

REVIEW OF RELATED LITERATURE

2.1 Introduction

The review of literature related to any field of study or problem is a very important and crucial step in the entire research activity undertaken by a researcher as it helps him/her in arriving at certain explanations providing description and developing understanding about or establishing casual relationships between variables relevant to a problem or phenomenon. As Good states, 'the key to the vast store house of published literature may open doors to sources of significant problems and explanatory hypotheses, and provide helpful orientation for definition of the problem'. Background for selection and procedure and comparative data for interpretation of results.

Researcher takes advantages of the knowledge. Which has accumulated in the past as a result of constant human endeavour? It can never be undertaken in isolation of the work that has already been done on the problem which is directly or indirectly related to a study proposed by an investigator. A careful review of the research journals, books, dissertations, thesis and other sources of information on the problem to be investigated is one of the important steps in the planning of any research study. Thus, a review of the related literature must be proceed on well planed research studies results.

The review of the literature helps an investigator to get into the frontiers of knowledge that are related to his area of interest. According to Miller research workers must be aware of what is known with some degree of certainty what is accepted as truth by some and not by others, must have some in linking of the nature of unexposed areas where additional research should be conducted. The review

involves locating, realizing and evaluating research reports as well as reports of observation and opinion that are related to the individual's planned research project. As such the investigator cannot have an insight into the problem to be investigated, unless and until he learnt what others have done and what remains to be done in a particular area of interest. Thus the related literature, besides forming part of the early chapters in the research report for orienting the readers, also serves some other purposes which are given by Good, Bar and Scats as follows:

1. To know whether the evidence already available solves the problem adequately without further investigation and thus to avoid the risk of duplication
2. To provide ideas, theories, explanations or hypothesis valuable in formulating the problem.
3. To suggest methods of research appropriate to the problem.
4. To locate comparative data useful in the interpretation of results.
5. To contribute to the general scholarship of the investigator.

2.2 Justification of Literature

The researcher has tried to find out the needed studies in the area of Science achievement, personal factors, environmental factors and institutional factors and during his hunt for related literature. It was found that there was no study available which was parallel to the present study. All studies had other different combination of variables or were taken at different levels and on different sample. In the light of the importance attached to related literature, the investigator highlights briefly the significance of research in secondary education and summarizes the relevant studies that have been conducted in this area. Secondary education has received a global attention in the recent and the past. However, the research in this priority sector of

education has mostly remained confined within the developed countries and especially in USA and U.K. till the nineteen century. As regards to developing countries and particularly in India, research in secondary education is not providing a healthy sign.

The present chapter attempts at reviewing the related literature in the domain of Science achievement, with special reference to secondary, schools students and variables under study. Prediction of Science achievement has been occupying a central position in the educational sphere. Prediction of Science achievement of secondary schools students through personal, environment and institutional factors has been studied. In order to present the reviewed literature in a comprehensive and systematic manner in the context of the present investigation, the various studies and findings have been categorized under the following headings.

- A. Studies related to Science achievement and personal factors of students.
- B. Studies related to Science achievement and environmental factors of students.
- C. Studies related to Science achievement and institutional factors of students.

2.3 Relationship between Science achievement and Personal factors of study

2.3.1 Relationship between Gender and Science Achievement

Clementine & Barber (1982) explored the influence of selected social variables on the achievement of Elementary school children in a Textile Mill Community. The data were analyzed through a series of stepwise multiple regression equations and through a discriminate analysis. The findings did not support the hypotheses. The only variable found to be significantly related to achievement were sex and grade. Boys consistently scored lower than girls at every grade level and scores of both boys and girls declined as grade increased.

Singh (1984) explored the relationship of home environment, need for achievement and academic motivation with academic achievement. The major findings were, (1) Aggregate marks were significantly and positively related to average marks and self concept of academic ability. (2) Self-Concept of academic ability was significantly and positively related to academic motivation. (3) Need for n-Ach as an operant was not related to any of the respondent's measures. (4) Sex difference were statistically effective in all the four areas of home environment. Males had significantly higher mean score on school, economic recreation and home problems. There were sex differences respect of permissive, loving, protecting and rejecting behaviours in father, whereas girls perceived permissive, loving, neglecting and rejecting behaviours in their mothers. Sex differences were unrelated to self concept of academic ability and need for achievement motivation. (5) School differences were significant in the area of school, economic and home problems of 'Home environment', restrictive, permissive, loving, protecting and rejecting behaviours of father and restrictive behaviours of mother.

Linn (1989) investigated that male have greater access to Science and technical fields and greater earning power than females. Many argue that cognitive and psychosocial gender differences explain these career differences. In contrast evidence from meta analysis and process, analysis indicate that (a) gender differences on cognitive and psychosocial tasks are small and declining, (b) gender differences are not general but specific to cultural and situational contexts, (c) gender difference in cognitive processes often reflect gender differences in course enrolment and training and (d) gender differences in height, physical strength, career access and earning power are much larger and more stable than gender differences on cognitive and psychosocial tasks. These trend imply that small gender differences in cognitive and psychological domains be deemphasized and instead that learning and earning environments be redesigned to promote gender's equity.

Shukla, et al. (1994) conducted another study to find out the level of attainment of primary school in various states of India. For the entire country the SC/ST pupils performed lower than the non-SC/ST ones. Further, the pupil's achievement was found to be positively related with father's education, facility for learning and educational environment at home. The variables related to schools and teachers indicated somewhat weak relationship with achievement.

Young & Fraser (1994) examined the relative contribution of schools to student achievement and school-level differences was found to contribute significantly toward explaining variations in student performance. Although statistically significant sex differences were found in physics achievement for 10 years old, 19 years old, and 12 years old students, school effects were much more powerful in explaining student differences. When compared with gender.

Wong & Staver (1997) investigated gender differences in student Science achievement. A Chinese data base collected from a random sample of more than 12,000. Math grade students in a SISS Extended Study (SES), a key project supported by the China state commission of education in the late 1980's. In this empirical data analysis, which uncovered significant gender differences across the nation, male students received the high scores. The result was interpreted in light of the educational, political, social and cultural contexts of modern day China.

1. They measured student Science achievement with an IEA SISS instrument.
2. The survey was conducted over a random sample of approximately 15,000 IX grade students in the seven provinces.

Melkonian (1997) conducted a study to know the effect of gender on Science achievement at secondary level. The sample was of 400 students having 17+ years of age from 14 government general secondary schools. The research analyzed the

performance in Greek-language grade and mathematics grade. It was found that generally female students attained significantly higher grades than their male counterparts.

Yoloye (1998) explored the result of this direct transfer of western curricular is a Science and Mathematics education in most African countries that is exemplified by decontextualized knowledge being transmitted by poorly trained teachers in order resourced and sometimes overcrowded classrooms.

Tamir (1998) studied a representative sample of 12th grade students (N = 2153) responded to a series of questionnaires and achievement tests in the last term of the academic years 1983 of 1984. The sample consisted of four groups, three of which specializing each in one of the Sciences (Biology, Chemistry and Physics) and one comprised of students who did not study any Science in their junior and senior years. The purpose of this paper is to report on gender differences in achievement, attitudes, preferences, learning experiences and study habits. The major findings were as follows.

1. The percentage of girls in each of the specializing groups are as follows.
Biology: 61, Chemistry: 49, Physics: 31, Non-Science: 66.
2. More boys perceive themselves as high achievers in Science and Maths.
3. Significantly more boys like to study Math's and Science more than other school subjects.
4. Significantly more boys aspire for Science-oriented careers.
5. Boys achieve better than girls in Physics and in earth Science, but their achievement in Biology and Chemistry is similar to that of girls. The achievement of non-Science girls is alarmingly low and with the exception of biology much lower than that of boys.

6. Boys have more positive attitude toward Science and better understanding of the nature of Science.
7. Girls express more positive attitude to school but boys are more interested in Science studies.
8. There are not differences in cognitive preferences.
9. Girls report on having more inquiry oriented experiences.
10. More boys aspire for scientific research and engineering careers. Relatively more girls aspire for medical careers.

Tamir (1998) presented a paper to report on gender differences in achievement, attitudes, preferences, learning experiences and study habits. The major findings were that more boys perceive themselves as high achievers in Science and Math. Boys achieve better than girls in physics and in earth Science, but their achievement in biology and chemistry is similar to that of girls. The achievement of non-Science girls is alarmingly low and with the exception of biology much lower than that of boys.

Lee (1998) a review of literature concerning the gender differences in Mathematics and Science achievement reveal certain stereotypes perpetuated by society, school and family. The 'Mathematics Report Card for the Nation and the states' by the National Assessment of Educational Progress and 'Everybody Counts: A Report to the Nation on the Future of Mathematics Education' report on the results of gender differences surveys conducted on male and female elementary students. Males were found to show higher motivation levels than females who were stereotyped as not having mathematical skills.

