Introduction:

The learning of mathematics is indispensable because of its wide ranging applications in our life. The present society requires the use of the skills such as estimating, problem solving, interpreting data, measuring, predicting and applying mathematics in every day life situations. The National Policy on Education (NPE) 1986 has rightly visualised mathematics as the vehicle to train a child to think, reason, analyse and articulate logically. Moreover, the National Curriculum Framework for School Education (NCFSE) 2000 has reiterated that the study of mathematics contributes to the development of precision, rational and analytical thinking, reasoning and positive attitude and aesthetic sense. Researchers have suggested that achievement in mathematics in secondary schools is a function of many interrelated variables like students abilities, gender, attitudes, perceptions, socio economic values, parental education & occupation, family size, parental assistance, peer groups, size of the school, size of the class, types of management, resources, salaries of the teachers and tuition fees and so forth. Many of these variables are home and families related and thus are difficult to change and also out of control of the educators. However, the school related variables such as attitude, perceptions and knowledge of the role of mathematics achievement in future career opportunities that be influencing and is easy to change by educational interventions. Thus understanding the role of personal (attitude towards mathematics, gender; amount of time spent on television watching and sport activities, familial (parental education, occupation, family size and parental assistance in solving mathematics problems) and institutional (size of the class, types management and resources) factors on achievement in mathematics attracts serious attention in present study.
Review of related literature:

Over several decades, the identification and examination of the factor that explain achievement such as attitude (Ma, 1997), beliefs (Garofalo, 1989; Kloosterman; 1995; Schoenfeld, 1985; Schommer, 1990), gender (Benbow and Stanley, 1980; Fennema and Carpenter, 1981) parent education (Ethington and Wolfe 1984; Ma, 1997; Tsai and Walberg, 1983) employment (Greenberger and Steinberg, 1986), homework (Keith and Cool, 1992), and school size (Lee and Smith, 1997) have been researched. Although, the investigation of individual factors is important, a multifactor model possesses a distinct advantage over individual characteristics and constructs because it allows for the examination of not only each individual characteristic's or construct's association with achievement but also for the exploration and examination of the relationships among those characteristics. Shavelson, McDonnell, and Oakes (1989) and Shevelson, McDonnell, Oakes and Carey (1987) argued that a model is required because a single indicator is not able to provide information about a "Phenomenon as complex as education."

Recent researches have supported the influence of attitudinal variables in learning. According to Reynolds and Walberg (1992), Thorndike Christ attitudes towards mathematics were shown to be predictive of academic performance in mathematics. Friedman (1989) noted that until age 10 either no differences between genders or differences favouring girls are observed. Finally, with regard to standardized tests, boys tend to score higher than do girls. (Halperen and La May 2000). Keith, Reimers, Fehrman, Pottebaum and Aubey (1986) observed a small but negative relationship between the amount of television Watched and achievement in mathematics. The finding of
Schereiber (2002) indicates that formal parental educational level is strongly associated with achievement in advance mathematics. Students from all ethnic groups who have parents with high education levels (high SES) perform better academically (Alwin and Thorton, 1984). Greenwald, Hedges and Laine (1996) concluded that resources of the school do have influences on students achievement in mathematics. Summers and Wolfe (1977) found that attending a small class is more beneficial for low achieving students than high achieving students.

Statement of the problem:

The problem selected for study reads as follows:

"Influence of personal, familial and institutional factors on achievement of secondary school students in mathematics."

Objectives of the study:

The present study is aimed at achieving the following objectives.

1- To compare the mathematics achievement of secondary school students on gender basis.

2- To study the attitude of students and math achievements.

3- To study the impact of television watching on achievement in math of students.

4- To study the impact of sport activities on math achievement of students.

5- To study the influence of parental education on math achievement of students.

6- To study the impact of parental occupation on math achievement of students.
7- To study the influence of parental assistance and math achievement of students.
8- To study the relationship between size of the family and math achievement of children.
9- To study the influence of school types on math achievement of students.
10- To study the impact of school resources on achievement of students in math.
11- To study the impact of class size and math achievement of students.

Hypotheses of the Study:

The following hypotheses were established:

1- Male and female students do not differ significantly on achievement in math.
2- There is no significant difference between attitude towards math of students and achievement in math.
3- T.V. watching of the students is not significantly related to achievement in math.
4- Sports activities of the students do not influence the achievement in math.
5- Parental education of the children is not significantly related to achievement in math.
6- Parental occupation of the children is not significantly related to achievement in math.
7- Family size of the children is not significantly related to achievement in math.
8- Parental assistance in problem solving does not influence the math achievement of their children.

9- Type of schools do not significantly related to achievement in math of students.

10- School resources do not significantly related to achievement in math of students.

11- Class size does not influence the achievement in math of students.

Sample used:

The selection of the sample for the present study was made from students of secondary schools of central districts of U.P., (India). The schools and students were selected in random manner keeping in view the needs and objectives of the study. The representative sample is approximately consists of 1127 9th grade students (boys (993) and girls (334) students.)

