INTRODUCTORY ORIENTATION

1.1 Introduction

Education on all accounts is accepted to be a systematic and applied discipline. It is systematic because it draws heavily upon other discipline. It is applied because educational ideas have to be practiced before they could gain proper acknowledgement and accuracy. It raises the status of the human beings and the community as a whole. It broadens the mental horizon of the human beings.

Education involves the transfer of communication of information knowledge and skills from one point (the source) to another (the Receiver). According to Gandhi “Education Means the all round drawing out the best in child, man, body, Mind and Soul”.

Education is described by Kirk and Gallagher (1983:34) as the mirror of the society, showing its strengths, weaknesses, hopes, biases and key values of its culture. Thus, education has a definite role to play in the development of people and countries. Education plays a significant role in the development of people because people are the wealth of any nation; therefore, people are viewed as a focus for development. It plays a vital role in the development of the country because education is the source of growth of any country. This may be one of the reasons why United Nations Educational Scientific and Cultural Organization (UNESCO) (2001:9) declare education a vehicle for and indicator of development.

Education and training play a vital role in assisting individuals and societies to adjust to social, economic and cultural changes and promote the development of the human capital essential for economic growth. Modern education, schooling in particular, aims at imparting knowledge, skills and attitudes required by the young ones to become functional
in their respective societies. Schools are therefore intended to serve as agents for developing individual citizens within a country (Pandey1996:77). In essence, schools are institutions where children are groomed to appreciate what the society in which they live stands for and are equipped in order for them to contribute to the advancement of their society.

Education is universally recognized as the most effective tool of bringing about change towards the social and economic betterment and cultural transformation of a society. It raises the status of human being and the country as a whole. It broadens the mental horizon of the human being. In one hand education develops the total personality of the individual; on the other hand it contributes to growth and development of the society. It is only through education the moral ideas and spiritual values, the aspiration of the nation and its cultural heritage are transferred from one generation to another for preservation, purification and sublimation into higher and higher culture. Humphreys, et al. (1960) have very correctly remarked “our future material and cultural welfare and progress, even our survival as a nation depends upon the wise use of abilities and energies of our people.”

Science and Mathematics are the parts of educational system which play a pivotal role in making a man rational and develop his independent thinking and help in removing the superstitions, prevalent in the system in various forms. In view of the modern development and its importance in today's world, the Science and Mathematics education has assumed a significant place in the curricula of primary and secondary school education.

In India, an attempt to take a holistic view of the role of education in national development was made in 1986. The National Policy on Education NPE-1986 (Govt. of India, 1986) is a landmark in the history of Indian education. The NPE-1986,
visualized education as a dynamic, cumulative, life long process providing diversity of learning opportunities to all segments of the society. It envisaged improvement and expansion of education in all sectors, elimination of disparities in access and stresses on improvement in the quality and relevance of education at all levels. The NPE-1986 also emphasized that education must play a positive and interventionist role in correcting social and regional imbalances in empowering women.

Science education is a part of education which makes a man rational, develops his independent thinking and helps in removing the superstitions, prevalent in the society in various forms. In view of the modern developments in Science and its importance in today's world, Science education and scientific outlook have assumed a significant place. Don-Phillips stated that Science education or indeed all education must develop in students both an awareness of the problems facing the society and the capacity to contribute toward their solution.

Science and Mathematics have become a substantial and integral part of an organized society. There is a close interaction between Science and Mathematics and the economic, social, political and educational issue of the society, therefore, there is hardly and need to justify the place of Science in a scheme of general education for school children. The objectives of Science teaching at secondary level as spelt out by the NCERT (1988), clearly indicates, “that the basic purpose of Science education at secondary level is to understand the nature of Science, its processes, methods and scope, so that the students can use scientific method to solve their problems and develop scientific attitude”. Another important objective of secondary school Science is to provide a sound foundation for those seeking to continue the study of Science at higher level. According to Education Commission (1964-66) in 1968, “the aim of teaching Science in the primary school should be to develop proper understanding of
facts, concepts, principles and processes in the physical and biological environment”.
The purpose of Science education at primary stage should not be to stuff the minds of
the children with facts and information, but to sharpen their senses to enable them to
observe their environment and to enrich their experiences.

There is close interaction between Science and Mathematics and the economic,
social, political and educational issues of the society. There is much discussion about
the relationship between gender and achievement in Science and Mathematics
education in these days. The concern has arisen because less number of female enters
the academic and professional areas related to Science and Mathematics. Here it
would be appropriate to understand the word “Gender”. It is the word that is inclusive
of both boys and girls on the basis of social justice and mutual respect. Meanwhile,
investigation of gender equity has attracted the attention of many scholars in national
and international study.