Mahapatra & Mishra (2000) conducted a study to find out gender difference in achievement problems related to mechanics under Indian conditions. Descriptive survey method, qualitative and quantitative approaches were used for the study. The sample taken

25 boys and 25 girls of classes 5, 7, 9 of D.M. School Bhubaneswar. There existed large differences in achievement in mechanics.

Nagaraju, et al. (2003) explored the study of academic achievement of senior secondary students in relation to certain factors. The sample was consisted of 240 senior secondary students of Tirupati a Chandagiri Mandals of Chittoor districts in Andhra Pradesh. The student's marks in junior intermediate class were considered as their academic achievement. The results indicated that the performance of girls was better than that of the boys in academic achievement and the performance of urban students was significantly higher than rural students in academic achievement.

Barry & Jane (2007) conducted a study using secondary analysis of a large database from a State-wide Systemic Initiative, and examined the effects of several types of environments on student's outcomes. Over 3 years, nearly 7,000 students in 392 classes in 200 different schools responded to a questionnaire that assess class, home, and peer environment as well as student attitudes. Students also completed an achievement measure that, developed by scientists, and Science educators, was not aligned with any particular curriculum. Students were enrolled in middle – school Science and Mathematics classes in schools that had participated in the State-wide Systemic Initiative. Findings confirmed the importance of extending research on classroom learning environments to include the learning environments of the home and the peer group. Although all three environments accounted for statistically significant amounts of unique variance in student attitudes, only the class environment (defined in terms of the frequency of use of standards-based teaching practices) accounted for statistically significant amounts of unique variance in student achievement scores,. The findings are supported by other studies if systemic reform in the United States.

Tzuriel, et al. (2010) explored Barriers to children's achievement in the areas of Science, Maths and Engineering. A gender difference in girls spatial abilities emerges very early in development. Researcher studied more than 100 first graders, placing about half of them in a training program that focused on expanding working memory, perceiving spatial information from a holistic point of view rather than based on particular details, and thinking about spatial geometric pictures from different points of view. The other children were placed in a control group that took part in a substitute training program. After eight weekly sessions, initial gender differences in spatial ability disappeared for those who had been in the first group. This is the first study to find that training helps reduce the gender gap in spatial ability. Further work can follow up on these findings by determining whether eliminating the gender gap contributes to achievement in Math and Science. While the research doesn't yet show that the intervention leads to better achievement in Science, Math, and Engineering for girls, this is a promising direction for supporting girls' achievement and eventual contributions in.

Oludipe & Daniel (2012) studied to investigate the influence of gender on Junior Secondary students' academic achievement in basic science using cooperative learning teaching strategy. Total number of one hundred and twenty (120) students obtained from the intact classes of the three selected Junior Secondary Schools in the three selected Local Government Areas of Ogun State, South-West Nigeria, participated in the study, employed a quasi-experimental design. Lesson note based on the jigsaw II cooperative learning strategy and Achievement Test for Basic Science Students (ATBSS) were the instruments used to collect the relevant data. The data was analyzed using descriptive and independent samples t-test statistical methods. Findings of this study revealed that there

was no significant difference in academic achievement of male and female students at the pre-test, post-test and delayed post-test levels respectively.

Ogunkola & Garner (2013) explored the study of gender differences in participation and achievement in science, collected the data from Caribbean examination council and found there are no marked differences between the achievement of males and females in physics, chemistry and biology. He found that in chemistry 17.16 percent of the males achieved grade 1 while 16.93 percent of females achieved grade 1, This can be interpreted as no marked difference between the number males and females that made grade 1. Almost the same trend is observable in the other grades and subjects.

Bezi & Vural (2013) investigated elementary students' science achievement in relation to academic procrastination and gender. A total of 4725 public elementary students (n=2335 girls, n = 2379 boys, and n= 11 gender not provided) participated in the study. In order to collect the data The Tuckman Procrastination Scale and a Science Achievement test were utilized. Multiple regression analysis revealed that the overall model was statistically significant. In the model both academic procrastination and gender were found to make a significant contribution to the variation in elementary students' science achievement. More specifically,

2.3.2 A Relationship between attitude towards Science and Science achievement

Hedley (1966) made a study of the student's attitude towards Science and its effect on Science achievement in Manitoba secondary schools (Doctoral Dissertation). The sample for the study was large , he found that there was a positive relationship between achievement Science scores and attitudes towards Science.

Lowery (1967) conducted a study to know the effect of attitude towards Science and achievement in Science at the secondary level students. They studied an experimental

investigation into the attitude of Vth grade students towards Science over a large sample. They find that at the start of the study, girls generally have significantly more positive attitudes towards Science than boys.

Sood (1977) reported the findings of his study

1. The sample reflected positive attitude towards Science.
2. Sex difference was not significantly related to attitude towards Science.
3. The attitude of students and teachers differed significantly.

Shrivastava (1980) studied the scientific attitude and its measurement.” He found that the amount of scientific knowledge of general exposure to Science course made impact on scientific attitude positively. Scientific knowledge helped in formation of scientific attitude positively. Boys and girls differed in respect of scientific attitude. Male teachers and female teachers did not differ in respect of scientific attitude.

Hough & Piper (1982) explored the relationship between attitudes toward Science and Science achievement of elementary pupils. The sample for that was large. They used two tools. “Hough pupil process test”. For pupils Science achievement and ‘Hough Attitude Inventory’ for assessing attitude towards Science. It was concluded that there was a significant relationship between the pupils residualized gain scores on the ‘Hough pupil Process Test’ and their residualized gain scores on the “Hough Attitude Inventory” ($r = 0.45$).

Bandopdhyay (1984) studied the adolescent students' attitude and environmental and academic factors that influenced their attitude towards Science. The sample, drawn on the basis of stratified random technique, consisted of 420 adolescent students, 221 boys and 199 girls, from 21 schools of Calcutta. The tools used were a researcher-made Information Schedule to know the respondents generalities, leisure activities, family background, relations with parents, peers and teachers, and social influences,

and sub-tests of DAT battery on numerical ability, mechanical reasoning and space relation. Achievements in school subjects were obtained from the annual examination records for last three years. The scientific attitude was measured by Science Attitude Scale of Avinash Grewal (Published). The data were represented by charts and tables, and analysed by statistical tools like t-test, ANOVA and chi-square test. Found that 1. Pupils having a high positive attitude towards and a negative attitude towards Science were different with respect to the independent variables either in isolation or in interaction. 2. The obtained casual factors were environmental, attitudinal and achievement related. Parent education and SES led to favourable attitude towards Science. Teachers' influence, peers influence, vocational value of Science and future aim of life were other contributory factors. The pupils who had a favourable attitude to Science possessed higher ability in mechanical comprehension and visualization of objects in space. They were higher achievers in physical and life Sciences. 3. There existed significant interactions between (a) source of inspiration and achievement in Physical Science, (b) source, achievement in Physical Science and space relations, (c) source, achievement in Life Science and space relations.

Thnhikom (1989) studied the 'Attitude towards And Achievement in Science of Secondary students in Kaset Sart Demonstration school, Bangkok, Thailand," conducted on the population of 709 students (374 boys and 335 girls) in grades VII, VIII & IX at the Kaset Sart demonstration school, Bangkok. Thailand, to determine the differences in ATS and achievement in physical and Biological Science of Thai boys and girls in lower secondary education. The researcher developed the ATS test and used two way analysis of variance. The conclusions drawn were:

1. Boys had more positive ATS than girls.

2. Grade level needed to be considered to determine whether boys or girls had more ATS.
3. Girls attitude declined and boy's attitude improved when grade level increased.
4. The difference in achievement between boys and girls increased in Physical Science and decreased in Biological Sciences as grade level advanced.

Molly (1993) conducted a study using met analysis covering the literature between 1970 and 1991 examined gender difference in student attitudes toward Science, and correlations between attitudes toward Science and achievement in Science. Thirty-one effect sizes and seven correlations representing the testing of 6, 753 subjected were found in 18 studies. The mean of the unweighted effect sizes was 20 (SD= .50) and the mean of the weighted effect size was 16 (SD.50), indicating that boys have more positive attitudes toward Science than girls. The mean correlation between attitude and achievement was .50 for boys and .55 for girls, suggesting that the correlations are comparable. Results of the analysis of gender differences in altitude as a function of Science type indicate that boys show a more positive attitude toward Science than girls in all types of Science. The correlation between attitude and achievement for boys and girls as a function of Science type indicates that for biology and physics the correlation is positive for both, but stronger for girls than for boys Gender differences and correlations between attitude and achievement by gender as a function of Science type indicates that for biology and physics the correlation is positive for both, but stronger for girls than for boys Gender differences and correlations between attitude and achievement by gender as a function of publication date show no pattern. The results for the analysis of gender differences as a function of the selectivity of the sample indicate that general level students reflect a greater positive attitude for boys, whereas the high-performance students indicate a greater

positive attitude for girls. The correlation between students indicates a greater positive attitude for girls. The correlation between attitude and achievement as a function of selectivity indicates that in all cases a positive attitude results in higher achievement. This is particularly true for low-performance girls. The implications of these findings are discussed and further research suggested.

