

ACHIEVEMENT IN MATHEMATICS OF STUDENTS IN RELATION TO THE DEMOGRAPHIC VARIABLES

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Abstract

The quality of teaching and learning mathematics has been one of the major challenges and concerns of educators as well as parents. Though Indians are generally regarded for their mathematical skills, it becomes necessary to identify factors contributing to achievement in the subject. The present study aimed to investigate the mathematics achievement of class 7th students in relation to the demographic variables i.e. Gender, Location and Parental Education. A sample of 400 was randomly selected from 20 schools of Rohtak district in Haryana. For obtaining the data, Mathematics Achievement was recorded by self made Achievement Test. The findings of the study suggest that there is a significant difference in the mathematics achievement of boys and girls of class 7th school students and those with differing parental education levels but location of the school does not bring in any significant difference in mathematics achievement of class 7th students.

Introduction

The quality of teaching and learning in mathematics is a major challenge and concern for educators. General concern about mathematics achievement has been dominating in the minds of the parents for quite some time. There has always been emphasis on designing innovative instructional techniques to produce individuals who can understand and apply fundamental mathematic concepts. A central and persisting issue is how to provide instructional environments, conditions, methods, and solutions that achieve learning goals for students with different skill and ability levels. In the recent times, there has been upsurge of newer concepts like Vedic mathematics and newer ways of teaching mathematics like revised use of Abacus among others. All these are indicating a renewed interest in mathematics achievement.

However, newer techniques alone cannot produce better learning and achievement. The educator must know crucial factors that affect student learning and build a bridge between goals and student performance. Identifying these factors will help to utilize limited resources including financial resources and time more effectively (Libiński & Gutierrez, 2008). In an effort to understand the factors associated with mathematics achievement, researchers have focused on many factors. (Beaton & Dwyer, 2002; Kellaghan & Madaus, 2002; Kifer, 2002). The impact of various demographic, social, economical and educational factors on students' math achievement continues to be of great interest to the educators and researchers. For instance, Israel et al. (2001) concluded that parents' socioeconomic status is correlated with a child's educational achievement. Another study by Jensen and Seltzer (2000) showed that factors such as individual study, parents' role, and social environment had a significant influence on "further education" decisions and achievements of young students'. A growing body of research provides additional factors which could have an impact on students' achievement such as gender, family structure, parents' educational level, socio-economic status, parent and student attitudes toward school, and parent involvement (Campbell et al. 2000; Epstein, 1991). Three factors or predictors in math achievement, are divided into sub factors: Demographic Factors (gender, socio-economic status, parent's educational level), Instructional Factors (teacher competency, instructional strategies and techniques, curriculum, school context and facilities), and Individual Factors (self-directed learning, arithmetic ability, motivation).

Need and Significance

Identifying factors that affect mathematics achievement is particularly important to effectively educate new generations in, what is for many, a difficult subject. It also provides instructional designers better inputs for their design decisions. The curriculum developers and teachers are better equipped to handle students of different performance if they know the factors responsible for the same. As already stated, there have been growing interest in researches which can provide additional factors that could have an impact on students' mathematics achievement such as gender, family structure, parents' educational level, socio-economic status, parent and student attitudes toward school, and parent involvement.

Many variables have long been studied as predictors of mathematics achievement. However, gender issues on math achievement are studied most frequently by researchers. For instance, a study through a meta-analysis reveals that males tend to do better on mathematics tests that involve problem-solving (Hyde, Fennema, and

Lamon 1990). Females tend to do better in computation, and there is no significant gender difference in understanding math concepts. Another study shows that females tend to earn better grades than males in mathematics (Kimball, 1989). These contrasting research results and general improving performance of girls in board exams intrigued the researchers and they felt that this should be explored further.

Similarly, location has been another issue which has been presumed to be affecting achievement in school, particularly mathematics. The location is supposed to affect the resources available to the students and thus seemed to be another variable which should be studied.

Further, Parents' educational level has been shown to be a factor in academic achievement. Parents serve as a role model and a guide in encouraging their children to pursue high educational goals and desires by establishing the educational resources on hand in the home and holding particular attitudes and values towards their children's learning. In this case, the educational attainment of parents serve as an indicator of attitudes and values which parents use to create a home environment that can affect children's learning and achievement. A number of studies indicated that student achievement is correlated highly with the educational attainment of parents (Coleman, 1966). For instance, students whose parents had less than high school education obtained lower grades in mathematics than those whose parents had higher levels of education (Campbell, Hombo, & Mazzeo, 2000). Research has shown that parents' educational level not only impact student attitudes toward learning but also impact their math achievement scores. The available body of research literature in the area left the researchers with these three aspects of demographic variables as suitable factors for research in the area and thus an attempt was made to study these three.

Objectives

1. To study gender wise differences in mathematics achievement of Class 7th students.
2. To study location wise differences in mathematics achievement on Class 7th students.
3. To study the impact of parental education on the mathematics achievement of Class 7th students.

Hypotheses

1. There is no significant difference in mathematics achievement of boys and girls of Class 7th students.
2. There is no significant difference in mathematics achievement of the students of urban and rural areas of Class 7th students.
3. There is no significant difference in the mathematics achievement of the Class 7th students with low and high parental education.

Methodology

Method

Descriptive Survey Method was found the most suitable for testing hypothesis and was employed in the present research.

