CHAPTER- I

INTRODUCTION

"Without good teacher even the best of system is bound to fail"

- Humayun Kabir
Any work without introduction and description is half done and if it research then it is very much true. Research in any field is like to reach the top of the mountain. If we don’t know what to achieve, how to achieve and which way to go it is like a sailor sailing the boat without knowing the edge of the sea. So it is the introduction which gives the answer to all questions.

This chapter deals with the introduction of the problem that is to be studied and the various variables used in the study.

1.1 INTRODUCTION

Development of science and technology is vital for the progress of any country. It is a major vehicle for enhancing the quality of human life. The developments in science and technology, particularly in information the technology and computer science are occurring so fast that it is difficult to portray the world of 2020. The emergence of globalization and the intellectual property rights regime have made ‘knowledge’ a big resource and it is believed that in the 21st century only those countries would excel which possess a wealth of knowledge. Under such a scenario it has become all the more important that we should have a strong science base to develop excellent technical mind.

The progress and prosperity of any nation is determined by its standard in science and technology, which is an outcome of science education provided to its youngsters. The advancement of the developed countries provides an ample evidence for this fact. Understanding the prime importance of science education in the advancement of any nation, the developed and developing countries have been attempting to improve their science education by restructuring it to fit with the needs, challenges and expectations of its people.

The destiny of the Country is shaped in the classrooms. This shape depends upon what teacher teaches and how it goes molding the children. In other words destiny of our youngsters falls on the shoulders of teachers. A teacher affects eternity, he can never tell where his influence stops (Henry Adams, 1907). It seems reasonable to
assume that good teachers are those who are skillful in developing the understanding of the world in which man lives, insightful with respect to the ways and means of stimulating intellectual appetites and capable of patience, understanding and sincere feelings for others that may pave the way for an enlightened and productive society (Ryans, 1960).

Due to rapid changes in our social, political, economical, science & technological condition, competent, intelligent and efficient teachers are required. Child is said to be the father of man. Right from the birth child is inquisitor and curious to know about living things, about his environment & surroundings. His interest in them is natural. No sound educational system can ignore and neglect curiosities and interests of children. Their curiosity is against the nature and surroundings to explore the things and to know the questions that arises in their mind like how, what, why, when. This curiosity can be only and only be satisfied by the science education letting them to know about the things and giving them the answers of what, why and when. So this is possible only by efficient and competent teacher. Science Education have the role of providing such scientifically literate citizens to the nation, to fulfill its expectations, citizens should be skilled in the processes of science, acquire scientific information in depth and cultivate an appreciation for science (National Policy on Education, 1992)

For the education in schools, the Government of India established the National Council of Educational Research and Training (NCERT) in the early 1988. It played the key role in all aspects of science education in schools, including policy formulation and implementation, curriculum development, textbooks production and training of teachers.

In the last two decades, the universalization of elementary education has emerged as a national goal. Education for all children up to Class X now seems a realistic target rather than a distant dream. It is therefore worthwhile to ask what the main aim of teaching science in schools is. The syllabi and textbooks of the last 40 years suggest that the aim of school science education has been to produce citizens having scientific attitude. Hence syllabi are dominated by the disciplinary demands of different branches of science, and there is a relentless downward pressure to cover more content in earlier classes. However, if all children up to Class X study science as a compulsory subject, even then primary aim cannot be achieved to produce scientists. (UNESCO, 1974) has mooted the goal of Scientific and Technological Literacy (STL) for all. Every citizen
needs to be aware of trends in science, cope with technology in daily life, and be able to take considered positions on science-related issues of social importance (e.g. the height of a dam, the location of a nuclear power plant etc). Clearly school science up to Class X has to be re-thought radically if STL for all is seen as the primary aim. Then there come shift in emphasis in only teaching of science content to that of teaching of science in helping students to develop competence in the science education. Actually science education includes intellectual skills used in collecting and analyzing data to solve problems. But this approach of application of intellectual skills is proved inadequate when teacher use traditional strategies of teaching science than modern instructional strategies to meet the needs, because it does not equip the learners to acquire the intended understanding of scientific knowledge, develop scientific attitude. That is the reason why majority of pupils fails to attain mastery over school science education. Only few pupils in class could able to gain the meaningful understanding.

A vast infrastructure for education, including science education, is created in the country. It comprises hundred, thousand schools, over 8600 colleges, more than 200 universities, several institutes of specialized learning like Indian Institutes of Technology (IITs) etc and about 40 scientific laboratories of the Council of Scientific and Industrial Research. All this had a positive impact and nation could produce renowned scientists, researchers and academicians.

To find out the development of science education it is necessary to know what is science and its importance in Indian school curriculum.

1.2 SCIENCE

Science is a particular way of understanding the natural world.

The word science comes from the Latin "scientia," meaning knowledge.

(Webster's New Collegiate Dictionary, 2006) defined science as a knowledge attained through study or practice or knowledge covering general truths of the operation of general laws, especially as obtained and tested through scientific method and concerned with the physical world. