to enhance students' academic performance.

The home has an important influence on the child's academic achievement. What the child learns at home and how his family motivates him towards education contributes to the child's success in school, (Essien, 2002). The home as an educational environment is considered as the social psychological contexts or determinants of learning. The term home environment refers to all the objects, forces, and conditions in the home which influence the child physically, intellectually and emotionally (Muola, 2010).

II. Objectives Of The Study

The objective of the study is to identify the influence of home environment on the academic achievement of students of standard 10 in Mathematics with the help of Home Environment Inventory for Mathematics (HEIM) questionnaire, because of the need and importance of Mathematics in all fields of science and technology.

III. Method Of The Study

The plan of study involved the use of Home Environment Inventory for Mathematics (HEIM) questionnaire, as the tool, to collect data in order to test the hypotheses generated in the study. The target population for this study was made up of students of standard X in Chennai and Thiruvallur District. Eleven schools of different management types like corporation, government, government-aided and matriculation were chosen randomly from two districts and 1007 students of both sexes were tested (as samples) with the home environment inventory questionnaire, which was used for the study. The questionnaire consists of statements mainly based on parental support in every aspect of home environment of students. The dimensions covered under this questionnaire were physical facilities, cohesion, parental behavior, achievement orientation and intellectual and cultural orientation. There were totally 22 statements in the questionnaire consists of both positive and negative items to measure the extent of favourable and unfavourable home environment for learning Mathematics.

Copies of the questionnaire were distributed by the researcher to a sample of 1007 students in eleven schools. Researcher's presence during administration enhanced better understanding of the items in the instrument. Copies of the questionnaire were collected back immediately after completion, by the researcher. The students were given five options for each statement as strongly disagree, disagree, undecided, agree, strongly agree. For a positive statement the scores assigned are 3,2 and 1 and for a negative statement the scores assigned are 1,2 and 3 respectively. The scores of the individual statements are summed to get the home environment score of a student.

An Achievement Test in Mathematics prepared by the researcher with the objectives knowledge, understanding, application and skill, based on the 10th standard Mathematics syllabus, was also conducted for the same students, who responded the HEIM questionnaire so as to measure the impact of home environment of the students on the performance of the test and the scores were tabulated and analysed.

IV. Statistical Techniques Used

i. Simple random sampling technique was used to select the sample.
ii. Descriptive and Inferential statistical methods were used to measure mean, standard deviation and correlation.

V. Results And Analysis

The following results were obtained on the analysis made with the datas collected:

Table 1. Frequency Distribution of Level of Home Environment Inventory of students.

Level of Home Environment	Frequency	Percent
Low	265	26.3
Moderate	482	47.9
High	260	25.8
Total	**1007**	**100.0**

From the above table, the level of home environment is 26.3% low, 47.9% moderate and 25.8% high. Hence, it can be concluded that more students have moderate level of home environment for the study of Mathematics.

Table 2. Mean and Standard Deviation of Academic Achievement in Mathematics

Factors of Academic Achievement	Mean	SD
Knowledge	14.74	3.30
Understanding	15.78	3.30
Application	18.42	4.38
Skill	1.60	0.59
Overall Achievement in Mathematics	50.55	9.99

From the above table, the mean value of home environment inventory is 49.85 with S.D. 12.51, the mean value of knowledge is 14.74 with S.D. 3.30, the mean value of understanding is 15.78 with S.D. 3.30, the mean value of application is 18.42 with S.D. 4.38, the mean value of skill is 1.60 with S.D. 0.59 and the mean value of overall achievement in Mathematics is 50.55 with S.D. 9.99.

Based on mean score achievement in Mathematics is the most important factor followed by home environment of students and the least factor is skill, which is also to be concentrated for the academic achievement of students in Mathematics.

Hypothesis 1
Null Hypothesis : There is no significant difference between male and female with respect to achievement in Mathematics of students of standard X

Table 3. t- test for significant difference between male and female with respect to achievement in Mathematics of students of standard X.

Factors of Achievement	Gender				t value	P value
	Male		Female			
	Mean	SD	Mean	SD		
Knowledge	14.04	3.30	15.29	3.20	6.112	<0.001[**]
Understanding	15.19	3.39	16.25	3.16	5.113	<0.001[**]
Application	17.69	4.36	18.99	4.31	4.732	<0.001[**]
Skill	1.58	0.60	1.62	0.58	1.196	0.232
Overall Achievement in Mathematics	48.49	9.98	52.16	9.71	5.870	<0.001[**]

Note: ** denotes significant at 1% level.