It is said that Science education in the schools should make a revolution in
attitudes and interest of children. In the words of Irwin L. Ramsay “We are living in a
world of change and challenge a world Filled with stocking and awe inspiring
discoveries as well as world filled with crumbling of moral root and decay.” Such a
time with its fast tempo has many implications for Science education, unimagined
higher to especially for a developing country like India.

Education systems worldwide are trying to build a scientific temper in
children and scientific literacy in society. The attitude of Indian students towards
Science is changing because of feeling that Science can solve our national problems
of over population, mass illiteracy abysmal ignorance, backwardness and low-
standards of living. Science is all pervasive. Modern societies exist on the basis of
Science. Science is intimately related to the means of production, communication and
transportation. Even economics and politics have to depend on scientific factors such as productivity from land or from industry. The power of modern weapons of the speed of transportation on land, air and water. In the present situation, therefore, everyone in every walk of life must know of certain quantum of Science and technology. The fact of today may not be fact of tomorrow and theories may also undergo changes but there can be going away from the scientific method.

In this context the role of Science is of utmost importance. Science education must become an integral part of school education, and ultimately, some study of Science should become a part of all courses in the humanities and social Sciences at all stages from school to the university stage.

The history of Science and technology in India begins with the Indus Valley Civilization which is often referred to as the Harappan Culture. The Harappan Culture had established commercial links with the neighbouring cultures in the central and western Asian regions, including Mesopotamia. The overall picture of this period appears to be that it had a farm economy having a reasonable agricultural surplus. The life was enriched by many a craft and industry.

From about the twelfth century to the end of the eighteenth century A.D., Science and technology in India was impacted by the Islamic and the European influences. Though some technological practices underwent perceptible changes and new developments took place in fields such as paper, gunpowder, enamelling, glass and metalworking, the Indian scientists chose to move in the previously determined grooves and were unable to develop new methods an attitude conducive to the development of modern Science.

The nineteenth century was the great dividing line. These hundred years changed the face of India far more than did the preceding thousand years. One of the main causes for this development was the introduction of English education. The British started
scientific activities in India in several areas and established the first three universities in Calcutta, Bombay and Madras. Thus foundation was laid for the introduction of Science education in English medium in India which helped in Indian scientists to have access to the scientific knowledge available in Western countries.

The last quarter of the nineteenth century witnessed eminent personalities like Mahendra Lal Sircar, Asutosh Mookerjee, Jagdish Chandra Bose, and Prafulla Chandra Ray, who were instrumental in heralding Western Science teaching and research into India. In 1876, Mahendra Lal Sircar founded the Indian Association for the Cultivation of Science on the model of the Royal Institution of London. During the first thirty years it functioned more or less as a Science college, but in the early part of the twentieth century it developed into a research instituting young students from all over India including C.V. Raman and K.S. Krishnan. Asutosh Mookerjee played a pioneering role in converting universities into institutions of higher learning and original research. Prafulla Chandra Ray built up a centre for active chemical research in the Presidency College and later University College of Science, Calcutta. In 1990 he started the Bengal Chemical and Pharmaceutical Works, which was a pioneering and pace-setting organization in the field of indigenous chemical and pharmaceutical industries.

Jawaharlal Nehru, the first Prime Minister of India, established the basic framework for Science and technology in India. He recognized the unique role of Science and technology for national development at an early stage of his region. He gave a free hand to men of Science and vision (Bhabha, Bhatnagar and Sarabhai) who set about organizing Science in a big way by establishing major national institutes and research laboratories outside the university system. While Homi J. Bhabha launched a major atomic energy programme in the country and land firm foundation of a rapid growth
of nuclear Science and technology, Shanti Swarup Bhatnagar's strategy was to establish a chain of national laboratories dealing with disciplines of physical Sciences, with emphasis on research and development. The huge space research that is witnessed in the country today may be traced to the vision of Vikram Sarabhai.

The twentieth century has been the most rewarding in terms of developments in Science as well as in technology. The century began with the epoch-making arrival of the quantum mechanics which subsequently influenced practically every major advancement in Science and technology. Gradually, the understanding of the world in terms of physics, chemistry and mathematics gave way to the new understanding of the universe. This was augmented by the discovery of relativity and general relativity. Newer perceptions of the structure of matter and its relationship to the larger universe were better understood in this century. From astronomy, the shift to astrophysics was initiated by none other than Prof. M.N. Saha.