All students who participated in the investigation were studying math as one of their academic subjects at standard 9th level, their ages ranged between 15 and 17 years.

It should be mentioned that these students have been selected from 14 different secondary schools located in different districts of central U.P. Out of these, three are girls’ schools, five co-education and the rest are boys’ schools.

Again, these schools constitute different categories of management, some of them are privately managed and some by minority and some managed by government or semi-government agencies.

Also, the sample schools range from very good to poor in their performance. For instance, some English medium schools are running on the lines of public schools and has a very high reputation and is
considered to be prestigious. Pupils in these schools pay high tuition fee and belong to well to do families with a high socio-cultural background. Some schools are, generally poor in quality, the pupils in these schools come from lower socio-economic strata of the society.

**Tools used:**

The tools employed for collection of the data mentioned above included the following -

1. Math Attitude scale (MAS).
2. Math Achievement test (MAT).
3. A Personal and Familial Background Assessment Questionnaire.
4. School Information Questionnaire.

**Statistical techniques employed:**

Following statistical measures were used for analyzing the data-

1. Determinations of reliability and validity of attitude scale and achievement test scale in math using known techniques.
2. Computation of means and standard deviation
3. Use of linear measure of correlation (Pearson Product moment coefficient correlation)
4. Use of the Newman - Keuls test on differences between treatment means.
5. Use of F-test (to see the significant difference between many means.
6. Use of the t-test for measuring the significance of the differences between means.
It may be relevant here to mention assumptions underlying the use of the product moment correlation and the test and how they satisfied before the use of these techniques.

Before $r$ is computed the data is tested to see if two conditions exist. The first of these conditions is that we have linear regression. This means that our points on the scatter gram tend to fall along a straight line. The second condition that we should look for is its homoscedasticity. By this we mean that the standard deviations of the arrays tend to be equal.

In the present study it was assumed that the data is linear. Consequently, product moment correlations were found out between total distributions of scores of the variables put into correlation.

When the analysis of t test is used, the following assumptions should be met:

1. The individuals in the various sub-groups should be selected on the basis of random sampling from normally distributed population.
2. The variance of the subgroups should be homogeneous.
3. The sample comprising the groups should be independent.

**Findings and conclusions of the study:**

1. There exists no significant difference between male and female students so far as their achievement in math is concerned. Both the groups are equally good or bad in the same measure.
2. The attitude towards math of students and achievement in it are positively correlated in this study. The higher the attitude of students towards math, the higher is the achievement in math.
3. The result presented support the idea that TV watching brings same benefits for students. The result shows that watching TV for 1 to 2 hours per day have increasingly positive effects on achievement in math of students. The results further show that, students have no TV in their homes and not watching TV and also students who have TV in their homes and viewing more than 2 hours per day have increasingly negative affects on math achievement.

4. Knowledge of how students spend their non-school hours can help in predicting their performance in school. This result presented support the idea that participating in sports activities brings some benefits for students. The result indicated that the school related activities (sports, drama and others) are related positively to math achievement.

5. In this study parental education is found to be an important factor of children achievement in math. Children from highly educated parents are likely to have significantly higher math achievement scares as compared to the children of less educated parents.

6. It has been found that father’s occupation is related to their children achievement in math. The nature of father’s occupation is important for their children’s math achievement. Children of professional group have got highest math score than all other groups. Children of businessman group have got more math achievement than other two groups but less than the professional group. The children of others group have got more achievement than the children of agriculturist group and on the other hand children of agriculturist group have got lowest math
achievement scores. It has been found in this study that mother’s occupation was not related to academic achievement in math. Children of housewife and working mothers have been found equally good or bad in math achievement.

7. The present study of parental assistance in solving math problems at home of their children and their achievement in math revealed that parental assistance is related to performance of their children in math.

8. This study also explained the relationships between students achievement and their family size. Children of smaller family size have got significantly higher achievement in math than the children of larger family size.

9. In this study the school type has emerged as a significant contributor in the determination of math achievement. The students of CBSE schools have got highest score than the students of other types of school. The students of KVS also achieved significantly higher achievement math score than students of other types of schools but lesser than CBSE students. Students of minority managed schools achieved significantly higher math score than the students of the government schools. In this way students of CBSE schools are highest achiever and students of government schools are lowest achiever in math.

10. The school resources and math achievement was positively correlated with each other. The better school resources lead towards higher scores in math achievement. In other
words the level of math achievement was very high where school resources were superior.

11. Students of smaller class size have got significantly higher achievement in math than the students of larger class size. There is negative correlation between size of the class and achievement in math. As the class size increases, accordingly the performance of the students decreases. In other words the low teacher-pupil ratio was positively associated with math achievement of students. The CBSE and KVS schools operated with comparatively low teacher-pupil ration than government and minority managed schools.