Kumar (1995) conducted a study of attitude towards Mathematics and Science among secondary school students in relation to sex.

The major findings of the study were as follows

1. Attitude of male and female towards Mathematics was expressed to same extent on utilitarian value dimension of attitude towards Mathematics.
2. Female group expressed more favorable attitude towards Mathematics than male groups on social value dimension of attitude towards Mathematics.
3. Attitude of male and female towards Mathematic was expressed to the same extent on aesthetic value dimension of attitude towards Mathematics.
4. Attitude of male and female towards Mathematics and expressed to the same extent on intellectual value dimension of attitude towards Mathematics.
5. Attitude of male and female towards Mathematics was expressed to the same extent.

Khatoon (1996) conducted a study to find out the attitudes and achievement of Muslim minority students in Science and also tried to find out whether there was any difference between Muslim minority and Hindu majority students in the attitudes and achievement in Science. She selected a sample of 550 senior secondary school students (170 Muslim males, 80 Muslim females, 150 Hindu males and 150 Hindu females) from 12 rural and urban colleges of U.P. A standardized instrument

developed by Grewal was used to measure the ATS and high school marks obtained in U.P. exams were taken as achievement of students. She concluded that:

- (i) Hindu students had significantly more favourable ATS than Muslim students.
- (ii) There was significant positive correlation between attitudes towards Science and achievement in Science.
- (iii) There was no significant difference between the attitudes of Hindu and Muslim female students in towards Science.
- (iv) The most important factor which affects the attitude and achievement of Muslim students in Science is their socio-economic status.

Khaton (1996) investigated attitude towards Science and its effect on Science achievement at secondary school students. She made a test over a large sample by the help of tools in her study of the minority student's attitude and achievement in Science. She finds,

- i. In general there exists a positive trend of attitude among students of both communities and 86.36% students have favourable attitude towards Science.
- ii. Application of t-test shows that Hindu students have significantly higher mean attitude score towards Science than Muslims.
- iii. The mean percentages of marks of Hindu and Muslims male students show that both differ significantly in their achievements i.e. Hindu students have significantly higher mean percentage of marks in Science than the Muslims students.

Marie (1996) conducted a study on self efficiency, attribution and attitude towards Science among high school students; The study revealed that males showed more positive attitude towards careers in Science and were more open-minded than females but females had more positive attitudes about the normality of scientist.

Derek (2009) has studied to examine the interaction effect between grade level and gender with respect to students' attitude toward chemistry lessons taught in secondary schools. The sample consisted of 954 chemistry students in grade Secondary 4-7 (approximately 16-19 years of age) in Hong Kong. Students attitudes were surveyed using an attitude toward chemistry lessons scale (ATCLS). When the ATCLS data were subjected to two-way ANOVA, the interaction effect between grade level and gender on students attitudes toward chemistry. Lesson was statically significant. The interaction effect was attributable to scores on the theory-lessons subscale and laboratory work subscale. Male students in Secondary 4 and 5 liked chemistry theory lessons more than their female counterparts. However, male students liking for chemistry laboratory work declined when they progressed from Secondary 4 to Secondary 7, no such a significant decline in attitude toward chemistry laboratory work was found in females. Overall, both males and females were just marginally positive about chemistry lessons during the years of secondary schooling. Implications of these findings for curriculum design are discussed.

Ahmad & Ashar (2011) examined the relation between attitudes towards science in biology courses and students' biology achievement. A total of 185 grade (age 17-18 years) students in Isfahan answered to a 30-item questionnaire provided by authors based on STAQ-R inventory. After collecting the date the SPSS version 16.00 software used for the analysis. The results showed that among attitude towards science dimensions, only "biology is fun for me", have meaningful and positive relation with students' achievement in biology. Also there was no significant difference between girls and boys in attitude towards biology, although girls had better achievements in biology in comparison with boys.

Narmadha & Chanundeswari (2013) investigated attitude towards learning of Science and academic achievement in Science among students at the secondary level. Using

random sampling technique 422 students, from the secondary level in different systems of education. The Attitude toward Learning of Science Scale (Grewal, 1972) was used to assess the attitude towards learning Science and the marks scored in Science were taken from their half yearly performance. The mean, standard deviation, 't'-test, 'F'-ratio, Karl Pearson's Product Moment Correlation Co-efficient 'r' are used for statistical analysis. Results showed that students belonging to the central board schools have a higher level of attitude towards learning of Science compared to students in state board but did not differ with students in matriculation board schools at the secondary level. Similarly, students belonging to central board schools performed better in Science subject compared to the students in state and matriculation board school at the secondary level. The girls are significantly better in their attitude towards learning of science when compared to the boys in all categories of schools. In matriculation and central board schools the girls are better than boys in their academic achievement in Science whereas in state board schools there is no significant difference in their gender. A positive correlation was found to exist between attitude towards learning Science and academic achievement in Science among the students.

2.3.3 Relationship between participation in sports and Science Achievement

Reith (1989) conducted a study to see the effects of sport participation on educational achievement, career mobility and social involvement for high school minority female students were analyzed by Reith , through a survey of a large national sample. The Hispanic high school female students who participated in sports were found to be more likely to score well on achievement tests, to stay in high schools and continue their education in colleges than their non-athletic peers. In contrast, black female high school athletes were found to have fewer special benefits from sport participation. They reported higher popularity than non-athletes and were more involved in

extracurricular activities. But the urban black female students who participated in sports and went directly into work force after high school actually fared worse in their careers than the non-athletes did.

Braddock & Royster (1991) conducted a study to see the impact of participation in sport activities on academic resilience among African-American 8th grade male students. Their analyses indicated that sport participation for these students was positively related to their aspirations to enrol in college preparatory programs in high school, to have definite plans to complete high school and enter college. Both interscholastic and intramural sport participants derived social status advantages (i.e., popularity and sense of importance) among their schoolmates, which were directly related to their involvement in sports. They were less likely to be involved in school related social misconduct problems, more likely to look forward to their core curriculum classes, and less likely to be judged by their teachers not giving full effort in their class work.

Ailshie (1996) examined the relationship between participation in co-curricular activities and the variables of school attendance and academic achievement. This test should be considered over a large sample by the help of test. The Result showed that as involvement in co-curricular activities increased, school attendance and academic achievement improved.

Fleenor (1997) explored the effects of participating in school sport program of CTBS test percentiles of students in the 4th and 11th grades, Fleenor compared a sample group's scores to those of the students from the rest of the United States. In this study, both male and female students who either did not play at all or who participated in school-sponsored baseball, basketball, cheerleading, football, golf, softball or tennis at any time from 4th grade through 11th grade participated. Twenty students formed

the experimental group and 20 made up the control group. Each group contained 10 boys and 10 girls. The data evaluation showed no significant differences in the CTBS percentiles of any of the groups in this study. The two groups showed no significant differences when analyzed together. Results of the study suggest that no negative/positive effects on achievement were found for students' participation in sports.

Jordon (1999) examined the effects of participation in school-sponsored sport activities on school engagement and achievement for black high school students. The potential differential effects of sport participation and the degree to which sport participation affected black students academic achievement were also among the issues that Jordan studied. Jordan found a small but consistently positive effect of sport participation on academic achievement, when other variables in the equation were held constant. This pattern of the effects of sport participation varied little across the different racial/ethnic groups. The researcher also reported that sport participation improved school engagement and academic self-confidence of all student athletes.

Din, et al. (2003) examined the relationship of sport participation to the educational achievement of African-American and Hispanic students, Melnick, Sabo and Vanfossen selected the participants from a national sample. The independent variable of the study was athletic activity participation; the dependent variables included senior year popularity, extracurricular involvement, grades achievement test performance, dropout rates, and educational expectations. The researchers found that athletic participation enhanced popularity and contributed to greater involvement in extracurricular activities. Sport participation was generally unrelated to grades and standardized test scores. Depending on school location (i.e., urban suburban, rural),

sport participation was significantly related to lower dropout rates for some minority youth. It was unrelated to educational expectations in the senior year. The researchers also noted that high school sport participation was a social resource for many minority youth, but only a modest academic resource for other.

Din, et al. (2005) conducted a study to determine whether participating in sport activities had any impact on student's academic achievement in rural high schools. The participating students (N=225) were selected from four rural high school districts. The participant's immediate pre-season grades in English, Math, Science and Social Science compared with their immediate postseason grades in the same courses. The independent variable was participating in school-sponsored sport activities and the dependent variable was the participants' postseason grades. The comparisons were conducted on a course-by-course and team-by-team basis. Results of data analyses indicated that no significant differences were found between the students pre-season and postseason grades, which suggest that participating in school-sponsored sports activities did not affect the academic achievement for the participating rural high school students.

