Chapter – 1

Introduction
INTRODUCTION

1.1 Introduction:

Education has pivotal role in the national development and progress of a nation can be gauged through the progress made in the field of education. It is also instrumental in building up human capital in the sense of producing the doers and thinkers, movers and shakers, moulders and makers of any country. India has far greater need of it than any other nation because we have very little time to make up long years of neglect and exploitation and catch up with other advanced countries. There indeed, is one thing that is education; where we have neither to doubt nor to work.

Education is seen as a route to participate fully in society, and widening participation in education and lifelong learning as a way of including those who are currently excluded from many of the benefits of society. Education for all is viewed as an imperative for world security, as an unconnected population suffering high unemployment leads to instability. Education, skills, ethics and socio-cultural values of educated and competent people and responsible citizens are the essential foundation for democratic societies and market economies (Daniel, 1999).

Education is the leading string of international interaction which helps in seeking better jobs (Sahni, 2000). It is commonly referred to as the process of learning and obtaining knowledge at school, in the form of formal education. However, the process of education does not only start when a child first attends school, but it begins at home. Knowledge could not be acquired only from a teacher; one can learn and receive knowledge from the parents, family member and even from acquaintances. In almost all societies, attending school and receiving an education is extremely vital and necessary if one wants to achieve success. Education is important for every individual in a nation as it plays a vital
role in changing the state of a country. No country could bring a revolution in it until and unless its every unit is educated enough to meet the challenges. Education is the most important single factor in achieving rapid development and technological progress and in creating a social order founded on values of freedom, social justice and equal opportunities. A key goal of education is to ensure that every student has a chance to excel, both in school and in life. Increasingly, children’s success in school determines their success as adults, whether and where they go to college, what professions they enter and how much they can earn. Education is inevitable to all. This is fundamental to our all round development, material and spiritual (NPE, 1986).

Development of science and technology, vital for the progress of any country, is a major vehicle for enhancing the quality of human life. It is a valuable tool that students will use in education and in their daily lives for the rest of their life. Science is a basic part of human experience and has relevance for everyone. As everyone can experience excitement from learning about the world in which they live. At the onset of the new millennium the importance of science to national development need not to be overemphasized. We are living in the modern age of science where we found technologies in every aspect of life. What makes life so brain friendly for us are the technologies which we use for our ease and comforts. Not only in our daily life but also in the research centre, in defensive measures of a country, biological aspects, etc. No nation could generate the progress unless it promotes technical aspects in diverse fields. Knowledge of science is an essential prerequisite in the pursuit of high status and well paid jobs in a technologically advanced workforce. Everyone today needs to understand what science is. Discoveries in science affect many aspects of society. To be responsible and useful citizens we must be able to judge how the discoveries of science may be best used for ourselves and society. Science education, at the secondary level, should be firmly included as a component of the education provision virtually worldwide. In most curricula, and through perceptions held by the majority of
teachers, science education is seen as building on logical positivism ideas (Aalsvoort, 2004) in propagating scientific information and concepts as a theoretical component on the one hand, and an observational language on the other. By recognizing that science education is a part of the education provisions within schools, the teaching of science subjects can be expected to promote the development of a range of skills and values, identified within the educational goals and especially to enable students to solve their problems and make appropriate socio-subject decisions (Holbrook & Rannikmae, 2002).

Current science education reform is motivated by social and economic challenges, as well as academic purposes (Raizen, 1997). Knowledge of science and technology has become essential for average citizens to enable their decisions about personal and social matters, such as health, population growth, natural resources, environment, and safety. In addition, the expanding global economy demands a work force that is adequately educated in science and technology. In response to these social and economic challenges, science education reform documents define what all students should know and be able to do in science in order to participate effectively in society. These documents define science content standards in a comprehensive manner that includes not only science knowledge and inquiry, but also how science is related to personal, social, and historical perspectives. One of the goals for school science that underlies the National Science Education Standards (1996) is to educate students who are able to experience the richness and excitement of knowing about and understanding the natural world. A common rationale given for studying science subjects in school is the achievement of scientific literacy (American Association for the Advancement of Science [AAAS], 1989; Bybee, 1997; Brown, Reveles, & Kelly, 2005; OECD, 2003; Shwartz, Ben-Zvi, & Hofstein, 2005). The phrase “scientific literacy for all learners” expresses the major goal of science education—to attain society’s aspirations and advance individual development within the context of science and technology (Bybee, 1997).
For the education in schools the Government of India established the National Council of Educational Research and Training (NCERT) in the early 1960s which has been the key player in all aspects of science education in schools, including policy formulation and implementation, curriculum development, textbooks production and teachers’ training. It was why that the Chairman of Education Commission (1964-66), Kothari, recommended that science should be made compulsory subject in school education. The National Policy on Education, NPE (1986) further reiterated the importance of Mathematics and Science Education as well as inculcation of scientific temper. Ramamurti Committee was constituted in 1990 to review the NPE 1986 recommendations. In order to improve quality of science, the committee emphasized on ‘Inquiry approach of teaching along with the aim to develop scientific temper and independent thinking among the children’. As a follow up, NCERT developed the National Curriculum for Elementary and Secondary Education- A Framework in 1988, and emphasized that science should be treated as one of compulsory areas up to the secondary stage as it plays a decisive role in equipping the learner for functional understanding, interpreting and dealing with the world in a more scientific way. The recommendations were accepted and now science education occupies a very eminent place in curriculum both at the school and university education in India. NCERT, in its National Curriculum Framework document of 2005, addresses the issue afresh. The strategy for the promotion of science education in the Eleventh Plan (2007-2012) aims at expanding and strengthening the Science & Technology base in our universities, and promoting excellence through competitively secured funding at centers for advanced research.

Children of 5 to 6 years age group in India begin formal schooling. A uniform 10+2 structure is adopted by all the states. Schools follow curriculum developed by the respective states, CBSE (Central Board of Secondary Education) or ICSE (Indian School Certificate Examination). Although the contents in the curricula are not same among these but learning of Science (Physics, Chemistry
and Biology) and Mathematics are mandatory for every year till 10th grade. As a result, among students having completed the 10th grade, there is no marked heterogeneity of knowledge base. Differences, however, may exist in the knowledge state of individual students. After 10th grade, students may choose any course of study Science or Arts, during their 11th and 12th grade. Languages in different states are different and hence learning may have taken place in the language specific to the region and not necessarily in English. Socio cultural aspects do have a definitive influence on both the attitude and effectiveness of learning.

Concomitantly, the “coin of the realm” in education today is student achievement, especially its measure and relationship to teacher, program, school, and organization and accountability. Moreover, an almost singular emphasis is being placed on student achievement in “core” academic areas such as science. Assessment plays a central role in determining the extent to which science education reform has achieved both high academic standards and educational equity (McLaughlin, Shepard, & O’Day, 1995; Smith & O’Day, 1991). Achievement in science is often a prerequisite for certain courses, and without it students cannot gain access to a large range of disciplines because the world is becoming more and more competitive. Quality of performance has become the key factor for personal progress. Parents desire that their children climb the ladder of performance to as high level as possible. This desire for a high level of achievement puts a lot of pressure on students, teachers, schools and in general, the educational system itself. In fact it appears as if the whole system of education revolves round the academic achievement of students through various other outcomes are also expected from the system. Thus a lot of time and effort of the schools are used for helping students to achieve better in their scholastic endeavours. Achievement is the end product of all educational efforts. The main concern of all educational efforts is to see that the learners achieves. Quality
control, quality assurance and, of late, total quality management of achievement have increasingly gained the attention of researchers in education.

