CHAPTER V

SUMMARY
Never before in the history of mankind has a society been as dependent upon scientific knowledge as it is today. Science has now become synonymous with survival. It would not be an exaggeration if we say that we live in the age of science, engineering and technology. The reason is that, there is hardly a village of significance over the globe where the fruits or products of science in one form or another have not yet entered. Distance and time stand fully annihilated.

The word Science is derived from Latin word ‘Scientia ‘or ‘Scire’ which means learning or knowledge but the science means more than that. It is defined as systematized body of knowledge which has been secured in a unique manner and used to predict future events. It is that human endeavour that seeks to describe with ever increasing accuracy the events and circumstances which occur or exist within our natural environment. The prosperity and strength of a country these days are directly dependent on the level of science and technical knowledge cultivated in the country and on its capacity to make use of that knowledge to serve practical ends. *(Kothari, 1991)*

Science teaching in schools can make a difference in the lives of children and the difference should be on the positive side of the educational ladder. Much has been said about the importance of children understanding the nature of scientific enterprise. This is important for several reasons. In a free society, scientific advancement has been dependent upon the will of the people, their will as decision making citizens to support it and their will as individuals to become scientists. Therefore, liberally educated people in a free society should understand the nature of scientific enterprise, the social, economic and political factors that affect its development and the personal satisfaction that comes to one who pursues a career in it.

The importance of education in building the destiny of the nation can hardly be over emphasized. Education is not merely the ingredient and an instrument of human resource development, but rather the most powerful means by which social, political and economic changes can be brought about in national life.

The desire to achieve something of excellence is inherent in all human beings. It refers to the ability of an individual who strives to accomplish something, to do his best, to excel over each other in performance. Academic achievement refers to the degree or level of success or proficiency attained in some specific area concerning the scholastic and academic
work. Academic achievement is of paramount importance particularly in the present socio-economic and cultural contexts obviously in the school, great emphasis is placed on achievement right from the beginning of the school education. Achievement is regarded as the end product of all the educational endeavours. *(Balasubramanyan, 1997)*.

Academic achievement is important as it helps the students to understand the hierarchy based on academic achievement i.e. higher the academic achievement more are the openings for the students and they can go for better lines and better jobs in all fields like science.

Research has come to our aid by looking into what variables (personal, home, school, teacher etc.) promote achievement and what are the deterrents to it. It has been thus indicated that a good number of variables such as personality, character of learners, the socio-economic status from which he hails, the organizational climate of school, curriculum, planning etc. to mention a few, influence achievement in different degrees. These variables are generally referred to as correlates of achievement. Therefore, the researcher has taken these three factors for the present study i.e. scientific aptitude, socio-economic status and study habits.

Science has many branches with different areas. Biology is that branch of science which deals with the study of life of plants and animals i.e. living things. It is divided into two branches i.e. Botany (study of plants) and Zoology (study of animals). Science of Biology is very vast and divided into several branches like morphology, anatomy, histology, physiology, ecology, taxonomy, pathology, embryology, genetics, evolution, palaeontology etc. Study of Biology has greatly contributed to the welfare of the human race.

So if an individual wants to be successful in the field of science, he must possess aptitude for science and the aptitude towards science is generally known as ‘scientific aptitude’ . Scientific aptitude is the major outcome of science education. If it is endowed with in an individual in its fullest form, he will be in a position to pursue science education efficiently with which he can climb the ladder of success with ease and effect. Aptitude for science constitutes namely clear thinking, mathematical computation, understanding laws and principles, ability to perceive & to have visual imagination. Scientific aptitude is considered as the capacity to acquire proficiency in science with given amount of training- formal & informal.
Human beings are known as the creature of habits. It is rightly said that character is the bundle of habits. This reveals the importance of habits in character. Effective study habits include learning to learn i.e. managing time, stress, avoiding procrastination, thinking critically, thinking genius, developing self discipline, motivate yourself, studying with multiple sources, developing a positive mood and schedule a productive time as well as selecting a less distracting space.

Study habit implies a sort of more or less permanent mode or method of studying. Individuals have their own way of studying. Study habits have an impact upon the academic achievement and the high achievers were having better study habits as compared to low achievers. (Patel and Patel, 1996). Very often teachers come across such students who appear to have above average scholastic aptitude, yet they are doing very poorly in their course of study. Thus study habits as a concept is more generic than specific in terms of its importance. It has very long leading effects into the life of individuals by communicative and interactive effects in the society. (Januar, 1974)

There is another factor having an influence on academic achievement i.e. Socio-economic status. Socio-economic status is a blanket term implying as many factors in the life of an individual as an investigator can possibly know about him. It may refer to the individual’s past and involve a study over a period of time concerning the socio-economic conditions of his home. It may involve considering such factors as the death of a member of a family, divorce or any other crises of social or economic nature, which influences the development of the child for the time being or permanently.