Lipscomb (2007) investigated the relationship between secondary school extracurricular involvement and academic achievement. Independent of individual ability, it is found that athletic participation is associated with a 2% increase in Math and Science test scores. Club participation is associated with 1% increase in Math test score. Finally, involvement in either type of activity is associated with a 5% increase in bachelor's degree attainment expectation.

Aeberli, et al. (2009). The aim of the study was to compare nutrient intake, dietary patterns and physical activity in overweight and normal weight children in Switzerland. The subjects were healthy 6 to 14 year old normal weight and

overweight children (n=74 and n=68 respectively). Dietary intakes were assessed during three home visits with two 24-hour recalls and one 1-day food record. Questionnaires on physical activity and social background were completed. The carbohydrate and fat contents of the diet as a percent of energy did not differ comparing normal and overweight children, but the percentage of protein was significantly higher in overweight children. Intakes of energy, carbohydrates and fat were not significantly correlated with body mass index (BMI) standard deviation scores (SDS) after controlling for age, gender and total energy (for carbohydrates and fat). However, protein intake significantly predicted BMI-SDS after controlling for age, gender and total energy. Similarly, meat intake predicted BMI-SDS after controlling for age, gender and total energy, but none of the other analysed food groups were predictors. Time spent watching television and times spent in organised sports activity were significantly correlated with BMI-SDS. The educational level of mothers of overweight children was significantly lower than of mothers of normal weight children.

Daniayl, et al. (2012) conducted a study to establish that co-curricular activities in which university students participate have a positive effect on their academic achievements by using the questionnaire filling technique which was distributed among 500 students of the university. Found that according to the students involved in any kind of sports, participating in dramatic and other literary activities positively affects their academic performance, while watching the television has also some positive impact on academic performance, it can be deduced from the study that co-curricular activities affect academic achievements of the students and this impact also depends upon those activities in which the students are keenly involved.

Martinez & Mickey (2013) studied the link between participating in interscholastic sports and academic outcomes for Latino high school students and whether Latino students participate in interscholastic sports to the same extent as other racial/ethnic groups. Results suggest a positive association between participation in interscholastic sports and mathematics scores for Latino students, and also a larger gain in mathematics scores in comparison to White students. In addition, results indicate that Latino students do not have the same access to these types of extracurricular activities as other students.

Singh (2014) investigated the effect of level of participation in various co-curricular activities on academic achievement of students in Allahabad district, trying to establish the relationship between the academic achievement of student in different subjects like science, mathematics, language and social science with co-curricular activities, a check list was prepared by researcher under the supervision of her guide. Mean, standard deviation and correlation coefficient to establish the nature of the relationships. Data was collected from 100 students (70 girls and 30 boys), respondents selected from the three CBSE board schools of Allahabad district. Pearson product moment correlation statistical tool was used to establishing the relationship between student's achievement in four subjects with co-curricular activities and significance of each result were tested. The findings revealed the existence of a significant relationship between student's achievement in different subjects as well as total with various co-curricular activities. The result shows the significant difference between the academic achievement of boys and girls in various subjects as well as significant difference between the levels of participation in different co-curricular activities in boys and girls were also found. Study also revealed that there is low correlation between the academic achievement in science subject and language and level of participation in co-curricular activities of students and significant correlation between the

academic achievement in mathematics and social sciences and level of participation in co-curricular activities of students.

Steven, et al. (2005) designed the study to overcome these deficiencies by using nationally representative data from the National Health Examination Cycle 2 and Cycle 3 Surveys. These surveys included 1,745 children who were studied both when 6 to 11 years old (between July, 1963 and December, 1965) and about four years later when 12 to 17 years old (between March, 1966 and March 1970). Simple analysis at just one time-point reveals substantial relationships between the amount of television viewing and depressed IQ and Wide Range Achievement Test (Reading and Arithmetic) scores of adolescents. When longitudinal controls are added however these relationships become statistically insignificant and substantively unimportant. Although these data are 20 years old, they indicate no significant causal relationship between the amount of television viewed and the mental aptitude and achievement test scores of adolescents, thus supporting and extending Gaddy's recent longitudinal study of a national sample of youth.

2.4 Relationship between Science achievement and Environmental factors of study

2.4.1 Relationship between parental education and Science achievements

Chatterji, et al. (1971) studied to investigate the effect of some important aspects of social class such as income, parents education, family size, general conditions of home etc. upon the scholastic achievement. There were 230 students both boys and girls of class VIth and VIIth in eight different Bengali medium schools in Calcutta.

The result indicates that:

- (i) The economic conditions of family seemed to have no effects upon academic achievement in all the intellectual ability groups.

- (ii) The family size and the no of siblings were inversely related to scholastic achievement especially in low intellectual level.
- (iii) In some cases parents help had significant positive contribution towards higher achievement.
- (iv) Parents educational level was, directly related to the achievement of their children.
- (v) Fathers occupation was not consistently related to children's achievement.

Caldis & Bankstone (1997) studied to know the relationship between SES of peers and individual academic achievement . Student SES was measured by using participation in the federal freely reduced price lunch pros tame as an indicator of poverty status, parental educational and occupational background as a measure of family social status. A questionnaire was used to set the information related with family social status. Regression techniques were used to analyses the data. Pre family social status in particular does have a significant and substantive independent effect in individual academic achievement, only slightly less than an individually own family social status.

Begum & Phukan (2000) The study was undertaken in English medium schools at Torhat district following the syllabus of Board of Secondary Education, Assam, The main objectives are, to find out the impact of family type, impact of number of siblings and impact of education and occupational status of parents an academic achievement. The sample was consisted of 180 students of class IX, out of which 118 were male and 62 were female. Total annual marks obtained by the obtained by the students in the last annual examinations were considered as their academic achievement records. A questionnaire on socioeconomic status was prepared. Results

revealed that type of family, number of siblings, education of the parents and family income had significant impact on academic achievement of student.

Jabor, et al. (2011) conducted a study to determine if parent educational status influences the achievement in high school Science. This utilized the student's grade point average (GPA) for Science during high school years to measure achievement. The data came from the National Assessment of Educational Progress (NAEP) High School Transcript Study (HSTS) 2005. The study described the graduating high school students in the U.S. by their parent educational status and their academic achievement in science. The study compared the mathematics achievement between parent educational statuses. The comparison revealed that there were statistically significant differences in Science GPA scores between parent educational statuses, however, the effect size was small.

Rafiq, et al. (2013) explored the effect of parental involvement in the academic achievement of their children. The research was conducted in Allama Iqbal Town, Lahore city. A total of 150 students (boys and girls) of 9th class of secondary schools (public and private) were taken as respondents. Four schools were selected through simple random sampling which include one boy and one girl from each of the public and private schools categories for equal representation of both boy and girl students in the sample frame of present study. Survey questionnaire was used as a tool for data collection. After the analysis of data, it was found that parental involvement has significant effect in better academic performance of their children, that is parental involvement enhanced the academic achievements of their children.

2.4.2 Relationship between father's occupation and Science achievement

White (1982) studied the relationship between socio economic status and academic achievement. Results indicated that as SES is typically defined (income, education, and occupation of household heads) and typically used (individuals as the unit of analysis),

SES is only weakly correlated ($r = .22$) with academic achievement with aggregated units of analysis, typically obtained correlations between SES and academic achievement jump to .73. Finally characteristics, such as home atmosphere, sometimes incorrectly referred to as SES, are substantially correlated with academic achievement when individuals are the unit of analysis ($r = .55$). Factors such as grade level at which the measurement was taken, type of academic achievement measure, type of SES measure, and the year in which the data were collected are significantly correlated statically with the magnitude of the correlation between academic achievement and SES. Variables considered in the meta analysis accounted for 75% of the variance in observed correlation coefficient in the studies examined.

Ibrahim (1994) studied the relationship between the academic achievement of student in Jordan state Universities and the socio-economic status (SES) of their families. In this study statistically significant negative relationship were found between students GPA and their fathers and mothers income, occupation and education. However the relationship between parent SES and student GPA were weak and without practical significance.

Suleman, et al. (2012) conducted a study to see the effects of parental socio-economic status on the academic achievement of secondary school students. The students studying at secondary school level in Karak District, Khyber Pakhtunkhwa (Pakistan) constituted the population of the study. The study was delimited to sixty government boys' high schools in Karak District. 1500 secondary school students were selected through simple random sampling technique. A self-developed structured questionnaire was used for the collection of data. Data was collected through personal visits. After collection of data, it was organized, tabulated and analyzed. Chi-square and percentage were used for the statistical analysis of the data. He found that parental socio-economic status, parent's

educational level, parental occupational level and parental income level affect the academic achievement of secondary school students.

Ghazi, et al. (2013) investigated the relationship between parents' socio-economic status and their children academic performance. The main objective of the study was to know about different socio-economic factors which affect students' academic performance at secondary level in Khyber Pakhtunkhwa, Pakistan. Students of intermediate level (1st Year) of six districts of Khyber Pakhtunkhwa Pakistan comprised the population of the study. Seven hundred and twenty (720) students were sampled from the selected districts. Pearson Product Movement correlation was used as statistical technique. A positive significant relationship of total family income, father's job grade was found with the academic performance of the students. The results of this study showed that parents' socio-economic status is an important variable which influence their children academic performance.