Science achievement has long been the centre of research inquiries since the presence of science curriculum in schools, and after each new implementation of science curriculum reform across the world. Under the sponsorship of the International Association for the Evaluation of Educational Achievement (IEA), the Third International Mathematics and Science Study (TIMSS) provides unprecedented opportunities for cross-national analyses of educational systems throughout the world. Information was also collected about students' home background, school characteristics and instructional practices for participating countries (Gonzalez & Smith, 1997). TIMSS results have provided invaluable data to researchers and decision-makers around the world. With rigorous methodology, TIMSS provided high quality and comprehensive data on students' achievement, which reveals substantial differences in mathematics and science achievement between top and bottom performing countries. The broad range of achievement both across and within countries is illustrated in TIMSS publications (Beaton et al., 1996a, b; Martin et al., 1997; Mullis et al., 1997, 1998).

The developments in science and technology, particularly in information technology and computer science are occurring so fast that it is difficult to portray the world of 2020. Throughout the world, science education reform has emphasised the need for integrating computer technology into the teaching and learning process (Chang, 2001) This is reflected by the increasing number of computers in schools, by the amount of educational software being written, by the number of educational technology courses being offered at colleges and universities, as well as by the increasing number of assessments that are computer based. The hype of technology in education grows as the internet and computers are becoming increasingly common in classrooms. Various technologies such as video disc, CD-ROM, video conferencing, the World Wide Web and other innovations have changed learning and instruction in all subject matter areas,
especially mathematics and science (Kelly & Crawford, 1996; Weaver, 2000 & Yalcinalp et al., 1995). An important reason to include computer for students use in a science course is that most (if not all) students, especially those planning a career in science, will be required to be computer literate. As students interact with computers in a variety of ways within their science courses, their degree of computer awareness and literacy will increase. More than one study found that computer use by students enhanced their self-esteem (Robertson, Ladewig, Strickland, & Boschung, 1987). This may also account, in part or in whole, for the increased interest in science by lower achieving students who have incorporated computers into their curriculum. Higher achievement and more positive attitudes were observed in a high school biology course that was "computer-loaded" (Hounshell & Hill, 1989).

A recent international survey of computer policies reported that most developed nations are striving to provide every student with access to their own computer (Pelgrum & Anderson, 1999). In the last few years there has been a great increase in the accessibility of computers in schools. The rationale behind the model of one computer for every student is the assumption that students will learn best when they have access to their own computer at any time, in any location (Rockman et al, 1998). According to Lewin, Mavers and Somekh (2003) technology plays a unique role as the unifying ‘big idea’ that policy-makers believe will deliver raised educational performance and at the same time open up opportunities for all in a more just and inclusive education system. Students who used a computer both at home and at school achieved significantly higher science score than those who only used the computer at school (Thompson and Fleming, 2003). In view of Trollip and Alessi (1988) one of the purposes of adding computers to classroom instruction is to facilitate learning for students by improving the quality and quantity of what they know. In many fields of science teaching it is convenient to use different kind of software in order to improve overall quality of teaching and learning. It is especially important for better and
deeper understanding of crucial scientific concepts and laws. Here study in science education has reported that the use of technology, and especially the use of computers, is highly and positively correlated to science achievement (Zacharia & Anderson, 2003; Beichner et al., 1999; Goldberg, 1997; Van Heuvelen, 1997; Eylon, Ronen, & Ganiel, 1996; Grayson & McDermott, 1996).

The science achievement of secondary school students has long been of concern to parents, academicians, policymakers, and the general public. Policymakers are inspired to inquire about the standing of their country relative to other countries with respect to students’ achievement. School performance in primary and secondary school does not depend on a student’s mental and physical abilities alone; other factors also have an important role. At the time of lively appraisal of educational development in India when many changes are being witnessed in organization, curricula and teaching techniques, it is pertinent to seek systematic and up to date information on the significant aspects of pupil achievement in science. It is appropriate in this context, to consider at once factors affecting the achievement in science such as attitude towards computer and multimedia, socio-economic background, personal variables (like gender, religion, participation in school sponsored activities, subject choice, computer and internet access etc.), language as a medium of instruction, various institutional factors, etc. These factors are of utmost theoretical and practical importance in developing curricula and designing educational programmes to suit the needs of pupils with varied backgrounds. Further the study of these factors assumes special significance in view of their implications in respect of day-to-day curriculum planning on part of the curriculum teacher. Evidence abounds in the literature to suggest that student background variables such as gender, race, ethnicity, home environment, attitudes and the like have a significant influence on their achievement in school science (Peterson and Carlson 1979, Schibeci and Riley 1986, Taiwo et al. 1999, Taiwo and Tyolo 2001). Adams and Singh (1998) proposed a model focusing on the direct and indirect effects of certain school
learning variables associated with student background characteristics, the school; the family; and the students on academic achievement.

In today's increasingly technology driven world it would seem to be a given that students who have had access to computers in their home or in classrooms would do better on science and mathematics achievement than those who had not (Berger et al., 1994; Shaw, 1998; Papanastasiou, 2003; Papanastasiou & Ferdig, 2003; Papanastasiou, Zembylas & Vrasidas, 2003). Schweir and Misanchuk (1993) believe an advantage of interactive multimedia instruction is the creation of meaning developed by the learner's interaction with the new information in the program. The researchers concluded that individual access to the portable computers resulted in higher levels of pupil motivation, harmonious and purposeful learning environments, and greatly accelerated information technology literacy among the pupils and teachers (Gardner et al. 1994). The positive educational value of the computer and internet is widely known and it is important medium for self learning and development (Kerawalla & Crook, 2002). Currently, higher education institutions in India and elsewhere encouraging faculty to incorporate various technologies into their teaching (Dillon, Greene & Cryness, 2001; Amundsen & Sohbat, 2001). There is a range of reasons proposed for this support. First, there is the promise a more efficient learning (Hooker, 1997); making learning available to more students in a more diverse ways, times and places (Bates, 1997; Laurillard, 1993). Second, students need to be prepared for the future provided with experiences of the kinds of activities that society will expect of them (Oblinger & Rush, 1997). Third, there is a belief that use of technology may enhance student learning by changing the focus to more student-centered learning (Gandell, Weston, Finkelstein & Winer, 2000).

The effective learning resulting from the use of computer in education depends upon a number of social and personal factors like the attitude of students' towards computer (Kerawalla & Crook, 2002). Demographic and family background characteristics such as socio-economic status, parental education, and
cultural and social capital have traditionally been found to be related to students’ achievement in science (Okes, 1990; Berryman, 1983; Schibeci & Riley, 1986). Literature reveals (Von Secker, 2004; Bacharack, Baumeister & Furr, 2003; Dimitrov, 1999) that gender is another factor which influences science achievement in which boys generally performs better than girls in science. Vamadevappa (2005) found that there was positive and significant relationship between parental involvement and academic achievement. Nessa (1994) observed that father’s education and mother’s education are correlated with academic achievement. Different activities, in which students participate, both inside and outside the school itself, are among the multiple situations that can have an effect on science achievement. Extra-scholastic activities have been associated with an improved educational level, more interpersonal competencies, higher aspirations and better attention level (Mahoney, Cairo & Farwer, 2003). Much of the research carried out that examines computer use and student achievement, seems to emphasise that there is a positive correlation between these variables. There is plenty of evidence to indicate a positive relationship between computer technology and student achievement (James & Lamb, 2000; Sivin-Kachala, 1998; Weaver, 2000; Weller, 1996; Wenglinsky, 1998). In terms of the type of school community, Zhang (1999) observed that students from suburban schools had higher science achievement than those from urban schools. However, rural and suburban schools show the same level of science achievement as their counterparts from urban schools. Type of schools (single-sex/co-educational schools) influence attitude towards and achievement in science of male and female students in single-sex schools and students in co-educational schools (Dhindsa & Chung, 2003). Narsimhan, et al. (1988) observed that the English medium students performed better as compared to their telugu medium counterparts.