In India, recommendations that Science be made a compulsory subject for all children up to Class X were made in the mid-fifties. However, it was only in 1968 Policy on Education which accepted the Kothari Commission's recommendations that Science and mathematics be made compulsory subjects in the first ten years of school both for boys and girls. This was reconfirmed in the National Policy on Education 1986. Needless to say that the merit of these recommendations has universal acceptability as these based upon sound logic and rationale.

In subsequent years, during the implementation of the recommendations on Science and mathematics in schools, several critical areas have been identified which require inputs in terms of content, its relationship to other disciplines, transaction strategies and the level and extent of interest, activity and utility as perceived by the learners. Globally the focus has also shifted from Science education to Science and
technology education and the global focus at present is on scientific and technological literacy which can be well understood in the context of initiative to universalize elementary education for all. The N.C.E.R.T. has been the key player in all aspects of Science education in schools. Its first major attempt was making in 1975 when it published the curriculum framework for the first ten years of schooling. This was built up around the recommendations of the Kothari Commission.

Science is the most potential vehicle for inculcating and nurturing the creative talent of every single individual, irrespective of all other differences and diversities. In the ageing society, utilization of leisure could also become a major issue. Leisure is no gift but a load which is tiresome, burdensome and cumbersome to the individual. Science education provides a vast potential for inculcation of values, particularly the values enshrined in the Constitution of the country concerned.

Science has responded to human concerns in several areas like medicine and agriculture. The technological developments have reduced drudgery for a considerable sector of the population. In future, however, the side effects of the developments and developmental activities which alienate human society from nature will have to be seriously responded to, every individual will require training and preparedness in areas like disaster management. Need based knowledge would be valued by the society and the community.

Academic Achievement has always been given much importance since the origin of formal system of education. In today’s competitive world, it is given more importance than ever before. Academic achievement not only facilities the process of role allocation for the social system but opens out avenues for advancement. Perhaps it is a ladder through which a child of today can reach his destination. It is a root for future development. Success in school, therefore, has often been shown to be predictive of success in further
education, career, and personal fulfilment. Obviously in the school, great emphasis is placed on academic achievement right from the beginning of formal education. In spite of considerable efforts, achievement of students is not satisfactory. A great difference of performance is found among students.

Achievement is the end product of all educational endeavours. The main concern of all education efforts is to see that the learner achieves. Quality control, quality assurance and total quality management of achievement have increasingly gained the attention of research in education. After exploring the concept of achievement in the cognitive, affective and psychomotor aspects of human behaviour, researchers have probed further and have attempted to understand the 'black box' of achievement.

Academic achievement is a paramount importance particularly in the present social, economic and cultural context. Obviously, in the school great emphasis is placed on achievement right from the beginning of formal education. The school has its own systematic hierarchy which is largely based on achievement and performance rather than quality. Thus, the school tends to emphasize achievement which facilitates among other things, the process of role allocation for the social system.

The world is becoming more and more competitive and quality of performance has become the key factor for personal progress. Parents desire that their children climb the ladder of performance to as high a level as possible. This desire of a high level of achievement put a lot of pressure on students, teachers and institutions and in general the educational system itself. In fact it appears as if the whole system of education revolves around the academic achievement of the students, through various other outcomes are also expected from the system. Thus a lot of time and efforts of the schools are helping students to achieve better in their scholastic endeavours. The
importance of scholastic achievement has raised several important questions for educational researchers. What factors promote achievement in students? How far do the different factors contribute towards academic performance? Therefore many factors have been hypothesized and researched upon and researchers have come out with different results, at time, complementing each other but at times contradicting each other.

A complete and comprehensive picture of academic achievement still seems to eluding the researchers. The search therefore continues and educational researchers all over the world are still seeking a breakthrough in elucidating this phenomenon. Therefore research has come to our aid by looking into what variables like personal, environmental and institutional factors, promote academic achievement and what are the determinants to it?

It has been thus indicated that a good number of variables such as personality characteristics of the learner, the environmental characteristics, the institutional resources etc. mention a few exert influence on Science achievement in different degrees. These variables are generally refers to as correlates of achievement. Head of the institutions, curriculum planners, teachers and others are involved in the task of helping students to achieve better would like to have knowledge of the extent of influence of these correlates on academic performance in Science.