2.4.3 Relationship between family size and Science achievement

Chatterji, et al. (1971) Conducted that the family size and the number of siblings were inversely related, especially in low intellectual level. Dave and Davel (1971) observed that the size of the family was not related to the academic achievement.

Ojha (1973) explored the relationship of achievement motivation with parental behaviour, psychological variables and certain socio-economic variables, viz., social classes, father's occupation, family system, family size, birth order, mother's age, parental separation, religion and cast, found that mother's love fathers permissiveness and love were, positively related where as with high achievement mother's rejections parental restrictions, rejections and protections were negatively related.

Alwin & Thornton (1984) explored the potential role of socio-economic factors in school achievement outcomes at two separate periods in the life course early in childhood and

during late adolescence. Our analytic results point to a potentially stronger role of early socioeconomic factors in cognitive development and school learning. In a single instance the case of family size, we find independent effects on school achievement from both early and late socioeconomic experiences.

Krishnan, et al. (1994) explored the study to find out the effect of familial variables on the educational status of the Adhivasis of wynod. The major hypothesis of the study is stated as, the educational status of the Adhivasis of wynad is dependent upon their family type, size and system. A stratified representative sample of 405 Adhivasis in wyand district is included in the present study. A schedule structured by the investigators was used in the interview personally conducted by one of them. Chi-square test of hypothesis of independence was employed. Joint family facilitated educational status in a better way. Smaller family size has led to higher educational status. They may be due to the possible possession of optimum resources by small families.

Pong (1997) Analysis of eighth-grade Science and reading achievement scores shows that schools that are predominated by students from single-parent families and stepfamilies negatively affect their student's achievement, even after individual demographic characteristics and family background are controlled. This negative effect of single-parent families and stepfamilies is partly explained by the relatively low socioeconomic status of children in these schools. However the negative effect of single-parent families and stepfamilies on school achievement can be countervailed when social relations among parents are strong.

Joseph (2009) conducted a study to see the influence of family size and family birth order on academic attainment of adolescents in higher institution. The sample comprised of 102 pre-degree students of University of Ado-Ekiti, Nigeria. The population of pre-degree students was 1000, including males and females. Survey method was used to elicit

information from the subjects. The data collected was subjected to statistical tests, specifically Analysis of Variance (ANOVA). The analysis of the data showed that family size and birth order have no influence on academic performance of pre-degree students of the University of Ado-Ekiti, Nigeria.

Jabbar, et al. (2011) investigated the effect of demographic factors on the achievement of secondary school students in the Punjab. The demographic factors of the students that are considered in the study were gender (male/female), urban/rural, family size and income level. The study was conducted in Punjab, 30 boys and 30 girl's secondary schools were selected and from each 15 urban and 15 rural schools were selected. The sample of student consisted of 25 male and 25 female from each secondary school. The data analyzed and interpreted by using SPSS software version 16 for chi-square, Pearson's correlation and T-test techniques. The major conclusions of the study drawn from the analysis of data were: (i) Female students excelled from the male students. (ii) Students of urban secondary schools secured more positions in S.S.C. examination 2007 than rural secondary schools in the Punjab. (iii) The number of students passed in the S.S.C. annual examination 2007 of urban secondary schools was better than the rural secondary schools. (iv) Family size affected the achievement of the students. (v) Financial pressure left disappointing effects on the performance of hard up learners.

2.4.4 Relationship between Science resources available at home and Science achievement

Sarkar (1983) explored the contribution of some home factors on children scholastic achievement. The major findings were: the home variables such as educational environment, income spatial environment, social background. Provision of facilities and parent child relationship showed a significant difference between the high achievers and low achievers at 0.01 level.² The child rearing attitude of the mothers of the two groups

showed a significant difference between the mothers of the high achievers at 0.01 levels, indicating thereby that the mothers of the two groups possessed different attitudes regarding child rearing practices.

Pamela & Davis-Kean (2005) examined the process of how socioeconomic status, specifically parents' education and income, indirectly relates to children's academic achievement through parents beliefs and behaviours. Data from a national, cross-sectional study of children were used for this study. The subjects were 868, 8-12 year-olds, divided approximately equally across gender (436 females, 432 males). This sample was 49% non-Hispanic European American and 47% African American. Using structural equation modelling techniques, the author found that the socioeconomic factors were related indirectly to children's academic achievement through parent's beliefs and behaviours but that the process of these relations was different by racial group. Parent's years of schooling also was found to be an important socioeconomic factor to take into consideration in both policy and research when looking at school-age children.

Hofferth (2010). This study provides a national picture of the time American 6- to 12-year olds spent playing video games, using the computer, and watching TV at home in 1997 and 2003, and the association of early use with their achievement and behaviour as adolescents. Girls benefited from computer use more than boys, and Black children benefited more than White children. Greater computer use in middle childhood was associated with increased achievement for White and Black girls, and for Black but not White boys. Increased video game play was associated with an improved ability to solve applied problems for Black girls but lower verbal achievement for all girls. For boys, increased video game play was linked to increased aggressive behaviour problems.

Jebsosn & Moses (2012) investigated relationship between learning resources and student's academic achievement in Science subjects in Taraba State Secondary Schools. A total of 35 Science teachers and 18 Science head of departments from 6 schools from three geopolitical zones of Taraba State were involved in the study. Three different research instruments were employed in collecting the data: (i) Bio-data of science teachers for Biology, Chemistry and Physics. (ii) Laboratory equipment inventory checklist (LEIC) for Biology (BLEIC); Chemistry (CLEIC) and Physics (PLEIC) for the 18 Science laboratories of the schools selected, (iii) Students' Academic Achievement scores collect data on students scores in WASSCE from 2003-2007;. Pearson's Product Moment Correlation Coefficient and student's t-test statistics. The results of data analysis showed that laboratory equipment and the number of qualified teachers were inadequate for Biology, Chemistry and in Physics where there were no qualified teachers at all. The results also indicated that there was no difference in the academic of schools with adequate laboratory equipment and those without them.

2.4.5 Relationship between exposure to media and Science achievement

Young, et al. (1996) analysed achievement test scores related to individual and school level factors in a national sample of about 2,000 x-grade students participating in the longitudinal study of American youth. In order to investigate the relative importance of school and individual factors in the determination of Science learning. Hierarchical linear analysis showed that individual measures accounted for most of the variance previous achievement was the preponderant-influence as subsequent achievement. Nonetheless, initial Science attitude, instructional time, home environment, and exposure to mass media were also significant individual level influences on Science achievement.

Ghosh, et al. (2000) examined the proficiency of the neo-literates of Mass Literacy Programme (MLP) in reading, writing and numeracy with respect to gender and caste among 96 neoliterate children (9-14 years) of tribal belt of Sundarban area. “Literacy and Numeracy Achievement Test” was prepared on the basis of “Dave Committee Report, (1992)”. Questionnaire was prepared for collection of information from MLP personnel. The scores of non tribal neoliterates were better than that of tribal is in the 3 R's (i.e. reading writing and arithmetic). Also the scores of male neo-literates were better than those of female neo-literates. The study revealed that the factors which influenced MLP were proper methodology of teaching, well-equipped literacy personnel, good quality teaching materials, well-knot organisation, proper academic and administrative supervision, profuse use of mass media of spread awareness, and universalisation of elementary education for children aged 6-11 years. Overall social and economic development, improvement in health, nutrition and sanitation, and population control are recommended for successful mass literacy programme in this.

Dina (2005) examined that media can influence aspects of a child's physical, social and cognitive development, however, the associations between a child's household media environment, media use, and academic achievement have yet to be determined.

Young, et al. (2006) explored the relative importance of school and individual factors in the determination of Science learning. Hierarchical linear analysis showed that individual measures accounted for most of the variance. Previous achievement was the preponderant influence on subsequent achievement. Nonetheless, initial Science attitude, instructional time home environment and exposure to mass media were also significant individual level influence on Science achievement.

Ennemoser & Schneider (2007) explored the long term effects of television viewing on the development of children's reading competencies. They found that vocational program viewing was positively correlated with reading achievement. Relations between entertainment program viewing and reading performance were generally negative. Children's who were classified as heavy viewers (average viewing time per day = 117 minutes) show lower progress in reading overtime as compared to medium and light viewer average viewing times per day 69 and 35 minutes, respectively. Partial support was found only for 1 of 3 tested casual mechanisms, namely television induced reduction in leisure fine book reading.