The development of favourable attitude towards computer is considered eminent for effective learning. Based on the knowledge that students have different learning styles and may need course content presented in a variety of
ways assessing students’ attitudes toward computer technology is essential (Bostock, 1998). A substantial body of research into students’ attitudes to computers does not exist, because it is a growing field (Brock & Sulsky, 1994; Larose et al., 1998; McBride & Nagle, 1996). For example, a number of researchers have investigated students’ attitudes after period of training and have concluded that some students do experience a positive shift in attitude as a result of the training (Gressard & Loyd, 1986; Torkzadeh & Koufteros, 1994). Colley et al. (1994) also found that participation in a computer course significantly reduced anxiety and increased confidence among both males and females. Within the last decade, there was widespread application of the Internet as an instructional tool and medium of communication because of its potential to facilitate and improve learning (Wang & Bagaka, 2002). Computer usage patterns among teens, including use of the Internet, is being increasingly being investigated. One area of interest for educators relates to the home use of the computer and the Internet by adolescents and its relationship to academic achievement. This is particularly relevant, as the amount of time that teens spend at home on the computer appears to be rising. This trend may have an impact on academic performance. Hoffman, Kalsbeek, and Novak (1996) found a strong relationship between type of access, computer and modern ownership, length of time of computer use, and the segments of time on the internet and web.

For years, the question of the impact of various social, economical, and educational factors on students’ educational achievements has been of great interest to the researchers in education, economics, and other social sciences. Since Coleman’s (1966) landmark study on Equality of Educational Opportunity, socio-economic status has been seen as a strong predictor of student achievement. Coleman asserted that the influence of student background was greater than anything that goes on within schools. His research indicates that family background and associated parental influences may be primary forces affecting students’ achievement every time. SES, a unidimensional concept, reflects
different aspects of home characteristics, such as economic level, education and learning environment, cultural and educative resources, and the like. Widespread socio-economic gaps in academic achievement exist not only in industrial countries but also in developing countries (Ishida, Muller, & Ridge, 1995). It is believed that families with high (SES) often have more success in preparing their children for school because they always have access to a wide range of resources at their disposal to promote, uplift and support their young ones. In other countries, researchers have weighed the effects of family socioeconomic status (Lockheed et al. 1989; Muller 1995; Goyette & Xie 1999; Adaju & Vargas 2002; Farkas et al., 2002) and parental influence (Kao & Tienda 1995; Ho & Willms 1996; Goyette & Xie 1999) on student’s mathematics and science achievement. Many researchers and scientists agree that success at school is associated with social background factors (Giddens, 1997), as these factors can greatly affect young children’s cognitive skills. SES has long been used to explain differences in student academic achievement (Sammons et al., 1997; Thomas, Sammons, Mortimore, & Smees, 1997). Sharma (1980) found that high socio-economic group demonstrated more sociability, emotional stability, thoughtfulness in comparison to low socio-economic group. Israel et al. (2001) conclude that both parents’ socio-economic status and social capital available in the family promote child’s educational achievement. Jegede (1987) and Jegede & Okebukola (1988) report that socio-cultural factors play a significant role in science learning in non-western cultures whereas Indira (1991) observed that students belonging to different social class differed in their academic achievement.

When difference in SES groups are compared in the United States of America it is found that there is a tendency for high SES groups to outperform lower SES groups (Von Secker, 2004). A study conducted by Kesmang & Taiwo (2002) inferred that there is a significant negative relationships between the students’ socio-cultural background and their attitudes towards school science on the one hand and their achievement in school science on the other hand. A similar
picture emerges in South Africa where students from the lower SES groups obtained significantly lower scores than those from higher SES groups (National Department of Education, 2005). Here SES is associated with possessions in the home and the expanded opportunities which the home environment provides to pupils (von Seeker, 2004; Yang, 2003). Further, Cuttance (1992) reported that achievement was significantly greater for students from more affluent home backgrounds, when compared with students from poorer homes. Several studies show that the presence of educational resources in the home, including computers, is a strong predictor of academic success in mathematics and science (National Center for Educational Statistics, 2000).

Gender differences in science have received serious attention in the science education research for the last two decades. Boys and girls have been compared on variables such as achievement, attitude, motivation, interest, and performance behaviours (Eccles & Blumenfield, 1985; Erickson & Erickson, 1984; Greenfield, 1997; Jovanovich & Shavelson, 1998; Kahle, Parker, Rennie, & Riley, 1993; Morrell & Lederman, 1998; Simpson & Oliver, 1985). There has been virtual consensus in the literature that, as a group, boys outperform girls in science in most countries (Esquivel & Brenes, 1988; Tamir 1988; Wang & Staver, 1995), either no gender difference (Al-Methen & Wilkinson, 1988; Sinha, 1991; Ventura, 1992; Calsambis, 1995) or girls outperform (Young & Fraser, 1990; Forrest, 1993; Calsambis, 1995; Zeegers & Giles, 1996; Soyibo, 1999). Usually the differences are smallest at age 10 and greatest at age 17. An increase in the gap with age is reported also by Johnson & Murphy (1986). However, in all cases and in all ages the longest difference in achievement is in physics and the smallest, if at all, is in biology. Much of the research into gender issues in education states that girls do not achieve as well as boys in Physical science (Levin, Sabar & Libman, 1991; Young & Fraser, 1990, Becker, 1990). The differential performance between boys and girls has been linked to the dominance of boys over girls in entering science courses in the higher secondary and university levels, particularly in physical
sciences (Gorard, Salisbury & Rees, 1999; Head, 1999). According to Sansanwal (1983), boys performed better in all science subjects including biology. Browne and Ross (1991) and Murphy (1997) noted that boys and girls are different in their interests and expectations from an early age. These gender differences may shape the children’s perceptions of self-competence in various school subjects, which may in turn affect their achievements in science. Murphy (1991) found that girls tend to consider contextual features as an integral part of the science tasks while boys tend to consider issues in isolation. Thus girls usually formulate more complex multivariable investigations that are difficult to work on, but the difficulty is often interpreted by teachers as evidence of girls’ misunderstanding or incompetence in science. Gender differences in achievement tend to be subject specific (Hedges & Nowell, 1995; Manning, 1998; Sammons, West, & Hind, 1997). Males outperform females in mathematics and science, with larger differences in science (Beller & Gafni, 1996). Pandey & Ahmad (2008) indicates statistically no significant difference between male and female adolescents on the measures of academic performance. Ormerod (1975) reported that girls were more likely to show preference for science and choose science in single-sex girls’ schools compared with in coeducational schools.