It is hard to find a more controversial topic in recent research than the personal, environmental & institutional factors that go to influence the Science performance of secondary school students. Keeping the far going discussion in view. It was considered appropriate to study the Science achievement of secondary school students in relation to their personal, environmental & institutional factors.
Over several decades, the identification and examination of the factor that explain achievement such as attitude (Ma 1997), beliefs (Garofalo 1989; Kloosterman 1991; Schoenfeld 1985; Schommer 1990), gender (Benbow & Stanley 1980; Fennema & Carpenter 1981) parent education (Edington & Wolfe 1986; Ma 1997; Tsai & Walberg 1983) employment (Greenberger & Steinberg, 1986), and homework (Keith & Cool 1992) have been researched. Although the investigation of individual factors is important, a multifactor model possesses a distinct advantage over individual characteristics and constructs because it allows for the examination of not only each individual characteristic’s or construct’s association with achievement but also for the exploration and examination of the relationships among those characteristics. Shavelson, Mc. Donnell & Oakes (1989) and Shevelson, Mc. Donnell, Oakes & Carey (1987) argued that a model is required because a single indicator is not able to provide information about a “Phenomenon as complex as education.”

By comparison, gender differences in achievement, especially Science, have not been consistent and continue to be a much debated topic. For the middle school years, some research favoured girls (Tsai & Walberg, 1983), and some favoured boys (Hilton & Berglund, 1974); other research showed no difference (Circicelli, 1967; Fennema & Sherman, 1978). Finally, with regards to standardized tests, boys tend to score higher than do girls (Halperen & La May, 2000); the difference is more prevalent in the extremes of ability distribution (Willingham & Cole, 1997). The research has consistently shown that at the end of high school boys perform better than girls on Science achievement tests whereas girls typically perform as well as boys in elementary school.

Linn (1989) investigated that male has greater access to Science and technical fields and greater earning power than females. Clementine & Barber (1987) investigated
that boys consistently scored lower than girls. Sarkar (1983) & Singh (1984) showed that girls scored higher than boys. Wong & Staver (1997) found that boys scored higher than girls. Melkonion (1997) found that generally female students attained significantly higher grades than male. Lee (1998) and Pinchas (1998) showed that boys like to study Math and Science that female and achieve high scored in science.

Affective background factors, such as attitudes and beliefs, play a central role in Science achievement. The general relationship between attitude and achievement is based on the concept that the better the attitude a student has toward a subject or task, the higher the achievement or performance level tends to be. Current reforms efforts in Science education call for student to be active participants in the learning process and for solving non-routine problems.

Lowery (1967) found that girls generally have significantly more positive attitudes towards Science than boys. Thnhikom (1989) found that boys had more positive ATS than girls, girls attitude declined and boys attitude improved when grade level increased. Marie (1996) found that females had more positive attitudes about the normality of scientist. Derek (2009) found that both males and females were just marginally positive about chemistry lesson during the years of secondary schooling. Ahmad & Ashar (2011) reported that there was no significant difference between girls and boys in attitude towards biology, although girls had better achievements in biology in comparison with boys.

Positive association between after school pursuits and achievement has been observed. Students involved in extra-curricular activities such as sports also tend to have good attitudes, positive self-concept, and higher achievement than do student not involved in these activities (Holland & Andre, 1987). Marsh (1992) results indicate that with small but statistically significant positive correlations between activities (e.g.,
sports, drama, chorus, clubs by subject meter, church student government, and service clubs) and achievement.

In a review of research, Holland and Andre (1987) focused on the examination of the relationship between athletic participation and achievement and reported that male high school athletes received somewhat higher GPAs than did nonathletic. When one considers standardized achievement or aptitude tests, boys who’s only after school activity was sports scored lower than national averages on the standardized achievement test. No significant difference in either GPA or standardized test score was observed between female athletes and female non-athletes.

Whitehead (2000:9) defines extra-curricular activities as those activities outside the normal time table taking place on the school premises and sometimes outside the school premises. Some of these activities are seen as part of physical education. The activities include: clubs, swimming, sports, games, debate, cultural activities, music etc. All these are believed to contribute to physical and social development of pupils.

Ailshie (1996) reported that as involvement in co-curricular activities increased, school attendance and academic achievement improved. Din (2005) found that participation in school-sponsored sports activities did not affect the academic achievement for the participating rural high school students. Martinez & Mickey (2013) revealed that 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.

Dave & Dave (1971) investigated the relationship of parental education on caste with the academic achievement. They found that higher percentages of rank holder belong to homes with higher parental education where as a higher percentages of failed students belong to those who have lower parental education. Children from highly educated parents
are likely to have significantly higher Science achievement scores as compared to the children of less educated parents. Caldis & Bankstone. (1997) found that social status have significant and substantive independent effect in individual academic achievement. Jabor, et al. (2011) revealed that there were statistically significant differences in Science GPA scores between parent educational statuses, however, the effect size was small.