So the present study is a humble effort to assess the scientific aptitude, study habits and socio-economic status of secondary school students through which parents can be made aware of their child potentialities which will ultimately make them resourceful enough in helping their wards in choosing a course of study according to their attributes which will ultimately help them in showing better academic achievement that will reduce the rate of dropouts and failures. So encouraged by these considerations, the researcher has chosen the present study.
RATIONALE OF THE STUDY

India is going through rapid transformation, so significant changes in our institutions are perceptible. Since the utilization of human resources is the key factor, it is imperative that these resources don’t get underutilized or wasted. Academic achievement is the unique responsibility of all educational institutions established by society to promote a wholesome scholastic development of pupils.

The area of academic achievement has not only aroused the curiosity of modern educationists and psychologists but even educationists and psychologists of past years have shown their ingenuity in choosing various methods and techniques assessing knowledge of their disciplines.

Achievement in any subject, skill or area is influenced by quite a large number of factors like interest, attitude, motivation, methods of teaching, study habits, socio-economic status and aptitude etc. students feel a strong urge to enrol themselves in science courses particularly in secondary stage due to number of causes, among which to ensure their well acceptance in surroundings is also a major one. Parents are also driven strongly by this type of external motivation, considering science learning of their children as a symbol of social status. (Shukla, 2005)

In order to strive for achievement in any subject the student must possess the aptitude for that subject. Considering the importance of scientific aptitude in all stages of human life, it is tried to identify the level of scientific aptitude possessed by secondary school pupils aged between 16-17 years, the age in which the scientific aptitude begins to take a concrete shape. These days choosing medicine as a career, has become so popular that the students don’t mind even dropping their one year to clear the entrance exam. These scarce resources should be maximally utilized. Otherwise the result will be mere wastage of time, effort and money. As a result the students may get frustrated or may develop into maladjusted personalities.

On the basis of socio-economic status, students can be divided into two categories-one with high socio-economic status i.e. advantaged students and other with low socio-economic status i.e. disadvantaged students. Socio-economic status has great influence in achievement in any subject. Study habits of the students also affect achievement. Sometimes the parental attitude, parent’s qualifications, influence of friends and aptitude becomes the
major determinants of opting for medical stream. Sometimes parents compel their children to opt for scientific courses irrespective of whether the child possesses medical aptitude or not. In other words, most of the times career choice of a student is tailored by parents regardless of the fact that every child has certain interests, aptitude and level of intelligence. Many parents are in the habit of determining virtually all academic decisions for their children. They choose the school to attend, the books to read and even the subjects to study in school. (Owoyele, 1999)

In the present system of school education, at the time of admission in the various fields of study in secondary stage, students’ aptitude in that discipline is hardly recognized as the matter of consideration. (Department of Science and Technology, 2010) As a result, in spite of gradual increasing rate of enrolment of students in science courses, the scenario of students’ achievement in science is not as per the level of expectation. This failure in science learning increases the possibility of wastage of human resource and therefore has become a major concern of school teachers, administrators and also science educators. (Ganguli and Vashistha, 1991; NAEP,1979)

The school needs to identify the aptitude in order to provide the child with education best suited to his needs and social welfare. There are at least two main concerns that the school should be responsible for identifying- firstly the general or specific abilities of each pupil and secondly the school should then encourage maturation of aptitude. So it is the responsibility of the school to help the students to know and understand their aptitude. On the other hand, other factors like socio-economic status of family and study habits also show their influence on the achievement of students. Students belonging to socially advantaged class i.e. well-to-do families get more facilities than the students coming from socially disadvantaged sections of society. The above stated reasons prompt the researcher to do the present investigation.
STATEMENT OF THE PROBLEM

STUDY OF ACHIEVEMENT IN BIOLOGY IN RELATION TO SCIENTIFIC APTITUDE, STUDY HABITS AND SOCIO-ECONOMIC STATUS AMONG SECONDARY SCHOOL STUDENTS

DELIMITATIONS OF THE STUDY

1. The study was confined to 500 students selected as per the design of the study.
2. The study was confined to boys and girls of +2 class of medical group.
3. The study was confined to the students of Government and Private Institutions.
4. The study was confined to the students of CBSE and PSEB.
5. The study was confined to the students of schools of Amritsar, Tarntaran, Ferozepur and Bathinda districts.
6. In the present study four variables i.e. achievement in Biology, scientific aptitude, study habits and socio-economic status were taken up for investigation.