Studies have also found that the religion is not a predictor of science achievement (Khatoon, 1996; Neathery, 1997). Muslims performed with as much success on the science test as the non muslims. But Sucharita (1999) found that the achievement of SC/ST students were lower than that of general students. A study conducted by Verma (1985) indicates that the mean achievement of scheduled caste students was found to be significantly lower than that of tribal students and the students belonging to the other castes. In another study, Gupta (1983) found that differences in the achievement of Hindu-Muslim students are significant. The academic achievement of non-muslim children has been found superior in comparison to their muslim counterparts (Alam, 2001).
The effects of parental education and occupation on educational achievement are, however, multifaceted. Measures of parental education and occupation in studies of schooling may function in a variety of ways. When viewed at the individual pupil level, these measures can reflect differences between pupils in a given school. When aggregated over the pupils who attend a given school, measures of parental education and occupation can describe community characteristics such as economic and social class. Parental education is also an important aspect of the socioeconomic status of school students because it is expected that parental and student education is strongly correlated. Highly educated parents are more likely to instill more positive values about education to their children, have a better understanding of what schools require and are probably better equipped to help their children in their school-work. Probably the most prominent and direct explanation of the link between parents’ education and their children’s academic achievement relies on the assumption that parents learn something during schooling that influences the ways in which they interact with their children around learning activities in the home (Eccles, 1993; Brody et al., 1995; Corwyn & Bradley, 2002; Hoff et al., 2002; Davis-Kean et al., 2003; Davis-Kean, 2005). Most often the effects of mother’s and father’s education are comparable although it is more difficult to compare (in the same analysis) than occupational status because mother’s and father’s education tends to be more highly correlated.

Number of family members has been found to be important predictor of academic achievement. Family structure (number of parents and number of siblings) is also said to influence student academic achievement (Manning, 1998; Pong, 1997, 1998). Smaller family size has been linked with higher academic achievement (Eamon 2005, Majoribanks 1996). Students with fewer siblings are likely to receive more parental attention and have more access to resources than children from larger families. The additional attention and support leads to better school performance (Eamon 2005, Majoribanks 1996). The most unsuccessful
students come from large families and from those with lower educational level of parents (Delibasic, 1970; Kmeta et al., 1973; Cloward, 1974; Comelius & Cockvurn, 1978; Bozic & Bozic, 1985; Jelavic, 1985; Nikolic, 1998).

Extracurricular programs offer alternative environment in which children can learn about themselves and their world, and can discover opportunities for carving their own versions of success (Eccles, 1999). These programs allow children to safely explore independence, peer relationships, new skills, leadership, and non-parental adult influence. Moreover, the extra-curriculum has the goal of providing another set of experiences that may engender positive growth. From a theoretical point of view extra-curricular activities are viewed as boosting academic performance (Hunt, 2005). Extra-curricular activities supplement and extend those contacts and experiences found in the more formal part of the program of the school day (Millard, 1930). Most research on extra-curricular activities (sports, games, debates, etc.) shows that participation in these kinds of activities is associated to positive outcomes as academic achievement (Holland & Andre, 1987; Marsh, 1992; Silliker & Quirk, 1997; Cooper et al., 1999; Eccles & Barber, 1999). Many extra-curricular activities have proven to be beneficial in building and strengthening academic achievement, even if the activities are not obviously related to academic subjects (Marsh & Keitman, 2002). Studies have found that children who participate in sports have higher grade point averages, better academic and social self concepts, higher graduation rates, and better peer relations than children who do not participate in extracurricular activities at all (Eccles & Barber, 1999; Gerber, 1996; Griffin, Chassin, & Young, 1981; Mahoney & Cairns, 1997; McNeal, 1995). The findings are further supported by Darling et al. (2005), whose study showed that students who participated in school-based extracurricular activities had higher grades, higher academic aspirations, and better academic attitudes than those who were not involved in extracurricular activities at all. A number of studies revealed that students
participating in extracurricular activities did better academically than students who did not participate (Marsh & Keitman, 2002).

In recent years, there has been phenomenal increase in the number of private teaching institutes (coachings) in India. Students are now no more dependent on their parents and family members for studies after school hours. Apart from self-study, they seek help from outside agencies in understanding the difficult concepts of science and mathematics. The private tuition is a phenomenon that invites special attention of researchers, educational planners and decision makers (NIEPA, 2002). The system of private tuition has been in existence in India for a pretty long time. The private tuition scenario has undergone a sea change during the last three decades, in tune with changing composition and character of a society. Earlier it was an urban phenomenon and the students of 'board' classes only thought of receiving tuition but now a days children start tuition from early classes onwards even in small towns and villages. In recent years, there has been a phenomenal increase in the number of private teaching institutes in India. The studies on effect of out-of-school hours academic coaching on students indicated that coached and uncoached students perform equally in most of the school subjects (Kenny & Faunce, 2004; Kenny & Stone, 2000; Achuff & Lila, 1988). Some studies reported that coaching has significant influence on results of the tests (Egan & Bunting, 1991; Shajila, 1992). Gafoor & Muhammad (2007) found that the pupils belonging to tuition group performed better in science than pupils belonging to non-tuition group. But when intelligence and achievement motivation of tuition and non-tuition groups are equated than coached and uncoached students perform equally in most of the subjects (Kenny & Faunce, 2004; Kenny & Stone, 2000; Achuff & Lila, 1988; Becker, 1990).

School quality varies dramatically in India. In terms of 'output' of education, the best products of Indian schools compete at the world level in projects such as the International Physics Olympiad (IPhO) and International Chemistry Olympiad (IChO) while the worst may complete high school without
much other than a poor ability to read, write and do simple arithmetic. In terms of inputs, the disparities are most conspicuous in physical facilities and teaching materials from high resource schools with excellent facilities to single-teacher schools with no building, drinking water, toilets, blackboard, electricity, furniture, charts or library (GOI 1985). Decisions pertaining to organizing, operating, funds allocation, adequate classrooms, teaching methods, etc. have direct impact on student learning. The importance of the school and classroom environment in enhancing learning has been investigated by Fraser (1986, 1991), who found strong links between student outcomes and their educational environments. Given these facts and the possibility that teacher characteristics and school organisation may also vary greatly, it is expected that institutional influences on pupil achievement will be strong.

Several international studies suggest that pupils attending private primary schools achieve higher academic levels than pupils attending public schools (Coleman et al. 1982, Willms 1984, Chubb and Moe 1990, Chrispeels 1992, Dijkstra and Peschar, 1996, Gamoran 1996, Hofman et al. 1996). A number of other studies have also taken up the question of whether private schools are truly better than public schools. These studies report that private school students have superior literacy and numeracy test scores (Williams et al., 1980) or better examination results in the final year of high school (Elsworth et al., 1982). Coleman and Hoffer (1987) compare public and Catholic schools and often found that Catholic schools outperform public schools, even with the inclusion of extensive controls. Dronkers and Robert (2003) critically examined Programme for International Student Assessment (PISA, 2000) data for 19 comparable countries and concluded that private government-dependent schools are more effective than public schools. Controlling the social composition of the school private independent schools were less effective than comparable public schools. Related studies in sociology (Noell, 1982; Bryk, Lee & Holland, 1993; Witte, 1996) provide a critical summary of recent comparisons of public and private
evidence that Catholic schools increase student achievement, especially for
minorities which are initially low achievers, but Sander (1996) finds no significant
effect. Study has suggested that private schools, especially Catholic schools, have
a positive effect on academic achievement (Hofman, 1995). Nair (1984),
Mazumdar (1992) and Ahsan (2005) reported that there were statistically
significant differences between the achievement scores of students attending
government and private schools with the latter category of students showing
higher scores. Similarly, Dange & Vijayalakshmi (2006) observed significant
difference between government and private college students’ achievement in
physics.

The concern about potential urban-rural differences in educational
outcomes is not limited to this country, but rather, it appears to be a global issue.
For example, research studies comparing students from rural and “metropolitan”
(urban and suburban) areas on a variety of social, psychological, and educational
outcome variables have been conducted in many countries, such as in South Africa
(Lidell, 1994; Mwamwenda, 1992), in Nigeria (Akande, 1990), in Australia
(Northern Territory Department of Education, Darwin, Australia, 1992), in India
(Shukla, 1984; Ghosh, 1985; Singh & Varma, 1985; Saraswat, 1988) and in Peru
(Stevenson; Chen & Booth, 1990), to name just a few. Many educators,
researchers, legislators, and the general public believe that students from smaller
and rural schools are inferior to those from larger urban or suburban schools.
Young (1998) found that the location of the school had a significant effect on
performance, with pupils from rural areas performing less well than their
counterparts in urban areas. Thirunarayanan (2004) compares students’
achievements in different content areas considering school location factor in the
United States and concludes that students in central-city schools in the United
States perform statistically “significantly worse” in many subject areas than
schools and found that students from smaller (often rural) schools achieved almost as par as students from larger schools. Kleinfeld (1985), in their Alaska city, did not find that big school size determined the quality of a student’s education, experience or achievement in standardized tests. Nair (1984) and Garg & Chaturvedi (1992) reported that the mean academic score of rural students was lower than the mean academic score of urban students. Another study which held socio-economic level and ethnicity constant revealed no urban-rural achievement gap (Edington & Martellaro, 1984).

The debate about whether single sex schools are better than co-educational schools and vice versa has been ongoing for many years, and seems likely to continue. Most of the public appears to be in favour of co-educational schooling, while a number of professional educationists have belief that single sex education is more beneficial (Shaw, 1995). In 1976, Elwood & Gipps (1999) and Shaw (1995) proposed that girls’ academic achievement was closely linked to school type, where most of the high achievers attended single-sex schools. Hamilton studied high school students in Jamaica in 1985 and found that boys and girls in single-sex schools performed better than those in co-educational schools whereas girls achieving the lowest performances (Streitmatter, 1999). A few reports (Kelly, 1981 & Harding, 1983) suggest that girls in girls’ schools do better in science and are generally more likely to study the physical sciences. Girls in the single-sex school reported more positive experiences with science and held more egalitarian views about women’s ability to study science and pursue science-related careers than girls in the coeducational school. A limited number of studies show that girls do better in single-sex schools and boys in coeducational settings (Ormerod 1975, Fraser-Abder 1990, Young and Fraser 1990). Steedman’s (1983) findings of higher science achievement of girls in single-sex schools than co-educational schools in England conflicts with research by Lee and Bryk (1986) in the United States and Carpenter & Hayden (1987) in Australia. The latter researchers found that girls and boys attending private single-sex schools had significantly higher
academic achievement than students attending government co-educational schools. Young & Fraser (1992) found that the average socio-educational level of the school population was a more important predictor of student attainment in science than school type (single-sex or co-educational).

Dale’s (1969) research during 1960-1970 proposed that there were more benefits for boys and girls in being educated in mixed settings, which was viewed as a more progressive form of secondary schooling. The derive behind this was the pursuit of equal opportunities for all. Dale advocated co-education as favouring better social development, and boys’ academic achievement, and suggested that girls’ progress was not harmed by co-educational schooling. There has been recent interest in the possible advantages of single sex grouping within mixed schools in order to gain the benefits inherent in both types of groupings (Stables, 1996). Ndunda (1990) believed that girls in coeducational schools were more likely to have negative school science experiences. Rowell (1971) demonstrated that in co-educational classes, boys performed better in science than girls. Branson and Miller (1979) found that girls in coeducational schools were less likely than girls in girls’ schools to equal boys in academic achievements. The only advantages coeducational schools offered were more opportunities to study science for an extended period. However, the girls in co-educational schools tended not to take advantage of these opportunities. Dhindsa and Chung (2003) analyzed significant differences in attitudes and achievement in science of male and female students in single-sex schools and students in co-educational schools.

‘Language is not everything in education but without language everything is nothing in education’ (Wolff 2006). Language education policy, particularly with regard to the medium of instruction in secondary education, is a key factor which can either facilitate or optimize access to the content of the curriculum or block learning, preventing both access and equity. The medium of instruction has always been a key issue among secondary schools. English has become a language of power as proficiency in English would confer a great advantage in securing
wellpaid posts in the government and the commercial field, and provides the means for social, economic and academic upward mobility. Bernstein (1971) claims that a child who does not know the formal language has to learn it at school, so he/she first has to focus on understanding the language that the teacher speaks before he can learn the subject. Research conducted in U.S. (Rosenthal et al., 1983; Fernandez & Nielsen, 1986; Schmid, 2001) and Hong Kong have (Cheung et al. 2003) emphasized differences in medium and instruction and language ability as a primary determinant of the gaps in educational performance. The findings by Professor Derek Cheung Sin Pui and his research team (2003) resonates that of Fernandez and Nielson (1986). Their results suggested that there are significant differences between students in English medium and Chinese medium schools in terms of their academic achievements and psycho-social developments. Specifically, English medium students were handicapped in science achievement compared to their Chinese medium peers. This gap in science achievement is due to their low levels of English proficiency. Science achievement of pupils of English medium classes was higher than those of pupils of Malayalam medium classes (Raveendranathan, 1983). According to Singh (1988), significant differences did not exist between the means of achievement scores in mother tongue and foreign language (English) of overachievers and underachievers.

For years question of the impact of various personal, social, economical, institutional and educational factors of students’ science achievement is of great interest to the researchers in education, economics and other social sciences. Having a number of indications about the relationship between students’ science achievement and attitude towards multimedia, socio-economic status, certain personal and institutional factors, it seems, however, that not much research has been done in this field. It is for this reason that investigator attempts to investigate if similar or dissimilar relationships would work out in case of secondary school students’ achievement in science.
1.2 Statement of the problem

"A Study of Secondary School Students' Achievement in Science in Relation to Attitude towards Multimedia, their Socio- Economic Status and Certain Personal and Institutional Factors."

1.3 Objectives of the study

The purpose of this research study is to find out achievement in science of secondary school students and also find out that if there is any relationship between achievement in science and their attitude towards multimedia information technology, their socio-economic status, and certain personal and institutional factors. Against this background the following were the aims and objectives of the present study:

1. To study the general features of science achievement of secondary school students.

2. To study the attitude towards multimedia information technology (combination of audio-video, text, graphics, sound, animation etc.) in relation to science achievement.

3. To study the socio-economic status (upper, middle and lower classes) in relation to science achievement.

4. To study the personal factors (gender difference, religion, parental education and occupation, family size, pre-primary education, type of primary education, type of assistance, computer and internet access friends interested in computers, time spent on study at home, school sponsored activities, educational tours organized by school, non-school hours playing with friends and choice of stream) in relation to science achievement.

5. To study the institutional factors (private and government, convent and non-convent, single-sex and coeducational, urban and rural,
1.4 Hypotheses of the study

In order to give proper direction 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 these areas, theoretical view points available in related literature and investigators 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 conceived as statistical hypotheses, usually they have taken on the form of 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, 0.01 and 0.001 levels. The reason for fixing the rigorous limit is discussed elsewhere. Common practice in this regard is to set up a region of 0.05 to 0.001 levels. The following hypotheses were established:

1. There is no significant difference in science achievement in relation to attitude towards multimedia information technology (combination of audio-video, text, graphics, sound, animation etc.) of students.

2. There is no significant difference in science achievement in relation to socio-economic status (upper, middle and lower classes) of students.

3. There is no significant difference in science achievement in relation to personal factors (gender difference, religion, parental education and occupation, family size, pre-primary education, type of primary education, type of assistance, computer and internet access friends interested in computers, time spent on study at home.
school sponsored activities, educational tours organized by school; non-school hours playing with friends and choice of stream) of students.