Implications:

This study and its finding highlighted some significant concerns in education. Several studies on Correlates of achievements come with conclusion that students personal, familial, institutional factors are determinants of math achievement. There are other studies also that give contrary results. But this study as many other studies gave mixed type of results. For example, on the whole it was found that school resources was positively correlated with math achievement. There are several major implications of this study. The implications can be classified in two broad categories. These are:

Research Implications

On the serious considerations of the findings of this study and its implication, it logically generates certain hypothesis and research questions. It would be important and necessary to conduct a number of studies in order to come to conclusive decision about whether or not personal, familial and Institutional factors have impact on learning. Some
of the major issues and research questions are recommended for further research.

1. This study was conducted in selected few districts of Central U.P. only. Sample was necessarily purposive this was warranted because of the nature of this study. Although one can be confident that finding would be generalizable to the all districts of central U.P. and to the other districts of the country, it would be necessary to carry out more studies in this format in several other districts in the state or other parts of the country. Such lateral replications would provide a stronger base for generalization.

2. It is also necessary to conduct studies at other class levels particularly at 10th and 12th classes where pressure for performance is significantly high. Together with the lateral replications this vertical replication would provide for larger base for testing the hypothesis on personal familial and Institutional factors.

3. In this study the expenditure were centered round only on institutional expenditures. It has not taken into consideration the household expenditure on the education. So, there is need to conduct a study that will extend the dimension of expenditure to include the household expenditures too.

4. In this study though major portion of syllabus was made the base for the construction of achievement testes but a limited portion was dropped on the grounds, peculiar to turbulent situations in central U.P.. There is a cope for
further studies taking the whole course content into consideration.

5. Research is needed to examine the dimensions of school resources too. School resources as operationally defined in this study can be limited or expanded to new dimensions in the ever changing social setup taking into consideration the latest technologies and the use of electronic media in education. Everyone is concerned about the quality in education, so there is ample scope on this area of research.

6. Economic (Parent education and occupation as an indicator of financial resources) disparities exist among secondary school students obviously, more work still needs to be completed to eradicate the disparity.

7. An important observation is that attitudes toward mathematics did not have a strong association with achievement in some school, which indicates that there may be school or teacher factors that reduce the impact of a poor attitude.

8. An important result for future inquiry for researchers is that factors were observed to vary from school to school.

9. One area that needs research is the amount of time and the type of programme watched. In previous research and in this study, the type of programmes the students are watching was not known and differential viewing preference may expose different associations with achievement.

10. Finally, in this study, I simultaneously examined achievement as a composite of several factors—both school...
and student levels. Schools are complex systems, and achievement should be examined as a system.

Management implications

The actual observations and responses of teachers, Headmasters and students and the responses to the questionnaires indicated that in all the sectors education there is need of gradation and minimum management inputs into the system are imperative like.

1. The manpower facilities are inadequate in terms of requirement, though the number may be more or sufficient but the dearth of math and science teachers is a common phenomena in public schools which needs a special intervention. There is no permanent teaching staff available in private schools and teachers in this sector are comparatively less qualified and less paid. The credit of comparatively better achievement levels of students in private sector goes to parents who take the education of their children very serious.

2. The lacks of infrastructural facilities are great hurdle in running the school smoothly. This largely affects the capacity of school to retain a child fairly for a good period of time in public schools. The lack of furniture and furnishing was a common problem in public schools.

3. The monitoring on the services a school offers to children is negligible at secondary stage of education. The classroom activities are not monitored by those who are responsible for the job especially in public sector schools. The lack of accountability on part of teachers was also
noticed by the investigator. All these short communing need to be taken seriously.

4. The lack of parental seriously and support for the education of their children was observed by the investigator especially in case of public school students.

Limitations:

It is not possible in a single research study to cover every aspect of variables associated with the problem under investigation. Although, the problem is very natural and is prevalent every where yet due to shortage of time and resources all the aspects variables could not be covered and the study is limited in several ways. It had to be determined in terms of population covered, sample selected, scope of variables studied, and the scope of generalizability of finding and so on.

1. The study was conducted on the students of few districts of central U.P. only. One can not generalize the findings of this study to all the institutions of India due to number of differences in their conditions and circumstances.

2. The number of students included in the sample was limited to 1127.

3. The study was limited to class 9th only due to limitation of time and resources.

4. The study can be conducted taking different variables which may contribute math achievement but only selected personal, familial and institutional variables have been taken into consideration.

5. The results that have been reported reflect merely what students are like have and now. The finding may be quite different at another time or in other cultural setting.
6. It is desirable that the researcher reaches first hand or original sources for the study, but as access to some material was not possible materials taken from available secondary sources has been used.

7. Collecting of data in two sitting may be one more delimitation as a number of students are present only in one of the two sessions. Through a third visit is made to cover such students, some drop outs still remain beyond reach of the investigator and have been dropped from the study.