Fathers occupation may influence student’s performance in various ways. For Example, occupation related income may determine access to learning opportunities and resources and so play role in learning outcomes. Fathers occupation may also influence how students perceive the value of Science learning. White (1982) found that SES is correlated with academic achievement. Suleman, et al. (2012) 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) found that a positive and significant relationship of total family income, father's job grade was found with the academic performance of the students.

Number of family members has been found to be important predictor of academic achievement. Family structure (parents and number of siblings) is also set to influence student’s academic achievement (Pong,1997). Children of smaller family have got significantly higher achievement in Science than the children of larger family. Size of the family was not related to the academic achievement (Chatterji, et al. 1971). Krishnan, et al. (1994) found that smaller family size has led to higher educational status. Joseph (2002) found that family size and birth order have no influence on academic performance of pre-degree students.

A variable that may have important effects on achievement is Science resources available at home. In this the resources like, Science books, Science magazines etc., if available at home then the achievement of students is increases. Socio-economic status
specifically parents education and income, indirectly related to children's academic achievement (Pamela & Davis-kean 2005). Hofferth (2010) found that the students who spent time on playing video games, using the computer and watching T.V. at home there having aggressive behaviour to solve the problems and improved their academic achievement.

Exposure to mass media were significant individual influence on Science achievement (Young, et al. 1996). Ahmad & Yousef (2008) 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. The students 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. Absence of a bedroom television combined with access to a home computer was consistently associated with the highest standardized test score (Kirkorian, et al. 2008).

Affective variable, such as spent some times on their Science home work, play a central role in Science achievement. Michael (2002) found that there is a strong relationship of time spent on Science home work and achievement. There seem to be a positive effect of homework an average. However, not all pupils seem to benefit from homework. The pupils from lower socio-economic background actually perform better if less homework's assigned. There is no consistent significant relationship between time spent on homework and grades (Matltese, et al. 2012).

Institutional factors (e.g., size, resources, culture,) also have been shown to also have an impact on achievement(Greenwald, Hedges, & Laine, 1996). Reeta (1986) found that pass percentage of government students setting were 45.8% as compared to the
87.5% of the boys belonging to private institutions, the highest marks percentage was 81 in case of private schools and 76 in case of government school. Verghese (1994) found that schools managed by private sector show marginally better performance than government schools. School type made no significant relative contributions to students' achievement in Chemistry (Aderonke, et al. 2013).

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 (Mirza 2014). Ravendranathan (1983) found that Science achievement, Science interest and mental health status of pupils of English medium classes were higher than those of pupils of Malayalam medium classes.

Resources are another institutional factor that has received a good deal of attention in the literature (e.g. Greenwald, Hedges & Laine, 1996, Hanushek, 1989). In a review of 377 studies, Hanushek (1989) observed no consistent pattern between the amount of money spent (e.g. teacher-student ratio or per pupil expenditure and achievement). Numerous studies in Hanushek's review had either significantly positive or negative results, or non significant positive or negative results. He concluded that no "strong or consistent relationship" exits between school resources and student performance and that more resources would not yield performance gains for the students. Greenwald, Hedges, and Laine (1996) performed a meta analytic review of the studies from Hanushek's review and more recent article and concluded that resources do have influence on student achievement. Neither study focused on the impact of resources on student variables that could affect performance.
The investigator is more convinced that student’s, personal, environmental and institutional factors need no longer be neglected in research efforts directed towards a study of correlates of Science achievement. The reason is obvious, conceptually, they appear to influence the Science achievement but their influence has not yet been empirically studied adequately. This being the reason, the investigator undertook the present study which attempts to investigate relationship of their personal, environmental and institutional factors of secondary school students with their Science achievement.

1.2 Statement of the problem

The problem selected for study reads as follows:

“Influence of Personal, Environmental and Institutional Factors on Achievement of Secondary School Students in Science”.

1.3 Independent and dependent variables

The independent variables are student’s personal, environmental and institutional factors. The schools are either single sex or co-educational. The dependent variables are the score they achieved for Science. This score was determined through the administration of self constructed Science Achievement Test.

1.4 Objectives of the Study

Every research project deals with the solution of a problem of human interest. Therefore, the researcher has a definite purpose in mind. He has certain specific goals to achieve through his research work. Such specific goals or purposes are technically formed as objectives. Every research study must have some objectives to achieves, without which no research can be conducted. The entire research process is guided by objectives which have been explicitly and precisely spelled out by the investigator in advance. The present study is aimed at achieving the following objectives.
1. To compare the Science achievement of secondary school students on gender basis.

