

Influence of Algebraic Ability and Study Habit on the Achievement in Mathematics at Secondary Stage

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Abstract:—The present study aims at studying the influence of areas in relation to the algebraic ability and study habit on the achievement in mathematics to the pupils' at secondary stage. A sample of 500 students of standard IX from secondary school of south kamrup district, Assam, participated in the present study, in which the relationship among the achievement in mathematics was most closely related with algebraic ability and study habit. Analysis of data indicated that there is a significant difference on achievement in mathematics of the students in case of sex for different sub categories but Achievement in Mathematics is independent for the sub-categories of medium. The regression equation thus obtained shows that algebraic ability and study habit contributes 38.8% and 38.2% respectively to the Achievement in mathematics.

Key words:—Algebraic Ability, Study Habit, Achievement in Mathematics, Sex, Medium

I. INTRODUCTION

Mathematics is a self contained mental discipline with its own language and structure, having a direct impact on the quality of human life on our planet. Throughout the world the status of mathematics is changing day by day, the change being at an exponential rate.. The national policy of education (1986)[1] has also considered the importance of mathematics in general education and suggests that 'mathematics should be visualized as the vehicle to train a child to think, reason, analyze and to articulate logically.

Trends in algebra education research, like other areas of mathematics education are influenced by factors external and internal to the field. It is more important that knowledge of algebra is a good choice in the achievement in Mathematics because many of the major concern of mathematics education as a whole also impact on algebra. Algebra education is a good choice because it has been particularly active field and can draw on the outcomes of the recent 12th ICMI study (Stacey, Chick & Kendal, 2004 and Chick, Stacey, Vincent & Vincent, 2001). [2, 3]

The ability of doing something is the quality acquired skill or talent. Study habit always creates talent and skill of problem solving techniques. Study habit is a well planned and deliberate pattern of study which has attained form of consistency on the part of the student towards understanding academic subjects and passing at examination (Pauk, 1962;Deese, 1959; Akinboye,1974)[4,5,6]

II. REVIEW OF RELATED LITERATURE

The use of variables and unknowns is related to the broader idea of algebraic thinking. Research in algebraic thinking has not specifically focused on the connections between algebra and geometry. However, some studies have examined the interface between algebra and geometry (Lee & Wheeler, 1989) [7] and the relationship between algebra and geometry (Nichols, 1986; Poehl, 1997).[8, 9]] For instance (Wotriak, 1977), found intelligence and reasoning ability to be related to mathematical achievement. On the other hand, (Reed, 1978) found logical thinking to have a low positive correlation ($r = 0.29$ depends on) with performance in algebra. It appears that the students would need a minimum level of intelligence after which other intervening variables such as pre-requisite knowledge, perseverance and motivation become very important variables and could thus account for the difference among students. A number of affective variables influencing the learning of mathematics were examined by Reyes (1984) [10]. These variables include self concept, mathematics anxiety, attribution, and perceived usefulness of mathematics. The Curriculum and Evaluation Standards for School Mathematics (NCTM, 1989) and other important literature in the area of reform in mathematics education (Mathematical Sciences Education Board, 1990; National Research Council, 1989) call for change in emphasis and content in geometry at all levels.

Sumangala(1995)[11] has studied 750 students of class IX in Kerala and found that the numerical ability, numerical reasoning , ability to choose symbols, spatial ability and abstract reasoning abilities to be significantly correlated to the achievement in mathematics.

Numerous research have been undertaken to investigate trends in mathematics achievement and the factors influencing mathematics learning and performance (Ma and Klinger, 2000; Papanastasiou, 2000; Al Khateeb, 2001; Tsao, 2004;Mullis, Martin, Gonzalez and Chrostowski, 2004; House and Telese, 2008).[12,13,14,15]

According to Olayinka (1996) and Yahaya (2003),[16] passing examination to secure certificates either for admission into higher institution or secure good jobs is the main goal of education to many people and not the acquisition of knowledge and skills through studying.

Hence the present study entitled "Influence of algebraic ability and study habit on the achievement in mathematics at secondary stage

III. OBJECTIVE OF THE STUDY:

The present study was taken up with the following objectives:

- (i) To find out the relationship between achievement in mathematics, Algebraic ability and study habit of IX standards students
- (ii) To study the significant difference of achievement in mathematics, algebraic ability and study habit of IX standards students when they are classified according to their sex.
- (iii) To study the significant difference of achievement in mathematics, algebraic ability and study habit of IX standards students when they are classified according to the medium of instruction.
- (iv) To study the significant difference of achievement in mathematics with different algebraic ability and study habit group of IX standards students when they are classified according to the sex.
- (v) To study the significant difference of achievement in mathematics with different algebraic ability and study habit group of IX standards students when they are classified according to the medium of instruction.
- (vi) To determine the relative contribution of the algebraic ability and study habit to the prediction of achievement in mathematics.