DEFINITIONS OF THE KEY TERMS USED

Achievement in Biology— Achievement tests how well students have mastered the subject matter in a course of instruction. (Megargee, 2000)

In the present study achievement in biology refers to the scores obtained by students of +2 class on achievement test in biology which is based on the contents which they are expected to have learnt by the instructional program at secondary stage.

Scientific aptitude- Scientific aptitude is the potentiality for future accomplishment in science without regard to past training and achievement. (Dressel, 1993)

In the present study scientific aptitude was assessed on the basis of the scores obtained by the students in the areas of general science i.e. Physics, Chemistry and Biology.
Study habits - Study habit is the tendency of a pupil as a student to study when the opportunity is given, the pupil’s way of studying whether systematic or unsystematic, efficient or inefficient. Study can be interpreted as a planned program of subject mastery.

(Good, 1959)

Study habits and strategies as intended to elicit and guide one’s cognitive process during learning. A self directed process as appropriate study strategies and uses them at appropriate times and placing during learning, knowing when to use them or modify use of study structure is a kind of meta-cognitive skill.

(Mayor, 1995)

In the present research study habits cover all related aspects of study such as budgeting time, physical conditions for study, reading ability, notes taking, factors in learning motivation, memory, taking examination and health.

Socio-Economic Status – Socio-economic status is the measure of an individual or family’s relative economic and social ranking. 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 possession along with the degree of respect, power and influence.

(Chapin, 1998)

In the present study socio-economic status covers the following areas such as parental occupation, father’s education, parents’ annual income, household possession, books and magazines, cultural sub possession, education of testee’s brothers and sisters, level of aspiration, concept of social prestige and belief in caste and total assets.

OBJECTIVES

Related to Achievement in Biology:

1. To find out the difference in achievement in biology of boys and girls.

2. To find out the difference in achievement in biology among students of government and private institutions.
3. To find out the difference in achievement in biology among students of CBSE and PSEB boards.

**Related to Scientific aptitude:**

4. To find out the relationship of achievement in biology with scientific aptitude.

5. To find out the difference in scientific aptitude of boys and girls.

6. To find out the difference in scientific aptitude among students of government and private institutions.

7. To find out the difference in scientific aptitude among students of CBSE and PSEB boards.

**Related to Study habits:**

8. To find out the relationship of achievement in biology with study habits.

9. To find out the difference in study habits of boys and girls.

10. To find out the difference in study habits among students of government and private institutions.

11. To find out the difference in study habits among students of CBSE and PSEB boards.

**Related to Socio-economic status:**

12. To find out the relationship of achievement in biology with socio-economic status.

13. To find out the difference in socio-economic status of boys and girls.

14. To find out the difference in socio-economic status among students of government and private institutions.

15. To find out the difference in socio-economic status among students of CBSE and PSEB boards.
HYPOTHESES

Related to Achievement in Biology:

1. There exists no significant difference in achievement in biology of boys and girls.
2. There exists no significant difference in achievement in biology among students of government and private institutions.
3. There exists no significant difference in achievement in biology among students of CBSE and PSEB boards.

Related to Scientific Aptitude:

4. There exists no significant relationship of achievement in biology with scientific aptitude.
5. There exists no significant difference in scientific aptitude of boys and girls.
6. There exists no significant difference in scientific aptitude among students of government and private institutions.
7. There exists no significant difference in scientific aptitude among students of CBSE and PSEB boards.

Related to Study habits:

8. There exists no significant relationship of achievement in biology with study habits.
9. There exists no significant difference in study habits of boys and girls.
10. There exists no significant difference in study habits among students of government and private institutions.
11. There exists no significant difference in study habits among students of CBSE and PSEB boards.

Related to Socio-economic status:

12. There exists no significant relationship of academic achievement in biology with socio-economic status.
13. There exists no significant difference in socio-economic status of boys and girls.

14. There exists no significant difference in socio-economic status among students of government and private institutions.