2. To study the relationship of attitude toward science with Science achievement of secondary school students.

3. To study the relationship of sports activities with Science achievement of secondary school students.

4. To study the influence of parental education on Science achievement of secondary school students.

5. To study the influence of father’s occupation on Science achievement of secondary school students.

6. To study the influence of family size on Science achievement of secondary school students.

7. To study the relationship of Science resources available at home and Science achievement of secondary school students.

8. To study the relationship of exposure to media and Science achievement of secondary school students.

9. To study the relationship of time spent on Science home work and Science achievement of secondary school students.

10. To study the influence of types of management on Science achievement of secondary school students.

11. To study the influence of medium of instructions on Science achievement of secondary school students.

12. To study the influence of school resources on Science achievement of secondary school students.
1.5 Hypotheses of the study

In order to give proper directions to investigation, it was thought necessary to formulate certain hypotheses which may be tested in this study. The investigator was guided by the results of previous researches in their areas, theoretical viewpoints available in related literature and investigator's intuitive understanding and insight. For the present study, the hypotheses have desirably to be stated in the null-form. The reason is obvious when they are conceived as research hypotheses they are generally stated in the form of statements but when they are conceived as statistical hypotheses usually they take on the form null-hypotheses.

The following null-hypotheses have been constructed for testing through the study. The confidence interval set-up for the purpose of accepting or rejecting the hypotheses in the study is 0.05 to 0.01 levels. The reason for fixing the rigorous limit is discussed elsewhere. Common practice in this regard, is to set-up a range of 0.05 to 0.01 levels. The following hypotheses were established.

The hypotheses that guided the present study were stated in null form, which are as follows:

1. Male and female students do not differ significantly on Science achievement.
2. There is no significant relationship between attitude and achievement in Science of secondary school students.
3. There is no significant relationship between sports activities and achievement in Science of secondary school students.
4. There is no significant difference among the categories of parental education and achievement in Science of secondary school students.
Sub Hypotheses:

4(a). There is no significant difference among the categories of father’s education and achievement in Science of secondary school students.

4(b). There is no significant difference among the categories of mother’s education and achievement in Science of secondary school students.

5. There is no significant difference among the categories of father’s occupation and achievement in Science of secondary school students.

6. There is no significant difference among the categories of family size and achievement in Science of secondary school students.

7. There is no significant relationship between Science resources available at home and achievement in Science of secondary school students.
   
   Sub Hypotheses:
   
   7(a). There is no significant relationship between Science books available at home and achievement in Science of secondary school students.
   
   7(b). There is no significant relationship between Science magazines available at home and achievement in Science of secondary school students.

8. There is no significant relationship between exposure to media and achievement in Science of secondary school students.

   Sub Hypotheses:
   
   8(a). There is no significant relationship between internet and achievement in Science of secondary school students.
8(b). There is no significant relationship between reading newspaper daily and achievement in Science of secondary school students.

9. There is no significant relationship between time spent on Science homework and achievement in Science of secondary school students.

10. There is no significant difference among the categories of types of management and achievement in Science of secondary school students.

11. There is no significant difference among the categories of medium of instructions and achievement in Science of secondary school students.

12. There is no significant difference among the categories of school resources and achievement in Science of secondary school students.

1.6 Definition of the key terms

The statement of the problem as given in the preceding section involves a lot of technical terms which need to be defined and elaborated. These terms are achievement in Science, personal factors, institutional factors and environmental factors. Although these terms are familiar to a common researcher in Education and also to a common reader, yet it is necessary to explain what these terms mean in the present study. Every study is guided by the meaning of those different variables under study carry with them. The definition of these terms are used in the study are presented below.

1.6.1 Achievement in Science

The term achievement here refers to the ability of the students to solve scientific problems as measured by specially designed test. The score of a student on a particular test will stand for a measure of his/her achievement on the test. Science achievement for the
present study shall mean the total score obtained by the sample groups on the Science Achievement Test constructed by the investigator for class IXth.

1.6.2 Secondary level

Secondary education which serves as a bridge between primary and higher education serves a step towards preparation for higher and professional education. It is the stage where a proper understanding of work ethos and values of a human and composite culture is provided to future citizens of the country. “Secondary school is the division following the elementary school, comprising most often grades from 9 to 10 or grades 7 to 12” (Good, 1973). “A school more advanced in grade than an elementary schools and offering general, technical, vocational or college-preparatory courses”. (Webster's Third New International Dictionary).

1.6.3 Personal factors

Any important factor of the individual which is responsible for his/her personality determinants is considered as personal factors. In this study investigator has taken gender, attitude towards Science and participation in sports activities as personal factors.

(A) Gender difference

Any significant difference in mental, physical, social and emotional traits that depends only on the sex of individuals is called the gender difference.