Ahmad & Yousef (2008) explored the extent and effects of intranet use on Ajman University students' achievement and self-confidence. This study used the quantitative method. Fifty-eight male and female students taking the Modern Education Technology course at Ajman University participated; 29 of them we put into the control group, and the other half in the experiment group. The study found that experiment group used the intranet and internet more often than the traditional group. Students in the control group and the experimental group had a positive, high level of confidence in all items. Also, the study found that there was no significant difference in achievement based on the number of hours spent using the intranet and internet; also, there is no significant difference in self-confidence or achievement between male and female students in the control group.

Kirkorian, et al. (2008) examined the relationships among a child's household media environment, media use and academic achievement. The household media environment is significantly associated with student's performance on the standardized tests. It was found that having a bedroom television set was significantly and negatively associated with students test scores, while home computer access and

use were positively associated with the scores. Regression models significantly predicted up to 24% of the variation in the scores. Absence of a bedroom television combined with access to a home computer was consistently associated with the highest standardized test scores.

Li & Ma (2010) examined the impact of computer technology (CT) on Mathematics education in K-12 classrooms through a systematic review of existing literature. A meta-analysis of 85 independent effect sizes extracted from 46 primary studies involving a total of 36,793 learners indicated statistically significant positive effects of CT on Mathematics achievement. In addition, several characteristics of primary studies were identified as having effects. For example, CT showed advantage in promoting Mathematics achievement of elementary over secondary school students. As well, CT showed larger effects on the Mathematics achievement of special need students than that of general education students, the positive effect of CT was greater when combined with a constructivist approach to teaching than with a traditional approach to teaching, and studies that used non-standardized tests as measures of Mathematics achievement reported larger effects of CT than studies that used standardized tests. The weighted least squares univariate and multiple regression analyses indicated that Mathematics achievement could be accounted for by a few technology, implementation and learner characteristics in the studies.

Delen, et al. (2011) conducted a study to see the effects of information and communication technologies (ICT) on students Math and Science achievement. The data for this study comes from the 2009 administration of The Programme for International Student Assessment (PISA), an internationally standardized assessment administered to 15 year old students (9th grades) in schools. The sample includes 4996 students in Turkey. Hierarchical linear modelling was used for analyzing the effects of ICT in student and

school levels by using ICT-related variables such as technology scores and ICT availability at home, etc. The results indicated that students familiarity with ICT and their exposure to technology helped to explain Math and Science achievement gaps between individuals and schools.

Adegoke (2013) studied the relationship between internet browsing, and students' achievement in school subjects such as Agricultural Science. This study therefore, sought to investigate the relationship between internet browsing and students' achievement in Agricultural Science. A sample of 300 students was drawn from 10 schools from the five local government areas of Ogbomosho. Internet Browsing Pattern Questionnaire (IBPO) and Agricultural Achievement Test (AAT) were used to collect data. Descriptive statistics and Pearson moment correlation were used to analyze data. Majority of the students have access to the internet. Most of the students that have access to the internet browse more for non-educative information (socio-networking sites). The relationship between internet browsing and students' achievement in Agricultural Science through positive is not significant.

Shahram & Azadeh (2014) investigated the relationship between internet addiction and social skills & high school student's achievements. The statistical universe of the study included all of the students of district 2 of Kermanshah City who were studying in academic year of 2013-2014. For this study, 320 students were selected, of which 150 students were girls and 170 were boys selected through cluster sampling. The Inventory of Social Skills (TISS) was used for collecting the data. The data was analyzed through regression method. The findings showed that Internet addiction could at a significant level predict social skills and educational achievement, that is the higher the scores for internet addiction, the lower the social skills and educational achievement. Moreover, there was no significant difference between boys and girls with regard to internet

addiction. Therefore, the results imply that unlimited use of internet has a devastating negative influence on both social skills and communications and educational achievements.

2.4.6 Relationship between time spent on Science home work and Science achievement

Singh (2002) examined the effects of 3 school-related constructs motivation, attitude, and academic engagement-on 8th-grade students achievement in mathematics and Science. Although cognitive abilities of the students and their home backgrounds are important predictors of achievement, in recent years affective variables have emerged as salient factors affecting success and persistence in Mathematics and Science subject areas. The authors used the nationally representative sample of 8th graders drawn from the National Education Longitudinal Study 1988. They used structural equation models to estimate and test hypothesized relationships of 2 motivation factors, 1 attitude factor and 1 academic engagement factor, on achievement in Mathematics and Science. Results supported the positive effects of the 2 motivation factors, attitude and academic time on Mathematics and Science achievement. The strongest effects were those of academic time spent on homework.

Michael (2002) examined the relationship between home and school factors and academic achievement in a local authority grammar school. An investigation was made of the relationship between the pupils self-report of the time they spent on homework and their levels of achievement in school examinations. Pupils varied considerably in the amounts of time they reported spending on their homework and levels of time on homework had a fairly strong positive association with academic achievement. This association was maintained when verbal reasoning scores at entry to the school and parental class and education were controlled. However, the

association between time on homework and performance was considerably stronger for pupils from working-class backgrounds and pupils whose parents had not themselves had experience of a selective school than for other pupils. Parental social class and education were controlled. However, the association between time on homework and performance was considerably stronger for pupils from working-class backgrounds and pupils whose parents had not themselves had experience of a selected school than for other pupils. Parental social class and education were only weakly related to the amount of time their children spent on homework and part-time employment and the amount of time spent watching television were not related to time on homework.

Matltese, et al. (2012) studied the association between time spent on homework and academic performance in Science and Math by assessing survey and transcript data from two nationally representative samples of high school students collected in 1990 and 2002. Using multiple linear regressions and controlling for students' background, motivation, and prior achievement, investigated how much variance in Science and Math course grades and achievement test scores could be explained by time spent on homework in those classes. The results indicate that there is no consistent significant relationship between time spent on homework and grades, but a consistently positive significant relationship between homework and performance on standardized exams.

2.5 Relationship between Science achievement and Institutional factors of study

2.5.1 Relationship between types of management and Science achievement

Reeta (1986) conducted a study to compare private and government schools on matriculation result of 1985. A correlation statistics was also worked out to find out the mean scores on Mathematics and Science (in both private and government settings). The

results show that the pass percentage government student's settings were 45.8 as compared to the 87.5 percent of the boys belonging to private institutions.

1. The pass percentage of government girls was 44.8 and that of 81.8 in case of private girls.
2. The highest marks percentage was 81 in case of private schools and only 76 in case of government school.
3. The private institution got 7 positions with an average of 80 percent marks as compared to position from government schools with an average of 78 percent marks.
4. The number of first divisionary from private sector was more than govt. sector. It was 263 in private schools and only 48 in govt. schools.
5. The number of students failed in Math and Science was more in case of govt. schools than private schools.

On the whole of was found that: The boys have done significantly better than girls (the level of significance.01).

1. Private schools boys have performed significantly better than government school boys (the level of significance.01).
2. Similarly private school girls have done significantly better than government school girls.

White (1992) conducted a study to examine the effect of type of schools on achievement in vocabulary and mathematics. The Major results of the study are as under: Once public and private schools are statistically equated they appear be produce similar gain in achievement. (i) On average catholic school students, slightly scored higher in vocabulary and mathematics test then public school students. (ii) Student background characterized

like SES largely influence the educational gains. (iii) That the difference in achievement in public and private school are trivial in size and highly uncertain.

Gaeta (1994) found that in Uttar Pradesh, private unaided junior schools were significantly more cost-effective than either government or private aided junior schools. Surveying grade 8th students in 30 secondary schools in Lucknow in 1991 and controlling for student background characteristics and selection defects, it was found that students in private unaided junior schools performed significantly better on tests of reading and Mathematics than students in government and private aided schools.

Verghese (1994) found that schools managed by private sector show marginally better performance than government schools. Duraisamy (1999) results indicate that students from private unaided schools do significantly better than public school counterparts and private aided school students in language and Math. Murthy and Kulshrestha, 1991. White, 1992, provide in their studies a strong evidence that there is, in vocabulary and Math, higher achievement for comparable students in private schools than public schools.

Murthy & Kulshrestha (1999) tried to study whether academic anxiety facilitates or impedes academic achievement in two management system viz. private and public school. A sample of 199 class IX students comprising boys and girls (100 boys and 99 girls) were taken from Government and public school of South Delhi. The academic anxiety scale of Sinha was used as tool to collect the data. The collected data were analyzed statistically using mean, standard deviation, correlation coefficient, one way ANOVA and for post hoc comparison, Duncan's Multiple Range Tests. Major finding of the study are academic anxiety and academic achievement are inversely and significantly related. It means, as the academic anxiety increases, the achievement level decreases.

1. That the mean difference of boys and girls of government and private schools

2. differed significantly on their academic achievement. The private boys have achieved far better followed by private girls. Govt. Boys and girls while as on the whole boys and girls do not differ significantly in academic achievement.

3. It has been found that government and private school students differ significantly (level of significance .01 in academic achievement and this difference is in favors of private school students).