IV. SAMPLES

The normative survey method on stratified random technique was used for the present study. For this purpose 250 boys and 250 girls of standard IX from secondary school of south kamrup district were selected at random.

V. TOOLS USED

Following tools were used to collect the data for the study-

- (a) **Mathematics achievement test:** This has its content based on senior secondary mathematics syllabus and contains multiple choice items and validated with the assistance of some senior secondary school teachers
- (b) **Algebraic ability questionnaire:** This was constructed and validated with the assistance of some senior secondary school teachers.
- (c) **Study habit Inventory:** This was constructed and validated by the investigator.

VI. DATA COLLECTION

The investigator collected data by visiting the schools. Three tools were used for analysis of data.

VII. DATA ANALYSIS

Correlation, t-test and multiple regressions were used to study the variables in the present study.

Hypothesis testing

- H1) There is no significant relationship between algebraic ability and study habit and achievement in mathematics of IX standards students
- H2) There is no significant difference in the mean achievement in mathematics, algebraic ability and study habit of boys and girls student studying in IX standards.
- H3) There is no significant difference in the mean achievement in mathematics, algebraic ability and study habit of English and Assamese medium students studying in IX standards.
- H4) There is no significant difference in the mean achievement in mathematics with different algebraic ability and study habit group of IX standards students when they are classified according to sex.
- H5) There is no significant difference in the mean achievement in mathematics with different algebraic ability and study habit group of IX standards students when they are classified according to the medium of instruction.

Table-1
r-value for Achievement in mathematics and Algebraic ability , study habit

Sl.No.	Variable	N	df	r	p
1.	Achievement in Mathematics	500	498	.623	<0.05
2.	Algebraic Ability				
3.	Achievement in Mathematics	500	498	.618	<0.05
4.	Study habit				

Table-2
Data and Results of test of significance of Difference between mean scores of Achievement in Mathematics for different Sub Samples

Sub Samples		N	Mean	S.D	t value
Sex	Boys	250	45.67	26.01	8.12
	Girls	250	30.39	14.45	
Medium	English	250	39.48	23.01	1.45
	Assamese	250	36.58	21.65	

Table-3
Data and Results of test of significance of Difference between mean scores of Algebraic Ability for different Sub Samples

Sub Samples		N	Mean	S.D	t value
Sex	Boys	250	16.56	9.31	4.05
	Girls	250	13.68	6.30	
Medium	English	250	16.05	8.36	2.60
	Assamese	250	14.09	7.67	

Table-4
Data and Results of test of significance of Difference between mean scores of Study Habit for different Sub Samples

Sub Samples		N	Mean	S.D	t value
Sex	Boys	250	65.09	21.56	3.29
	Girls	250	58.82	20.97	
Medium	English	250	62.78	20.70	.855
	Assamese	250	61.14	22.24	

Table-5
Significance Differences between the Means of Achievement in mathematics Scores with different sub categories of Algebraic ability

Sl. No.	Sub category	N	Mean	SD	SE(Means)
1	High	76	59.05	21.99	2.52
2	Average	276	36.22	19.14	1.15
3	Low	148	30.61	21.82	1.79

Group	t value	D.F.	Significance
High/Ave	8.91	350	.000
Ave/Low	2.74	422	.006
High/Low	9.21	222	.000

Table-6
Significance Differences between the Means of Achievement in mathematics Scores with different sub categories of Study Habit

Sl. No.	Sub category	N	Mean	SD	SE(Means)
1	Regular	142	54.08	19.61	1.65
2	Moderately Regular	120	48.04	18.62	1.70
3	Irregular	238	23.41	15.18	.98

Group	t value	D.F.	Significance
Reg/Modreg	2.54	260	.012
Modreg/Irreg	13.41	356	.000
Reg/Irrg	17.05	378	.000

Multiple Regression Analysis

In pursuance of the objective (VI) of the study, i.e. to determine the relative contribution of the algebraic ability and study habit to the prediction of achievement in mathematics of IX standard students, data were subjected to statistical treatment of multiple regression technique.