(B) Attitude towards Science

In the present study the Science attitude has therefore been operationally defined as a generalized attitude towards the universe of Science content and being measured in terms of its favourableness and unfavourableness estimated from the score obtained by the subjects on an attitude towards Science. The Science Attitude Scale is a dependable tool for measuring student's attitude towards Science. It appears
to be useful for teachers of Science, guidance workers and research scholars. It can be used by the curriculum specialists to measure the outcomes of teaching Science. The students of Psychology and Education can also use it to study the development of their attitude towards Science.

(C) Sports activities

The term participation in sports activities determines that how much participation in sports activities during non school hours.

1.6.4 Environmental factors

Any important factor of the individual which is responsible for his/her environmental determinants is considered as environmental factors. In this study investigator has taken parental education, father’s occupation, Science resources available at home, family size, exposure to media and time spent on Science home work as environmental factors.

(A) Parental education

Father’s and mothers’ educational qualification of the students were categorised as parents education. Parental education has been categorized into three groups, that is (i) Illiterate (ii) Up to XII and (iii) Degree level & above.

(B) Father's Occupation

Father’s occupation was considered as father’s occupation of the student. The father’s occupation has been categorised into four groups, i.e., Professional (Engineer, doctor, administrator, educationists etc.), Businessman (High status shopkeeper, property dealer, jewellery shop etc.) Agriculturist (Former, labour etc.) and Others (Peon, Coli, daily wagers etc.).
(C) **Science resources available at home**

The Science resources like video games, T.V., news paper, using of computer and any other material which is related to Science is considered as Science resources available at home.

(D) **Family size**

The term family size was considered as total number of members in the family.

(E) **Exposure to media**

The term exposures to media refers that use of internet(social media) and reading newspaper is considered as exposures to media.

(F) **Time spent on Science home work**

Homework is defined as “Tasks assigned to students by school teachers that are meant to be carried out during non school hours”.

1.6.5 **Institutional factors**

Any important factor of the schools which is responsible for its determinants is considered as institutional factors. In this study investigator has taken types of management, medium of instructions, school resources and teacher pupil ratio as institutional factors.

(A) **Types of Management**

Two types of schools have been considered for this study (1) Government school and (2) Private school.
1. **Government Schools**: Government school means any secondary school fully controlled, financed, supported and administrated by local bodies and State Government.

2. **Private Schools**: Private school means any school recognized by U.P. Board Allahabad & Central Board of Secondary Education, New Delhi, without any financial support and administrative control of local, State or Central Government.

(B) **Medium of instructions**

A Medium of instructions is a language used in teaching; it may be English or Hindi for the present study.

(C) **School Resources**

Greenwald et al. (1996) defined educational inputs or resources as including (a) school characteristics and facilities and (b) student characteristics such as S.E.S. or ability. According to Hartwan (1999), the school inputs studied most frequently include student/teacher ratio or class size, teacher education level, experience of teacher, teacher salary, and expenditure per student. It determines that the Science resources available at school like Science lab, Science magazines, Journal of Science, play ground etc.

In the present study, teacher’s qualification, number of Science teachers, teacher’s experience, and physical facilities in the schools considered as school resources.

(D) **Teacher pupil ratio**

Teacher pupil ratio was calculated for each school by dividing the numbers of all pupils at a school by the number of teachers at the beginning of the school year.
1.7 **Need and Importance of the study**

Science education is a part of education which makes a man rational, develops his independent thinking and helps in removing the superstitions, prevalent in the society in various forms. In view of the modern developments in Science and its importance in today's world, Science education and scientific outlook have assumed a significant place. Science and Mathematics have become a substantial and integral part of an organized society.

Academic Achievement has always been given much importance since the origin of formal system of education. In today's competitive world, it is given more importance than ever before. Academic achievement not only facilitates the process of role allocation for the social system but opens out avenues for advancement. Perhaps it is a ladder through which a child of today can reach his destination. It is a root for future development. Success in school, therefore, has often been shown to be predictive of success in further education, career, and personal fulfilment. Obviously in the school, great emphasis is placed on academic achievement right from the beginning of formal education. In spite of considerable efforts, achievement of students is not satisfactory. A great difference of performance is found among students.

A complete and comprehensive picture of academic achievement still seems to eluding the researchers. The search therefore continues and educational researchers all over the world are still seeking a breakthrough in elucidating this phenomenon. Therefore research has come to our aid by looking into what variables like personal, environmental and institutional factors, promote academic achievement and what are the determinants to it?
It has been thus indicated that a good number of variables such as personality characteristics of the learner, the environmental characteristics, the institutional resources etc. mention a few exert influence on Science achievement in different degrees. These variables are generally referred to as correlates of achievement. Head of the institutions, curriculum planners, teachers and others are involved in the task of helping students to achieve better would like to have knowledge of the extent of influence of these correlates on academic performance in Science.