15. There exists no significant difference in socio-economic status among students of CBSE and PSEB boards.

**METHODOLOGY**

This study comes under the domain of descriptive research. Investigation was done to find out the achievement in biology of students of +2 class and its relation with the scientific aptitude, study habits and socio-economic status.

**SAMPLE**

A sample of 500 students of +2 class was drawn from different secondary schools of Amritsar, TaranTaran, Ferozepur and Bathinda districts. Stratified random sampling technique was used. The test was administered in the secondary schools of both government and private bodies under CBSE and PSEB on both boys and girls studying in medical stream of +2 class.

**DATA COLLECTION**

The investigator selected the sample as per the needs of the study and administered the tools for different variables i.e. achievement in biology, scientific aptitude, study habits and socio-economic status taken for the study. The quantitative data was collected purposefully from the medical students of +2 class of different secondary schools of Amritsar, Taran Taran, Bathinda and Ferozepur districts.
PROCEDURE

Researcher took the sample of 500 students of +2 class which was further bifurcated into 250 boys and 250 girls. 125 students were from private institutions and 125 from government institutions running under CBSE and PSEB, on whom test for achievement in biology, scientific aptitude, study habits & socio-economic status were administered separately.

Figure 5.1
Flowchart representation of sample

TOOLS


STATISTICAL TECHNIQUES

To achieve the objectives and arrive at certain conclusions the following statistical measures were used:

1. Descriptive statistics such as mean, standard deviation to study the achievement in biology, scientific aptitude, study habits and socio-economic status of secondary school students.

2. Differential analysis such as t-test to compare the achievement in biology of secondary school students, both boys and girls studying in government and private institutions under CBSE and PSEB was used.

3. Bivariate analysis such as correlation to study the extent of relationship of achievement in biology with scientific aptitude, study habits and socio-economic status of secondary school students was used.

5.2 MAIN FINDINGS

Findings related to Achievement in Biology:

1. There is no significant difference in achievement in biology among boys and girls. It may safely be stated that gender does not affect the achievement in biology of secondary school students.

2. There is a significant difference in achievement in biology among students of government and private institutions, which is in favour of private institutions. It may safely be stated that the nature of administration of the school does affect the achievement in biology of the students.

3. There is a significant difference in achievement in biology among students of CBSE and PSEB, which is in favour of CBSE board. It may safely be stated that the nature of education board does affect the achievement in biology.
Findings related to Scientific Aptitude:

4. There is a significant relationship of achievement in biology with overall scientific aptitude as well as with aptitude in all the three branches of science.

5. There is no significant difference in overall scientific aptitude of boys and girls along with aptitude in all the three branches of science viz. physics, chemistry and biology. It may safely be stated that gender does not affect the scientific aptitude of secondary school students.

6. There is a significant difference in scientific aptitude among students of government and private institutions, which is in favour of private institutions. Students of private institutions show better performance in overall scientific aptitude along with aptitude in Physics, Chemistry and Biology as compared to students of government schools. It may safely be stated that the administration of the school does affect the scientific aptitude of the students.

7. There is a significant difference in scientific aptitude among students of CBSE and PSEB, which is in favour of CBSE. Students of CBSE schools show better results in overall scientific aptitude along with aptitude in Physics, Chemistry and Biology as compared to the students of PSEB. It may safely be stated that the nature of education board does affect the scientific aptitude of secondary school students.

Findings related to Study Habits:

8. There is a significant relationship of achievement in Biology with overall study habits particularly with the dimensions like physical conditions for study, notes taking, factors in learning motivation, memory and health. So, it may safely be stated that achievement in biology is significantly related with study habits.

9. There is no significant difference in overall study habits of boys and girls along with all the dimensions. It may safely be stated that gender does not affect the scientific aptitude of secondary school students.

10. There is a significant difference in overall study habits among students of government and private institutions, which is in favour of private institutions. It may safely be stated that the (nature of administration) type of the school does affect the overall study habits of the students along with its other dimensions.

11. There is a significant difference in overall study habits among students of CBSE and PSEB. Particularly in dimensions like reading ability, factors in learning motivation, memory and
taking examination. It may safely be stated that the nature of educational board does affect the study habits of the students.

**Findings related to Socio-Economic status:**

12. There is a significant relationship of achievement in biology with Socio-economic status.

13. There is no significant difference in socio-economic status among boys and girls. It may safely be stated that the gender does not affect socio-economic status of secondary school students.

14. There is a significant difference in socio-economic status among students of government and private institutions which is in favour of private institutions. It may safely be stated that (nature of administration) the type of school does affect the socio-economic status of the students.