4. **There is no significant difference in science achievement in relation to institutional factors** (private and government, convent and non-convent, single-sex and coeducational, urban and rural, English and Hindi medium, multimedia and non-multimedia schools) of students.

1.5 **Definition of the terms**

Some terms and concepts have been repeatedly used in this study owing to the unfortunate situation that those terminologies in behavioural sciences has not yet attend a standardized form. It appears necessary that their definitions as accepted for this study are given so that any term may not mean different things to different readers of the dissertation. It is obvious that the investigator has not coined her own definitions, but has for each term selected the one from those given in standard text books which was found to have best solved the purposes of the present study. In case of each term or concept the accepted definition is preceded by a brief discussion of how it is viewed by different authors.

1.5.1 **Education**

Education as a discipline has been steadily growing in its size, significance and scope over the years in response to the needs of an ever-increasing population and the diverse developmental demands. It not only raises the socio-economic status of human beings and community as a whole but it also brings about the cultural transformation of a society. It is one of the basic activities in all human societies. It may be interpreted to connote the process through which experience or information is gained, or it may be used to indicate the results of such training, or
the product of the learning process..... Using either connotation of the term, education implies experience, insight and adjustment on the part of learner as he is stimulated toward growth and development.

The Latin word ‘Educatum’ means to train; ‘E’ means from inside and ‘Duco’ means to lead or to bring up. By combining the two education comes to mean to draw from within. Education is a process which draws from within. Latin words ‘Educare’ and ‘Educere’ mean to bring up, to lead out or to develop etc. In this way the word education means to develop the inborn qualities of a child to the full. According to a definition formulated by group of experts for the Dictionary of Education, “education is the aggregate of all the processes by means of which a person develops abilities, attitudes and forms of behaviour of positive value in the society in which he lives.” Brown and Roucek, defined education as “the total of the experience which moulds the attitudes and determines the conduct of both, the child and the adult.” According to Dewey, “Education is a continued process of experiencing and revising or recognising experiences.” In view of Gandhiji, “By education I mean an round all drawing out of the beast in child’s and man’s body, mind and spirit.” Perry, points out “Education is the cultural process by which successive generations of men take their places in history.” Webster defines education as the process of educating or teaching. Sumner viewed education as the attempt to transmit to the child the mores of the group so that he can learn, “what conduct is approved and what it disapproved...., how he ought to behave in all kinds of cases, what he ought to believe and reject.” In the words of Swami Vivekanand, “Education is the manifestation of perfection already reached in a man.”

1.5.2 Science

Science now dominates every field of our activities. Every country is trying to preponderate others by providing new ways of life, which serve as a timely warning to our country to reorient science education in our schools and colleges in
the shortest possible time so that we can attain a status of equality in the community of nations and face the world with confidence and dignity. According to Columbia Encyclopedia (1963), “Science is an accumulated and systematized learning, in general uses restricted to natural phenomena. The progress of science is marked not only by an accumulation of facts, but by the emergence of scientific method and of the scientific attitude. In New Webster’s Dictionary, science may be defined as, “knowledge of facts or principles gained by systematic study, a particular branch of knowledge, especially on dealing with the body of the facts of truths systematically arranged and showing the operation of general laws.” Patrick defined science as, “a cumulative and endless series of empirical observations which result in the formation of concepts and theories being subject to modification in the light of further empirical observations. Science is both, a body of knowledge and a process of acquiring and refining knowledge.” Pioncare, points out that science is built-up of facts like a house which is built of stones, but an accumulation of facts is no more a science than a heap of stones. According to Sullivan, “Science is the activity where truthfulness is obviously an essential condition for success. Its success in fact is measured by its truthfulness.”

From the above definitions three basic principles regarding nature of science can be identified:

1. an accumulated and systematized body of knowledge
2. the scientific methods of investigation
3. the scientific attitudes and way of thinking

Finally, science is the name we give to a group of processes through which we can systematically gather information about the natural world.

1.5.3 Technology

Technology is an increasingly influential factor in education which offers powerful learning tools that demand new skills and understandings of students, including Multimedia Literacy, and provide new ways to engage students, such as
classroom management software. The use of technologies such as powerpoint and interactive whiteboard in capturing the attention of students in classroom. Technology is also being used in the assessment of students. Good, defined technology as, “a systematic body of facts and principles comprehensively organized for a practical purpose; may include the principles of effective teaching.” In Advance Learner’s Dictionary of Current English, technology is, “the science which deals with industrial arts.” Technology may also be defined as “an object or sequence of operations created by man to assist in achieving some goal. A technology is a body of human knowledge that can be passed along from one place to another and from one generation to the next.” (www.demac//vub.ac.be)

1.5.4 Information technology (IT)

The growth and use of IT and its tools in the field of education has seen tremendous growth in the recent past. IT involves finding, sharing and re-structuring information in its diverse forms. Because of the speed of data processing, the storage capacity of computers and instant accessibility of electronically transmitted data we now live in a global capsule with the world at our fingertips, no more than a few clicks of the mouse away. Technology has entered the classroom, the big way to become part of a teaching and learning process. Computers have made direct impact on education in the form of systems that are actually involved with the teaching process, viz. CAI (Computer Assisted Instruction), CAL (Computer Assisted Learning), CBT (Computer Based Training) and CMI (Computer Managed Instruction), etc. According to Wikipedia, IT is the technology required for information processing. In particular the use of electronic computers and computer software to convert, store, protect, process, transmit and retrieve information from anywhere and anytime is the acquisition, processing, storage and dissemination of information by means of computers and telecommunications (Dictionary of Computing and New

IT is a term that encompasses all forms of business data, voice conversations, still images motion pictures, multimedia presentations, and other forms, including those not yet conceived. In the broadest sense, IT refers to both the hardware and software that are used to store, retrieve and manipulate information.

1.5.5 Multimedia

Multimedia is nothing but processing and presentation of information in a more structured and understandable manner using more than one media such as text, graphics, animation, audio and video delivered by computer. The computer is an intrinsic part of multimedia. All these elements, text, graphics, sound and video, are either computer generated or transmitted through computer. Multimedia can be loosely defined as computer-based technology integrating some, but not necessarily all, of the following: text, graphics, animation, sound and video (Barron and Orwig, 1995). Fenrich (1997) defined multimedia as the exiting combination of computer hardware and software that allows you to integrate video, animation, graphics and text resources to develop effective presentation on an affordable desktop computer. In Percieval and Ellington (1984) view multimedia is a term used to describe collection or groups of documents in several media, a work designed to be presented through the integrated use of more than one medium (e.g. a tape slide programme). According to Philips (1997)
multimedia is characterized by the presence of text, pictures, sound, animation and video, some or all of which are organized into some coherent programme.

Thus, the term multimedia describes a number of diverse technologies that allow visual and audio media to be combined in ways for the purpose of communicating. Its applications include entertainment, education and advertisement. But the term multimedia describes a number of dedicated media appliances, such as digital video recorders (DVR’s), interactive TV, MP3 players, advance wireless devices and public video displays.

1.5.5.1 Different media elements-

1. **Text inclusion** - of textual information in multimedia is the basic step towards the development of multimedia software. Text may be any type, may be a word, a single line or paragraph.

2. **Graphics** - Another interesting element in multimedia is graphics. As a matter of fact, taking into consideration the human nature, a subject is more explained with some sort of pictorial/graphical representation, rather as large chunk of text.

3. **Animation** - Moving images have an overpowering effect on the human peripheral vision. Animation is a set of static state; the change between states will be much easier for users to understand if the transitions are animated instead of being instantaneous.