Rivkin, et al. (2005) examined the impact of schools and teachers in influencing achievement with special attention given to the potential problems of omitted or mis measured variables and of student and school selection. Unique matched panel data from the UTD Texas Schools Project permit the identification of teacher quality based on student performance along with the impact of specific, measured components of teachers and schools. The results suggested that the effects of a costly ten student reduction in class size are smaller than the benefit of moving one standard deviation up the teacher quality distribution, highlighting the importance of teacher effectiveness in the determination of school quality may also contribute to Science achievement as measured by the GHSQT.

Aderonke, et al. (2013) conducted a study to find out extent to which school factors predict senior secondary school students' achievement in Chemistry. Ex-post facto research type with a survey design was adopted for the study. The sample used consisted of senior secondary school Chemistry students and teachers drawn from fifty seven (57) local governments and development areas of Lagos state. Pearson Product Moment Correlation and Multiple Regression Statistics were used to analyze data collected. Findings from the study showed that as the conditions accrued to school factors improve, the performance of students in Chemistry improves. The study also found that

school type made no significant relative contributions to students' achievement in Chemistry.

2.5.2 Relationship between medium of instructions and Science achievement

Anand (1973) studied the effect of socioeconomic environment and medium of instruction on the mental abilities and the academic achievement of children in Mysore at secondary school level. The analysis revealed the following (I) the F values of score on all the criteria tests were found significant. (II) three S.E.S. groups differed significantly from one another in their non-verbal and verbal intelligence (III) high S.E.S. group achieved higher Mean scores than pupils in both low S.E.S. group and middle S.E.S. and academic achievement was found to exist even when the influence of intelligence of non-verbal as well as verbal type was partial led out (VI) the relationship of media of instruction to intelligence was found inconsistent whereas that of S.E. environment remained almost identical, the impact of socioeconomic environment was found to influence mental abilities and academic achievement, (VII) Student studying through Kannada medium achieved significantly mean score than those studying through English medium.

Raveendranathan (1983) studied the impact of medium of instruction on the Science achievement, Science interest and mental health status of secondary school students. The objectives of the study were (i) to compare the Science achievement, Science interest and mental health status of secondary school pupils in the English medium and Malayalam medium classes, and (ii) to determine the relationship between the medium of instruction and Science achievement, Science interest and mental health for the sample and sub sample. The main hypothesis was that the pupils studying in the English and Malayalam medium classes differed significantly in their Science achievement, Science interest and mental health status. The main findings of the study were, 1. Science achievement, Science

interest and mental health status of pupils of /English medium classes were higher than those of pupils of Malayalam mediums classes. 2. Science achievement, Science interest and mental health status of pupils of English medium classes for sub- samples equated on the basis of intelligence, interest and mental health status. 3. for sub-samples equated on the basis of high socio-economic status and high mental status.

Ansari (1984).The objectives of the study were (i) to construct and standardize a battery of achievement tests in general Science for pupils of classes V, VI and VII studying through Hindi as the medium of instruction in Greater Bombay, (ii) to compare the achievement in Science of children studying in municipal and non-municipal schools in the city of Greater Bombay, and (iii) to compare the achievement of boys and girls in Science. For standardization of achievement tests, the test items were tried out on different samples. The try-out sample was 1200 students. Item statistics were calculated. The final sample for fixing the norms included 1702 students of class V, 1462 students of class VI and 1391 students of class VII. The norms were expressed in stoniness, percentiles and standard scores.

The major findings were as follows

1. The performance of boys was better than that of girls.
2. The students of non-municipal schools had a better performance in general Science than those municipal schools.
3. These findings held good for all the classes, viz. class V, class VI and class VII.

Patil (1999) found that English medium school in Bhubaneswar city had very good infrastructural facilities like building, qualified teaching staff, furniture, playground, laboratory, library, sports equipments, computer and school but which were not

available in most of the state managed schools. Talent and economic status were two main considerations for selection and admission in English medium schools.

Begum & Phokan (2000) conducted a study in English Medium Schools at Jarhat district following the syllabus of Board of Secondary Education, Assam. The sample consisted to 180 students of class IX. Out of which 118 were male and 62 were female. Total annual marks obtained by the students in the last annual examinations were considered as their academic achievement records. A questionnaire on socio-economic status was prepared. Results revealed that type of the family, number of siblings, education of the parents and family income had significant impact on academic achievement of students.

Mirza, et al. (2014) presented a Study aiming to empirically test the theoretical academic achievement model for the perceived impact of the medium of instruction. It explores the effect of English as medium of instruction on academic performance. For this retrospective study, a self-made questionnaire was used to collect the data from 300 university students by using the stratified random sampling with proportional allocation. This study uses structural equation modelling (SEM) to indentify the critical dimensions in the model. The results support the hypothesis that good learning in English language does not only rely on the English language knowledge, but other factors such as students' ability and talent, communication skills, supportive teacher and supportive home environment, motivation and the right attitude towards language also affect the learning and Academic achievement both directly and indirectly.

2.5.3 Relationship between School resources and Science achievement

Sutton & Soderstrom (1990) investigated the relationships between school and social factors reported on the Illinois goal assessment program (IGAP). The participants in this study included all of the 3,856 schools in Illinois that reported information for the 1994

Illinois school report card. Statistical analysis included the generation of frequency distribution and descriptive statistics for all variables. Co relational analysis included bivariate correlation multiple linear regression and stepwise multiple regression. Results revealed that all of the independent variables (except high school per pupil expenditure) were significantly related to achievement scores. A schools IGAP achievement score is more a function of the school demographic status and SES than its effectiveness education legislators, and the public should consider this when comparing achievement among and rank them accordingly.

Sajitha (1994) investigated as whether the greater managerial discretion associated with the private sector leads to high academic performance in Tamilnadu . A multi grade sampling design was used, yielding on analytic sample of 2667 pupils in 113 schools (65 public schools, 24 private aided schools and 24 unaided private schools) located in five districts of state. Major findings of the study are (i) not the father's education nor does mother's education seem to affect student performance. (ii) Aided schools exert as strongly positive effect on mathematics achievement but the effects for reading comprehension are mixed.(iii) the class- teacher ratio has a positive effect on mathematics achievement. (iv) Pupils in school with physical facilities score higher. (v) Private unaided schools performed worse than public schools. (vi) Other important results included the factor that longer teacher experience seems to produce a negative effect.

Singh & Saxena (1995) attempted to study the effects of school related variables on pupil achievement using the Baseline Assessment Studies (BAS) data's in eight states. Main Results, the results show that there are large and statistically significant differences between boys and girls within school in their achievement in Mathematics in states of Assam, Haryana, Karnataka, Madhya Pradesh and Orissa. These differences also found statistically significant in language achievement for all states except Haryana and Kerala.

1. At the school level the mean SES is positively associated with the achievement in mathematics and language after adjusting for pupil's background.
2. Mother and Father's education and father's occupation have positive association with pupil achievement and are mostly consistent across states.
3. The factors of educational and physical facilities in school have positive association with school mean achievement in Mathematics

Gupta (2003) conducted an experimental study to see the impact of physical facilities of primary schools on scholastic achievement of the students. He has taken primary schools of two districts i.e. Calcutta and Coach Bihar. Two random samples of schools were estimated. The three subjects (i) Bengali language (ii) Arithmetic and (iii) Environmental studies are taught in primary. Three achievement tests for three subjects were constructed and used to assess the academic achievement of the children at the end of the course. The result of the test indicates that differences between means of two districts in all three subjects are significant at 0.001 level as (ii) students of primary school of Calcutta has significant higher mean achievement score in Arithmetic than the primary school student of Cooch Bihar (iii) The Primary school of Calcutta has good physical facilities than the primary school of Cooch Bihar.

Owoeye, et al. (2011) conducted a study to know that how the facilities relates to academic performance of students in agricultural science in Ekiti state of Nigeria between 1990 and 1997. The study population was results of the West African School Certificate Examinations (WASCE) conducted between 1990 and 1997 in 50 secondary schools in both rural and urban areas of the state. One validated instrument (STQF) was used for data collection. Data were analyzed using mean and t-test. The results showed that there were no significant differences in the performance of students between rural and urban secondary schools in term of availability of library facilities ($t = 1.79, p < 0.05$),

availability of textbooks ($t= 1.20$; $p < 0.05$) and availability of laboratory facilities ($t = 1.83$, $p < 0.05$). It has been established that facilities are potent to high academic achievement of students.

Sevasci, et al. (2013) explored the study to see the relationship between the academic achievement level of 7th grade students and the educational resources of schools. The population of the study was the elementary schools in the province of Burdur in 2007-2008 academic. Two stage cluster sampling was conducted in conformity with the aim of the study. To analyzed the data mean, standard deviation, percentage and frequency distribution and spearman's correlation coefficients was used, found the relationship between the educational resources of the schools and the academic achievement as a whole, there are negative and significant relationships between the SBS scores of the students, and the average service length of the teachers, the lack of qualified science teachers, the lack of qualified Turkish teachers, the lack of the teachers in other courses and the lack of the laboratory technicians. That is there is a relationship between the educational resources and academic achievement.