15. There is a significant difference in socio-economic status among students of CBSE and PSEB. It may safely be stated that students of CBSE are better in socio-economic status than the students of PSEB.

**5.3 CONCLUSIONS**

The study has highlighted certain important issues. As far as gender is concerned, there is no difference on achievement, scientific aptitude, study habits and socio-economic status. Gender has no difference on any of the three branches of scientific aptitude viz. Physics, Chemistry and Biology. As far as dimensions of study habits are concerned, gender has been found to affect Physical conditions for study, notes taking, memory and health. No affect of gender has been found on budgeting time, reading ability, factors in learning motivation and taking examination.

There is significant difference between government and private institute students on all the parameters viz. achievement in biology, scientific aptitude, study habits and socio-economic status. Students of private institutions have been found to be better on all three branches of scientific aptitude viz. Physics, Chemistry and Biology. As far as dimensions of study habits are concerned, students of private institutions have found better on all dimensions of study habits. Government sector institutes need to do a lot of
introspection and try to improve the environment which will ultimately lead to the improvement in performance of their students on above mentioned attributes.

There is significant difference between students of CBSE and PSEB boards on all the parameters viz. achievement in biology, scientific aptitude, study habits and socio-economic status. Students of CBSE affiliated institutions have been found to be better on all the three branches of scientific aptitude viz. Physics, Chemistry and Biology. As far as dimensions of study habits are concerned, students of CBSE institutions have been found to better on reading ability, factors in learning motivation, memory and taking examination. It shows that inspite of advancements in curriculum and technology there is still considerable difference in education- imparting ability of different education boards. A significant relationship is observed between achievement in biology and all studied variables viz. scientific aptitude, study habits and socio-economic status. There is a significant relationship of achievement in Biology with overall study habits and with dimensions like physical conditions for study, notes taking, factors in learning motivation, memory and health.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

No study is complete in itself. The present study brings to light a good number of new areas to be studied by the future researchers. The areas and variables which are not covered by this study may be put to test to enlighten the factors associated with the inculcation of scientific aptitude and study habits, as also the other factors associated with the achievement in biology. The researchers may think of further work in areas as below:

1. Study on scientific aptitude, study habits, socio-economic status and achievement in biology may be extended to other educational levels such as college and university level.

2. Study on aptitude, study habits, socio-economic status and achievement in other subjects may be taken up.

3. Study may be taken up to find out the effect of various aspects of scientific aptitude on achievement in biology.
4. Study may be taken up to find out the effects of environmental and psychological factors of any attribute i.e. personality, interest, aptitude, attitude, study habits etc. on achievement in cases of controlled and experimental groups.

5. Study may be taken up to identify reasons for poor achievement.

6. Study may be conducted on the use of audio-visual aids, laboratory and library facilities available in learning institutes as these may have great influence on the development of scientific aptitude.

7. Study may be conducted on the role of science exhibitions, science clubs, science museums and other such centers in improving achievement in science subjects.

5.5 EDUCATIONAL IMPLICATIONS

In the light of the findings of the present study, following educational implications can be drawn:

1. Functioning of government schools needs to be improved that will ultimately result in better performance of students studying in government schools. They should organize science fairs, science quiz, science exhibitions etc. to improve their achievement in biology.

2. Functioning of PSEB needs to be improved. They should make the curriculum utilitarian and skill based i.e. practical aspect of the curriculum should be given due recognition.

3. The fact that students in government schools are from low socio-economic status background as inferred from study. The role of the government becomes more important in improving their lot, keeping in mind the social obligation.

4. Inculcation of the effective study habits like physical conditions for study, notes taking, factors in learning motivation, memory and health etc. should be done from basic levels of schooling.
5. Efforts should be made by the educational institutions to provide healthy environment and update facilities which will promote scientific aptitude and can ultimately leads to better results.

6. Continuous evaluation and formative assessment should be stressed in spite of the annual examination system especially in PSEB to improve study habits and achievement level of students.

7. The researcher hopes that the findings may provide practical insight to administrator, school counsellors, policy makers and teachers etc. who aim to prepare the students to become productive citizens of society.

8. The study may be helpful to the teachers to understand the importance of having the knowledge of various attributes of the child which will ultimately help them to give individual attention, secure involvement and use the instructional time efficiently.

9. The study may be helpful to the policy makers to frame curriculum while giving more emphasis on skill based activities that will ultimately help the students to know about their attributes like aptitude, study habits etc.