4. **Video** - The video clips may contain some dialogues or sound effect or moving pictures. The video clips can be combined with the audio, text and graphics for multimedia presentation.

5. **Audio** - Audio gives life to the static state of multimedia, which enhances the multimedia usability to its full potential. There is several type of sound, which can be used in multimedia.
1.5.5.2 Uses of multimedia in education

Placing the media in a prospective within the instructional process is an important role of teacher. Following are the possible areas of application of multimedia:-

- Can be used as reinforcement
- Can be used to clarify or symbolize a concept
- Creates the positive attitude of individuals towards what they are learning and the learning process itself can be enhanced
- The content of the topic can be more carefully selected and organized
- The teaching and learning can be more interesting and interactive
- The delivery of instruction can be more standardized
- The length of time needed for instruction can be reduced
- The instruction can be provided when and where desired or necessary
- Access for teachers and students in remote locations.
- Replaces ineffective learning activity.

1.5.6 Attitude

Attitude is the state of consciousness within the individual human being. It is sentiment or a feeling pattern of behaviour in response to particular people or objects. It is usually a hypothetical construct not directly open to observation but inferred from verbal expression or overt behavior. Attitudes, effective by products of an individual’s experience, have their basis in his urges, acquired habits and the environmental influences by which one is surrounded. In other words attitudes result from personal desires and group stimulation. Attitudes operate in specific behaviour patterns and are associated closely with emotional reactions. According to Baldwin (1905) an attitude is readiness for attention or action of a definite source. Chave (1928) states that an attitude is a complex of feelings, desires, fears,
convictions, prejudices or other tendencies that have given a set or readiness to act
to a person because of varied experiences. In Ewer’s (1929) view, attitudes are
modes of emotional regard for objects and motor “sets” or slight, tentative
reactions towards them. Krech and Crutchfeld (1948) define an attitude as states
that an enduring organization of motivational, emotional, perceptual, and cognitive
processes with respect to some aspect of the individual’s world. Lundberg (1929)
states that an attitude denotes the general set of the organism as a whole towards
an object or situation which calls for adjustment. Thurstone (1946) define an
attitude as the degree of positive or negative effect associated with some
psychological object. Triandes (1971) defined attitude as an idea charged with
emotion which predisposes a class of actions to a particular class of social
situations." Mueller (1986) points out that while there is not total consensus
among social scientists regarding the definition of attitude, there is substantial
agreement that affect for or against is a critical component of the attitude concept.
Allport (1935) considered attitude as a mental or neural state of readiness,
organized through experiences, exerting a directive or dynamic influence upon the
individual’s response to all objects and situations with which it is related.

From the aforesaid definitions following important characteristics of
attitude can be highlighted:

- An attitude is a subtle (artful), real and acquired phenomena of human
  personality. It is one of the psycho-physical systems that enter into the
  organization of personality and it is a purely subjective side of human
  behaviour.

- According to Catell, “it is a vector definable by strength, direction,
  object situation and stimulus situation”.

- An attitude originates an incomplete stage of an organism to external
  conditions that may be quite unstable or permanent. It is based on the
  experience of the individual relating to an object or situation.
• An attitude includes needs, interests and sentiments of the individual and derives its dynamic effect from them.

• An attitude is an observable set, sometimes intellectual and emotional. Attitude may be latent in, the individual. These attitudes act as ruders steering the boat, redirecting individuals to select objects, situations and ideas from the environment.

The process of measuring attitudes, therefore, can be conceptualized as consisted of three stages:

1. Identification of the types of behaviour samples those are acceptable as a basis of making inferences.
2. Collection of the samples of behaviour.
3. Treatment of the behaviour samples so as to convert findings about them into quantitative variable.

1.5.7 Attitude towards computer and multimedia

A computer has been used in education for more than four decades, as they have now been accepted “unconditionally” as an integral part of our entire educational system. Computers have an increasingly important effect on undergraduate courses, in terms of pedagogical methods, curriculum content and student study practices. Computer attitude has been defined as a person’s general evaluation or feeling of favour or antipathy towards computer technologies and specific computer related activities (Smith et.al, 2000). A person’s attitude towards computer is influenced by a variety of aspects, e.g. the social issues relating to computer use (Popovich et al., 1987), computer liking, computer confidence, computer anxiety or comfort (Loyd & Gressard, 1984), achievement (Bandalos & Benson, 1990), usefulness and value (Francis & Evans, 1995). Positive attitudes enhance the learning process (Shneiderman, 1980), specifically the motivation to learn and the ability to retain information in the given situations (Jawahar & Elango, 2001). A negative attitude may lead to computer resistance
(Shneiderman, 1980). A person’s attitude towards computers and related technology could determine one’s performance with the technology and the satisfaction one draws with the experience.

Multimedia impacts student’s daily lives and certainly plays an important part in developing student’s positive and negative attitudes towards it. As a direct means multimedia may help to develop attitudes through students experience with computers. Attitude has been found to be a predictor of the adoption of new technologies such as computers (Anderson et al., 1979). The present study involves the measurement of secondary school student’s attitude towards multimedia; therefore, it is necessary to give operational definition of attitude towards multimedia, which is as follows:

“Attitude towards multimedia means the sum total of a student’s evaluative reactions (positive and negative) as expressed through preferences or expressions of likes and dislikes of various aspects of multimedia”

Thus, the measurement of attitude in this study is done by evaluating the student’s reaction (positive and negative) towards all important aspects of multimedia as well as by his/her opinion, feeling, likes and dislikes towards multimedia.

1.5.8 Achievement

As the global economy expands, student groups will enter the workforce of the future. Thus great emphasis is placed on the achievement of high academic standards for all students. Academic achievement is of paramount importance particularly in the present socio-economic and cultural contexts. Obviously, in the school priority is given to achievement right from the beginning of formal education. Achievement refers to the traditional indices of the degree to which a student has encountered success in school. These may include school grades, grade point average, rank in class, scores on standardized achievement and aptitude tests, and other scaled indicators used within the school setting to
document and report level of academic progression. The Dictionary of Education (Good, C.V. 1973) defines achievement as, “accomplishment or proficiency of performance in a given skill or body of knowledge”. Glaser (1963) defined the measurement of student achievement as the determination of the characteristics of student performance with respect to specified standards. According to Mitzel (1982), “achievement is often defined in relation to the concept of aptitude by a single contrast: measuring the learning that takes place during a definable course of instruction is achievement testing measuring the outcomes of very lengthy and diffuse set of learning experiences in aptitude testing.” In the standards for test construction (APA, 1999) achievement is viewed basically as the competence people have in an area of content. “Ability to demonstrate accomplishment of some outcome for which learning experiences were designed” (www.artswork.asu.edu/glossary)

1.5.9 Achievement in science

Achievement in science is often a prerequisite for certain courses, and without it students cannot gain access to a large range of disciplines. The importance of science learning and achievement for all is about scientific literacy. That scientific literacy is a central goal of education as affirmed by the American Association for the Advancement of Science (1989). The fundamental purpose of science education in an institutionalized setting is to enable the pupils to learn effectively and to develop certain skills and competencies in various branches of science such as physics, biology and chemistry. The knowledge so acquired is termed as achievement in science.

1.5.10 Socio-economic status (SES)

The ‘socio-economic status’ is a very important concept being employed frequently in day-to-day matters. In general socio-economic status has been considered as one of the important variable influencing child’s social and
psychological development, and his academic achievement. Obviously for any study related to socio-educational problems, economic status of the parents and their occupation may be considered an important variable. All these factors influence child’s academic achievement and his social, cultural and aesthetic development.