Sample

The study was carried out on 400 students of class 7th of twenty schools of Rohtak district. These 400 students were randomly selected. Out of these selected students of class 7th, 200 students will be selected from the urban areas school and rest 200 will be students will be selected from the rural areas school. The age of the students was in the range of 11 to 12 years.

Tool

In order to achieve the objectives of the study, the investigators used an Achievement Test constructed and standardized by the investigators themselves. Also a background information sheet was used to collect information on the different demographic variables.

Procedure

Data was collected from the sample after securing permission from the Principals' of the school. The investigators used an achievement test and a background information sheet to collect the data in the school itself in the presence of one of the investigators.

Analysis

Data was analyzed by using descriptive data analysis like Mean and Standard Deviation. 't' Value was calculated to test the Hypothesis.

Gender-wise difference in mathematics achievement of Class 7th students. To explore the gender-wise difference in mathematics achievement of Class 7th students, mean and 't' score was calculated. The descriptive scores have been tabulated in table-1.

Table-1
Difference in Mathematics achievement of boys and girls of Class 7th students

Gender	Sample Size	Mean	S.D.	't' Value	Level of Significance
Boys	200	72.8	12.6	5.26	Significant at both the levels
Girls	200	60.6	10.5		

It is clear from the above table that the mean scores of boy students of 7th class is 72.8 and that of girl students of 7th class is 60.6. Standard Deviations are 12.6 and 10.5 respectively. The obtained t value is 5.26 which is greater than the table value at 0.05 level and 0.01 level of significance. Thus, it can be inferred that the two groups differ significantly in mathematics achievement and there is gender difference in mathematics achievement of boys and girls with boys scoring better than the girls. This is in consonance with results of many studies which indicate that as students reach higher grades, gender differences favour increase in math achievement by males (Gray, 1996; Mullis, Martin, Fierros, Goldberg, & Stemler, 2000). The results of the study and literature on gender differences provide evidences that gender issues impact achievement in mathematics. Hence, it is crucial for educators and researchers to pay attention to gender differences in the design of mathematics instruction.

Location-wise difference in mathematics achievement of Class 7th students - To explore the location-wise difference in mathematics achievement of Class 7th students, mean and 't' score was calculated. The descriptive scores have been tabulated in table-2.

Table-2
Difference in Mathematics achievement of boys and girls of Class 7th students

Variable	Sample Size	Mean	S.D.	't' Value	Level of Significance
Urban	200	65.36	14.21	0.135	Not
Rural	200	65	12.48		Significant

It is clear from table – 2 that the mean scores of students of urban areas is 65.36 while that of students of rural areas is 65. The obtained t value is 0.135 which is less than the table value at 0.05 level and 0.01 level of significance. Thus, it can be inferred that the two groups do not differ significantly in mathematics achievement. This shows that location of the students (i.e. urban and rural areas) does not affect the mathematics achievement of Class 7th students.

Difference in mathematics achievement of Class 7th students according to difference in Parental education levels – For the present study, education levels of parents was treated as parental education levels. Information about educational background of parents was collected in the information sheet filled by the students. Further, parents who have completed school education and not gone for higher studies were treated as parents of low education level and those who have pursued and completed atleast graduation were treated as parents of higher education level.

Table-3
Difference in Mathematics achievement of Class 7th Students with low and high parental education

Variable	Sample Size	Mean	S.D.	't' Value	Level of Significance
High	183	76.6	9.66	9.79	Significant at both the levels
Low	217	55.4	5.99		

Table–3 shows that the mean scores of students with High parental education is 76.6 while that of students with low parental education is 55.4. The obtained't' value is 9.79 which is greater than the table value at 0.05 level and 0.01 level of significance. Thus, it can be inferred that the two groups differ significantly in mathematics achievement. The rejection of the null hypothesis shows that parental education affects the mathematics achievement of Class 7th students with children of parents of higher education level scoring better than those with parents of low education level. This was not an unexpected result because parents of higher education are expected to provide an academic impetus to their children and also may act as a source of information to their children.

Educational Implications

The findings of the study leave us with certain implicit and certain explicit educational implications. Some of the important ones are as follows -

1. Special emphasis should be given on girl students in relation to mathematics achievement because this study reveals that boys perform better than girls.
2. Students should be encouraged to perform better by adopting various new techniques of teaching and motivation.
3. Teachers and parents should take interest in the queries of the students and should help them in their better performance.
4. Students should be given free environments to express themselves, so that teachers as well as parents can understand their problem and accordingly solve it. This leads to improvement in their performance.
5. Students should be motivated to participate in various quizzes and tests like Olympiad to improve their mathematics achievement.

Conclusion

Identifying the factors that possibly affect the mathematics achievements of students could help instructional designers and instructors to select the best instructional strategies to design the most effective and efficient instruction. Existing studies suggested many variables that can have effects on the math achievement of students. From the results of the study, it can be said that in terms of demographic factors, the findings revealed that parents' education level and gender were two vital factors for math achievement. These are the factors that instructional designers should not ignore since they are important for math achievement. Teachers and curriculum planners need to adapt and create alternative innovative learning and teaching strategies for effective mathematics education. One-size-fits-all instructional design strategies are not as efficient as those that are customized to meet specific learner needs. It is important to embody diagnostic and prescriptive tools to determine the best-fit design for each individual learner, and to make learning more meaningful based on known critical factors that affect mathematics achievement.

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