Teacher Pupil Ratio and Science achievement

Geo (2002) conducted a study on California schools that focused on examining aggregated school-level achievement s reflected in the state's Academic Performance Index for the school and a number of school-level student, school and teacher variables. Using multiple regression, she found that two teacher quality factors showed small but significant negative correlations with students achievement: The percentage of emergency-permit teachers in the school and the percentage of first-year teachers in the school (controlling for credential status) . The study is hampered by the fact that fact it uses aggregated student and teacher data rather than linking individual student achievement scores with teacher. In addition, given that hard-to-staff schools typically have all three factors-low student

achievement, many first-year teacher's and many uncertified teachers-it is possible that an unspecified (hidden) variable might explain the relationship. Thus, no casual claims can be made and the generalizability of the findings is limited by the study design.

Thum (2003) conducted research using linked archival data for elementary students and teachers in Arizona. He tested production-function model on 75 teachers and 1,276 students in grades 3-6 in elementary school in Arizona. He used student- and classroom-level covariates in the analysis, including sex, race, English proficiency, prior achievement, special education status, and grade level. He found that the mean growth for student test scores was positive and significant in all three grades. Using a teacher productivity profile (a function of targeted gains, degree of confidence and model), he ascertained that only 17 of the 65 teachers who had 10 or more students in their classrooms achieved at least a 5 percent gain in student achievement in their classrooms at the 70 percent confidence level, and only 12 achieved that gain at the 80 percent confidence level. Thum's findings suggest that while teachers are certainly contributing to student learning, it may be difficult to measure teacher's contributions with a high degree of certainty. Although many teachers had students who gained at least 5 percent, the confidence levels were too low to know whether such gains could be attributed to the teacher, to other sources, or merely to chance. For those who believe that teacher contributions to student learning are a measure of teacher quality, this question remains: How much confidence is enough for certainty that the gains are truly attributable to the teacher: 80 percent?, 70 percent? or Less?

Nye, et al. (2004) determined the actual degree of teacher effects on student achievement. They defined teacher effects as his portion of student achievement that remains accounted for after controlling for student demographics, class size, and school fixed and random effects. To examine achievement gains, the authors also controlled for lagged test scores.

The authors used data from the four-year Tennessee Project STAR. (Student Teacher Achievement Ratio) experiment in which students and teachers were randomly assigned to classrooms with a range of teacher-pupil ratios. Their sample included 79 elementary schools in Tennessee. They found that between-classroom effects on achievement gains ranged from 0.123 (third grade) to 0.135 (second grade) for Mathematics, tests and from 0.066 (first grade) to 0.074 (third grade) for reading tests. All effects were significant. The between-classroom effects on achievement status were similar. The authors' examinations of teacher experience and education effects through hierarchical linear modelling, for the most are not significant or of small magnitude, some were even negative depending on the year and grade, they found that observable teacher characteristics have small but significant effects on student achievement gains but that most of teacher effectiveness is due to unobserved differences in instructional quality. They also determined that teacher effectiveness increased during the first year but levelled off after the third year.

Carr (2006) linked Ohio teachers' experience, degree level, and designation as highly qualified by NCLB requirements with student achievement as measured by Ohio's standardized proficiency tests. He used archival data from students and teachers in traditional and charter schools for the 2004-05 school years. Other variables linked by him with student scores included student attendance, mobility, and disciplinary referrals. Controls included student socioeconomic status, learning disability status, race, and community type (urban versus nonurban). He also considered policy alternatives that could be tied to results, including increasing school funding, changing funding priorities, decreasing student-teacher ratios, increasing teacher quality, and improving student behaviour. Carr's findings suggested that for public schools, teacher quality (i.e. highly qualified teacher status) was significant in 18 of 21 models but teacher experience and advanced degrees did not significantly contribute to student achievement (when controlling

for highly qualified status). Teacher variables made no statistically significant contribution in charter schools. Although the teacher quality effects in public schools were statistically significant, they were not large. This finding suggests that NCLB-authorized -paper qualifications alone account for only a small percentage of teacher contributions to student learning as measured by student achievement test scores.

Noell (2006) used value-added scores for Louisiana students to examine the efficacy of teacher preparation programs. In the first phase of the research, value-added scores were calculated for students in Grades 4-9 in 66 of the 68 Louisiana public districts, and then linked with teachers. Databases were constructed to allow separation of subject tests so that teacher effectiveness could be examined based on scores in specific subjects (English language arts, Mathematics, Science, and Social studies). Not surprisingly, the single largest predictor of student achievement was the student's prior test score in the content area, followed by prior achievement in other subject areas in the next phase of the study, teachers preparation programs were identified and ranked according to estimates of effectiveness. Although the author found a relationship between teacher preparation programs and teacher effectiveness, large overlapping confidence intervals meant that the relationships could not be reliably determined with the data.

Agah, et al. (2013) examined the determinants of senior secondary school of students" logical reasoning and Mathematics achievement. Three factors; age, sex and class level were viewed as determinants of students" logical reasoning. Ex-post-facto research design was used for the study and the sample size was 420 senior secondary school students in Olamaboro Local Government Area of Kogi State-Nigeria. Three research questions were raised and three hypotheses also stated and tested at 0.05 level of significance. The instrument used for data collection was "Mathematical Reasoning Test (MRT)" developed by the researchers and validated by two Mathematics Educators and one

measurement and evaluation lecturer. The reliability of the instrument was determined using inter-rater approach and Kendall's coefficient of concordance statistic gave .84. Data was analyzed using t-test and analysis of variance. The findings revealed among others that; age and class levels determine students' logical reasoning in Mathematics. It was recommended that age and class level should be given serious recognition in planning and organizing the Mathematics curriculum.

2.6 Review of the Studies

A critical analysis of the above mentioned studies give rise to certain substantive inquiries which need to be highlighted and addressed for the sake of further investigation. Most of the studies whether conducted in India or abroad support multiple results leading to phenomena where the need of further research becomes imperative. In the area of personal, environmental and institutional factors the researcher found contrary and mixed results. In the area of Personal factors, Kumar (1995) found that attitude of male and female towards mathematics was expressed to same as extent. As in the area of Environmental factor Pamela & Davis (2005) found parent's education and income directly related to academic achievement. Whereas in the Institutional factors Verghese (1994) found private schools shows better performance than government schools.

The study conducted by Linn (1989) found that male have greater access to Science and technical fields and greater earning power than females. Lee (1998) found males show higher motivation levels than females. Clementine & Barber (1987) investigated that boys consistently scored lower than girls. The studies of Sarkar (1983), Singh (1984) showed that male scored higher than boys. Wong & Staver (1997) found that boy scored higher than girls. Bezci & Vural (2013) found that girls appeared have higher science achievement compared to boys. The study conducted by Lowery (1967)

found that girls generally have significantly more positive attitudes towards Science than boys. The study conducted by Narmadha & Chanundeswari (2013) found a positive correlation between attitude towards learning Science and academic achievement in Science among the students.

Jabbar, et al. (2011) found that family size affected the achievement of the students. Young (1996) founds that exposure to mass media were significant individual influence on Science achievement". Barber (2002) found that Math, Science and reading scores were positively correlated with national income and mass media. Dina (2005) found that media influence that academic achievement of the students. Shahram & Azadeh (2014) found that unlimited use of internet has a devastating negative influence on both social skills and communications and educational achievements. Epstein & Voorhis, (2001) found positive and significant relationship between time spent on home work and achievement.

Christopher & Sarch (2006) found that private schools perform remarkably well, after outscoring private and charter schools. Aderonke, et al. (2013) found that school type made no significant relative contributions to students' achievement in Chemistry. The medium of instructions (reading and writing) of the students are significantly related to science achievement. Anand (1933) found the students studying through Kannada Medium achieved significantly mean score than those studying through English medium. Mirza, et al. (2014) found that motivation and the right attitude towards language also affect the learning and Academic achievement both directly and indirectly.

The contradictory findings of various studies mentioned above inspired the investigator to conduct a study of influence personal, environmental and institutional factors on achievement of secondary school students in Science. There is already lack of research activity in the area of secondary education in the state, although a lot of

research has been conducted outside the country on these variables, still all these variables in combination have not been studied extensively.

Besides getting an overall view of research at secondary stage of education, the review of literature helped the investigator in understanding the important variable like attitude, gender, sports, prenatal education, father occupation, Science resources available at home, media, time spent at Science home work, types of management, medium of instruction and school resources and its impact on Science achievement at secondary school students. The review of studies highlighted the need for such a study in the light of inconclusive and conflicting finding. It also come to the notice of the researcher that the work so far done in this area in India is inadequate and the area needs further exploration especially at secondary stage of education. The review through some light on method of data collection, research design, method of tool construction, standardization and use of statistical tool for analyzing data, which helped the researcher in developing an appropriate methodology for the present investigation which will be discussed in the next chapter.