Table-7

The relative contribution of Algebraic ability and study habits in to the prediction of achievement in mathematics.

Variables	Constant	Regression Coefficient	B-Coefficient	r value	% of contribution
Algebraic ability	-12.07	1.32	.48	.623	38.80
Study habit		.49	.47	.618	38.20
					R ² =76.00

- (i) From table-I it may be observed that the r-value of algebraic ability and study habit on achievement in mathematics are 0.623, 0.618 respectively. All these values are much closed to one. So algebraic ability and study habit to the achievement in mathematics are significantly related. So it may be concluded that the student who has the high algebraic ability and better study habit imply the high achievement in mathematics.
- (ii) From table-2 we observed that with regard to achievement there is significant difference between boys and girls (t=8.12, significant at 0.05 level) but not significant between English medium and Assamese medium students (t=1.45, not significant at 0.01 level). It is seen that the mean achievement score for boys (M=43) is higher than that of girls (M=33.06). So it may be concluded that the null hypothesis is rejected for achievement in mathematics for different sub samples of sex and accepted in case of medium. This implies that Boys are high on achievement in mathematics when compared with girl's students. But Achievement in Mathematics is independent for the sub-categories of medium.

From table-3 we observed that with regard to algebraic ability there is significant difference between boys and girls (t=4.05, significant at 0.05 level) and between English medium and Assamese medium students (t=2.60, significant at 0.05 level). So it may be concluded that the null hypothesis is rejected for algebraic ability for different sub samples sex and medium. This implies that Boys are high on algebraic ability when compared with girl's students and assamese medium student has high algebraic ability than English medium students.

- (iii) From table-4 we observed that with regard to study habit there is significant difference between boys and girls (t=3.29, significant at 0.05 level) and there is no significant difference between English medium and Assamese medium students (t=.855, not significant). So it can be inferred that study habit is independent for sub-categories of sex and medium.
- (iv) From table-5 we observed that with regard to achievement in mathematics, there is significant difference between sub-categories of Algebraic ability between high and Average (t= 8.91), average and low (t=2.74) and high and low (t=9.21).
- (v) From table-6 we observed that with regard to achievement in mathematics, there is significant difference between sub-categories of study habit between regular and moderately regular (t= 2.54), moderately regular and irregular (t=13.41) and regular and irregular (t=17.05).
- (vi) From table- 7 it is observed that-
 - (a) The achievement in mathematics by the independent variable algebraic ability of IX standard students to the extent of 38.80%.
 - (b) The achievement in mathematics by the independent variable study habit of IX standard students to the extent of 38.20%.
 - (c) The regression equation obtained for total sample of 500 to predict achievement in mathematics of IX standard students with the help of the prediction variable algebraic ability and study habit is :
 $AIM = -12.07 + 1.32 * ALA + .49 * SH$

Where AIM= Achievement in mathematics, ALA= Algebraic ability, SH= study habit

Findings of the study

I. Findings of coefficient of analysis

- . Algebraic ability and achievement in mathematics are significantly related.
- . Study habit and achievement in mathematics are significantly related.

II. Findings of t-test analysis

- . Boys have better achievement in mathematics than girls.
- . English and Assamese medium students are independent for the achievement in mathematics.
- . Boys are high on algebraic ability compared with girls.
- . High algebraic ability group have the better achievement in mathematics than average and low group of pupils.
- . Regular study habit group have the better achievement in mathematics than irregular and moderately regular group of pupils

III. Findings of Multiple Regression analysis

- . Algebraic ability as an independent variable depends on the achievement in mathematics of IX standard students to the extent of 38.8% %.

- . Study habit of mathematics as an independent variable depends on achievement in mathematics of IX standard students to the extent of 38.2%

VIII. CONCLUSION

From the above study we may conclude that the algebraic ability and study habit influence the achievement in mathematics. While most of the previous studies had investigated the relationship between the variable separately, an attempt has been made here to look at the combined effect of Algebraic ability (Mathematical Background variable) and Study habit (psychological background variable) and recommended that graphical approach and algebraic representation through word problem to improve the algebraic thinking. Moreover the achievement in the subject mathematics mostly depends on pupils study habit. The teacher needs to improve their relationship with the students to encourage good study habits through home assignment. So it is beyond imagination for most of the parents and teacher's that study habit influence pupil's achievement in mathematics and to guide the students proper study habit to improve problem solving in mathematics.

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