The socio-economic status is a blending of a two statuses, social and economic. Though none of the two exist without each other yet they are distinctively different. Socio-economic status appear to be the resultant of the position of an individual in a society by virtue of a complex fusion of both of them, which often do not run parallel to each other in their own areas. This intermingling takes place in an undefined and curious manner eventually to present an indicator to socio-economic status. According to Good (1973), SES may be defined as the level indicative of both the social and the economic position of an individual and group. Srivastava (1978) in his SES scale has taken socio-economic status as an index of education, occupation, income, cultural living or cultural standard and social participation of a person. Thomas, et. al (1978), viewed it as person’s position in any group, society or culture as determined by education, occupation, wealth and social class.

The term socioeconomic status is used by sociologists to denote an individual or family’s overall rank in the social and economic hierarchy (Mayer & Jencks, 1989). In most research, including national studies, SES has been measured as a combination of parents’ education, parents’ occupational prestige, and family income (Mayer & Jencks; White, 1982). ‘Socio-economic Status’ would, therefore, be a ranking of an individual by the society he lives in, in terms of his material belongings and cultural possessions along with the degree of respect, power and influence he wields. In the present study SES is taken as a broad term that is used to describe factors about a person’s lifestyle including occupation, income and education.
1.5.11 Personal factors

A set of potentially influential factors for pupil achievement are generally categorized as being associated with personal characteristics such as gender and religion.

1.5.11.1 Gender

Gender refers to a set of qualities and behaviours expected from a female or male by a society. It is the social dimension of being male or female. The term “gender” difference will be used throughout and its meaning will be synonymous with “sex” difference. That is, gender here refers simply to “boy” or “girl”, “male” or “female” in the sense these are generally understood.

1.5.11.2 Religion

A religion is a set of common beliefs and practices generally held by a group of people often confined to prayer, ritual and religious law. On religion basis, secondary students’ were divided into two groups, i.e., muslim and non-muslim. The non-muslim group consists of all the students who are Hindu, Sikh, Christians, Jains, etc.

1.5.12 Institutional factors

Institutional factors include the climate, atmosphere, ethos, tone, ambience, the cultural or personality of the institution or school. In the present study all the schools are divided into eleven categories which are as follows-

1.5.12.1 Government and private schools

Government schools are financed by the central, state, local; governments and their number is increasing every year. They follow the syllabi of State or Central Boards of Education and generally their final examinations are conducted by them. Both the recurring (teaching & non-teaching) grant and non-recurring expenditure of these schools are met from the budget. These schools are permitted
to collect a small amount of admission and special/amenity fees which are used to purchase office and library, consumables, maintenance of building, etc. Government schools educate the majority of students and do not charge large tuition fees (most do charge a fee as a contribution to costs). The major part of their costs is met by the relevant State or Territory government.

Private schools are owned and governed by entities that are independent of any government—typically religious bodies or independent boards of trustees. Private schools also receive funding primarily from nonpublic sources: tuition payments and often other private sources such as foundations, religious bodies, alumni, or other private donors. According to Good’s Dictionary of Education private school is “a school that does not have government support and that is not under public control. This means that private school is a school that is managed and administered by individuals who are not the employees of government and arrange their funds themselves.

1.5.12.2 Single-sex and co-educational schools

The system of education in which only boys (male) attend the institution or school are known as single-sex (boys) school. The system of education in which only girls (female) attend the institution or school are known as single-sex (girls) school. Co-education is the recent system of education where girls sit and study along with boys in the same class and in a common school or institution. Such a system of education gives an opportunity to understand each other’s problems and, therefore, can co-operate better in achievement of respective goals.

1.5.12.3 Rural and urban schools

Good’s Dictionary defined rural school as, “a school that may include the elementary grades or the high school grades, or both, under the administrative supervision of county, district, or other superintendents of schools, and that is located in the open country or in a village or town of fewer than 2,500 population”
A school that is located in cities and towns of more than 2,500 population are known as urban schools. Urban schools are located in large central cities with all the modern infrastructural facilities.

1.5.12.4 Convent and non-convent schools

A community, especially of nuns, bound by vows to a religious life under a superior and the building or buildings occupied by such a community is known as convent. Convent schools may be defined as those schools which being run and administered by such communities. All the private and government schools will come under the category of non-convent schools.

1.5.12.5 Multimedia and non-multimedia schools

Multimedia schools are those schools where computer education is imparted and there students had access to computers and computer practical are conducted. Non-multimedia schools are those schools where students do not have computer knowledge and these schools are not equipped with sufficient facilities for computer practical.

1.6 Significance of the study

Science education occupies an important place in school curriculum. It is ironic that science education in the early years of schooling has not been received due attention as it requires. This discipline as a matter of fact is under fire, both in developed and developing countries for different reasons. In developing countries, the teaching of science is linked more with the exploitation of natural resources, i.e., economic development, while in developed countries; the emphasis has been rather on ideas generated due to rapid advancement in science education. Precisely due to its progressive and critical nature, it has always been the prime focus in the agenda of various committees and commissions.
The present study has a significant and pragmatic value in the field of education. The main purpose behind conducting this study is to take a holistic view of different environmental conditions influencing academic performance in science of the students at secondary level. It is an accepted fact that the quality of a nation depends upon the quality of its human resources. This in turn depends upon the quality of their education imparted in educational institution.

In this study investigator makes a humble endeavor to trace the influence of the attitude towards multimedia, personal (gender, religion, school sponsored activities and educational tours organized by schools, access to computer and internet, etc.), socio-economic status and institutional factors (type of school such as private, government, convent, single-sex, co-education, private, urban, rural, multimedia and non-multimedia schools) on the science achievement of students especially at secondary level.

The purpose of this report is to bring to the attention of the science education community a research direction that may have potential for enhancing children’s achievement in science. This work suggests to the authors that understanding more about influence of various factors on students’ academic performance and the role of those factors play in science achievement may have important curricular and instructional implications. Consequently, the direction posed in this research may be important in continuing national concern regarding scientific literacy.

The rational for this study is that by better understanding of the relationship between various factors and achievement, educators can make informed decisions of how to improve science achievement. A careful examination of this issue could offer insights into what are the factors which hinder science achievement.

The purpose of this study is not an international comparison of the countries. Rather, it is to describe and highlight the wide spectrum of nuances of students’ home background, free and school-time activities, their motivational factors and effective outcomes of schooling, which all are connected with
students' science achievement. Attention is also given to social and cultural background issues and the historical context of each country.

The present study examines how schools are using computer based multimedia as a tool in teaching and learning process to develop skills among science students needed to assimilate and transform massive quantities of information into solution for today’s fast paced changing society. This project also aims at to determine the effects of an environment where MIT become a routine component of every student’s educational experience, on technology knowledge, practical application and achievement in science.

Thus the present study in view of investigator might help in bringing about qualitative as well as quantitative improvement in teaching learning process, which would enhance the quality and level of educational products. It might also serve as a reference work for the researchers who are interested in investigating the different factors influencing the achievement in science of the students.

Science achievement involves a complex interaction of factors that have specific direct effects and/or indirect effects through other factors on school outcome. Although the relationship between science achievement and factors such as self-concept, home background, and attribution has been studied widely, it is important to explore the factors that could contribute significantly to the Indian students’ science achievement. This would help to fill up the existing gap in the research carried out in India in this area. In addition, it could pave the way for more comprehensive research on the comparison of national and international research findings.

This study is intended to provide educators and policy makers with an unparalleled multidimensional perspective on science curricula, their implementation, the nature of student performance science, and the social, economic, and educational context in which they occur.