Since P value is less than 0.01, the null hypothesis is rejected at 1% level of significance with respect to all the factors of achievement of students. Hence, there is significant difference between male and female students with respect to the factors of achievement of students. Based on mean score, female students are better in academic achievement than male students.

There is no significance difference between Male and Female students with respect to skill, since P value is greater than 0.05. Hence, the null hypothesis is accepted at 5% level of significance with respect to skill.

Hypothesis 2
Null Hypothesis : There is no significant difference between English and Tamil medium students with respect to factors of Achievement.

Table 4. t- test for significant difference between English and Tamil medium students with respect to factors of Academic Achievement

Factors of Achievement	Medium				t value	P value
	English		Tamil			
	Mean	SD	Mean	SD		
Knowledge	15.14	3.04	14.05	3.61	5.107	<0.001[**]
Understanding	16.18	3.05	15.11	3.59	5.008	<0.001[**]
Application	18.93	4.20	17.53	4.54	4.949	<0.001[**]
Skill	1.62	.57	1.57	.61	1.186	0.236
Overall Achievement in Mathematics	51.87	9.32	48.27	10.68	5.598	<0.001[**]

Note: ** denotes significant at 1% level.

Since P value is less than 0.01, the null hypothesis is rejected at 1% level of significance with respect to all the factors of achievement of students. Hence, there is significant difference between English and Tamil medium students with respect to the factors of achievement of students. Based on mean score, English medium students are better in achievement than Tamil medium students.

There is no significance difference between English and Tamil medium students with respect to skill, since P value is greater than 0.05. Hence, the null hypothesis is accepted at 5% level of significance with respect to skill.

Hypothesis 3
Null Hypothesis: There is no association between gender and level of home environment inventory of students of standard X

Table 5: Chi-square test for association between gender and level of home environment inventory of students of standard X

Gender	Level of Home Environment Inventory			Total	Chi-Square value	P value
	Low	Moderate	High			
Male	148 (33.4) [55.8]	214 (48.3) [44.4]	81 (18.3) [31.2]	443		
Female	117 (20.7) [44.2]	268 (47.5) [55.6]	179 (31.7) [68.8]	564	32.545	<0.001**
Total	265	482	260	1007		

Note: 1. The value within ( ) refers to row percentage.
2. The value within [ ] refers to column percentage.
3. ** denotes significant at 1% level.

Since P value is less than 0.01, the null hypothesis is rejected at 1% level of significance. Hence, there is association between gender and level of home environment inventory of students of standard X.

Based on the row percentage, male students have 33.4% low level of home environment and 18.3% have high level of home environment where as 20.7% female students have low level of home environment and 31.7% female students have high level of home environment for the academic achievement.

Hypothesis 4
Null Hypothesis: There is no association between gender and level of Achievement in Mathematics of students of standard X

Table 6: Chi-square test for association between gender and level of Achievement in Mathematics of students of standard X

Gender	Level of Achievement in Mathematics			Total	Chi-Square value	P value
	Low	Moderate	High			
Male	147 (33.2) [56.1]	203 (45.8) [42.2]	93 (21.0) [35.2]	443		
Female	115 (20.4) [43.9]	278 (49.3) [57.8]	171 (30.3) [64.8]	564	32.545	<0.001**
Total	262	481	264	1007		

Note: 1. The value within ( ) refers to row percentage.
2. The value within [ ] refers to column percentage.
3. ** denotes significant at 1% level.

Since P value is less than 0.01, the null hypothesis is rejected at 1% level of significance. Hence, there is association between gender and level of Achievement in Mathematics of students of standard X.

Based on the row percentage, male students have 33.2% low level of achievement in Mathematics and 21.0% have high level of achievement in Mathematics where as 20.4% female students have low level of achievement in Mathematics and 30.3% female students have high level of achievement in Mathematics.

Hypothesis 5
Null Hypothesis: There is no association between medium and level of home environment inventory of students of standard X

Table 7: Chi-square test for association between medium and level of home environment inventory of students of standard X

Medium	Level of Home environment inventory			Total	Chi-Square value	P value
	Low	Moderate	High			
English	154 (24.2) [58.1]	293 (46.1) [60.8]	189 (29.7) [72.7]	636		
Tamil	111 (29.9) [41.9]	189 (50.9) [39.2]	71 (19.1) [27.3]	371	14.219	<0.001**
Total	265	482	260	1007		

Note: 1. The value within ( ) refers to row percentage.
2. The value within [ ] refers to column percentage.
3. ** denotes significant at 1% level.