One of the old and still persisting question is “why some students perform well in school, while other performs poorly”? Earlier studies showed positive relationship between academic achievement and Science tests score. In most of the studies the relationship of just one or two variables with academic achievement in Science has been worked out. To have an idea about the relative importance of different variables in determining academic achievement in Science, there is need to have more comprehensive studies in which a larger number of independent variable may be included and by working out their relationship with Science achievement, the ones having positive relationship with achievement may be identified and then through appropriate statistical techniques their relative importance in determining Science achievement may be found out. Most of the work in this area has been done in the more developed countries. Because of the popularity of the social set-up and economic conditions in India, the findings of these studies may be fully applicable here. There is thus, need to have the Indian data to see how the different factors are at work in various school situations in this country. Achievement is different for different subject of study. Mostly, it is found that level of achievement of students differs from subject to subject and factors influencing the achievement vary in their importance as their contributing factors. Achievement in Science like other subjects has certain
contributing factors. Therefore, it is worthwhile to take up a detailed study of achievement in Science along with various factors influencing the achievement.

The present study is therefore, designed to fulfil these needs and it aimed at identifying variables, having relationship with Science achievement. Through appropriate statistical techniques an attempt was made to work out the relative importance of the different variables in determining achievement in Science. If the education system is to provide equal access to school for all, it requires reliable information about the cause of low achievement in Science among secondary school students. Several studies have been made to investigate the relationship between academic achievement in Science and personal, environmental and institutional factors conflicting results were obtained. The present study therefore, is conducted to determine achievement in Science of secondary schools students in relation to their personal, environmental and institutional factors.

While there was a number of studies available on academic achievement in general, there was only a few studies directly related to the academic achievement in science. Secondly in the opinion of the investigator most of research studies suffered from methodological drawbacks. The major theoretical and methodological drawbacks were as follows:

(a) Most of the researchers studied the relationship between attitude and academic achievement only, leaving aside the other relevant variables.

(b) Some of the researchers studied the attitude of students, their socio-economic status and familial variables in relation to academic achievement for minority students.

(c) Some researchers studied the relationship of gender, SES and attitude towards science on academic achievement of SC/ST students.
On the basis of these gaps the investigator felt that there was need to conduct a study of the influence of personal, environmental and institutional factors on achievement of secondary school students in science.

**Research Questions**

The research questions for this study include the following:

1. Do gender explain differences in the Science achievement?
2. Does the attitude correlates with Science achievement?
3. Do the sports activities influence the Science achievement?
4. Does parental education explain differences in the Science achievement?
5. Does father’s occupation explain differences in the Science achievement?
6. Does the family size explain differences in the Science achievement?
7. Does the availability of Science resources at home correlates with the Science achievement?
8. Does the exposure to media correlates with the Science achievement?
9. Does the time spent at Science home work correlates with the Science achievement?
10. Do the management types explain differences in the Science achievement?
11. Do the medium of instructions explain differences in the Science achievement?
12. Do the school resources explain differences in the Science achievement?
1.8 Delimitations of the study

It is generally not possible in a single research study to cover every aspect of variables associated with the problem under investigation. Every research study is limited in general ways. It cannot be exhaustive. It has to be delimited in terms of population covered, sample selected, scope of variables studied, the scope of generalizability of findings and so on. The present study is no exception in this regard and also has certain "borderlines".

The following are the delimitations of the study:

1. The study was conducted on the student population of selected districts of central U.P. only. Therefore, one cannot generalize the findings of this study to all the institutions of India due to number of differences in their condition and circumstances.

2. The sample was restricted to urban and rural areas of central U.P. only so as to make an in-depth study of the factors that affect achievement in Science in these schools.

3. Due to the shortage of time and resources the study was carried out only on students of class 9th although problem of achievement is common to elementary classes yet the focus of the study has been on the secondary stage only.

4. The study can be conducted taking to number of variables which may affect Science achievement but only selected personal, institutional and environmental factors or variables have been taken into consideration for present study.
5. The tool for the assessment of the achievement in Science is developed by investigator himself. Although attempt has been made for proper item selection, try out, estimation of reliability and validity of the tool, detailed norms still remain to be prepared.

6. Though the simple random sampling is adapted for selection of samples at which extent it was practicable but due to some other factors like permission for administration of the tests and availability of schools made the researcher forced to adopt the again random sampling as an alternative measure for the study.