Since P value is less than 0.01, the null hypothesis is rejected at 1% level of significance. Hence, there

is association between medium and level of home environment inventory of students of standard X.

Based on the row percentage, English medium students have 24.2% low level of home environment and 29.7% have high level of home environment where as 29.9% Tamil medium students have low level of home environment and 19.1% Tamil medium students have high level of home environment for the academic achievement.

Hypothesis 6
Null Hypothesis: There is no association between medium and level of Achievement in Mathematics of students of standard X

Table 8: Chi-square test for association between medium and level of Achievement in Mathematics of students of standard X

Medium	Level of Achievement in Mathematics			Total	Chi-Square value	P value
	Low	Moderate	High			
English	135 (21.2) [51.5]	310 (48.7) [64.4]	191 (30.0) [72.3]	636		
Tamil	127 (34.2) [48.5]	171 (46.1) [35.6]	73 (19.7) [27.7]	371	25.161	<0.001**
Total	262	481	264	1007		

Note: 1. The value within ( ) refers to row percentage.
2. The value within [ ] refers to column percentage.
3. ** denotes significant at 1% level.

Since P value is less than 0.01, the null hypothesis is rejected at 1% level of significance. Hence, there is association between medium and level of achievement in mathematics of students of standard X.

Based on the row percentage, English medium students have 21.2% low level of achievement in Mathematics and 30.0% have high level of achievement in Mathematics where as 34.2% Tamil medium students have low level of achievement in Mathematics and 19.7% Tamil medium students have high level of achievement in Mathematics.

Hypothesis 7
Null Hypothesis: There is no association between level of achievement in Mathematics and level of home environment inventory of students of standard X

Table 9: Chi-square test for association between level of achievement in Mathematics and level of home environment inventory of students of standard X

Level of Home Environment Inventory	Level of Achievement in Mathematics			Total	Chi-Square value	P value
	Low	Moderate	High			
Low	93 (35.1) [35.5]	118 (44.5) [24.5]	54 (20.4) [20.5]	265		
Moderate	131 (27.2) [50.0]	242 (50.2) [50.3]	109 (22.6) [41.3]	482	44.550	<0.001**
High	38 (14.6) [14.5]	121 (46.5) [25.2]	101 (38.8) [38.3]	260		
Total	262	481	264	1007		

Note: 1. The value within ( ) refers to row percentage.
2. The value within [ ] refers to column percentage.
3. ** denotes significant at 1% level.

Since P value is less than 0.01, the null hypothesis is rejected at 1% level of significance. Hence, there is association between level of achievement in Mathematics and level of home environment inventory of students of standard X.

VI. Correlation Analysis

Table 10: Pearson correlation coefficient between factors of achievement in Mathematics and home environment inventory of Mathematics

Factors of Academic Achievement	Home Environment Inventory
Knowledge	0.186(**)
Understanding	0.207(**)
Application	0.174(**)
Skill	0.067(*)
Overall Achievement in Mathematics	0.479(**)

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The correlation coefficient between knowledge and home environment inventory is 0.186, which indicate 18.6 percentage positive relationship between knowledge and home environment inventory and is significant at 1% level. The correlation coefficient between understanding, application, overall achievement in Mathematics with home environment inventory is 0.207, 0.174 and 0.479 respectively, which indicate 20.7%, 17.4%, and 47.9% positive relationship between understanding, application, overall achievement in Mathematics with home environment inventory and they are significant at 1% level. The correlation coefficient between skill and home environment inventory is 0.067, which indicate 6.7% positive relationship between skill with home environment inventory and it is significant at 5% level.

The correlation analysis reveals that there is a positive relationship between every aspect of achievement in Mathematics and home environment of students and that the parents should maintain a healthy environment at home to help their children to attain a good academic level in curriculum.

The findings of the study support the observation made by Atkinson and Feather (1966) that children from favourable home environments tend to have a high need for achievement as opposed to those from unfavourable home environments.

VII. Discussion And Conclusion

The study concludes that there is a positive correlation of home environment with academic achievement in Mathematics and also that favourable home environment of students have significant influence on the better performance not only in Mathematics but also in all areas of academic achievement.

Parents should get awareness in such a way that to know the importance of the home environment on their children's academic performance. Parents need to be informed that they can support the education of their children through encouragement, provision of learning facilities and active assistance among other ways. Parents should encourage their children to read and do their home work at home.

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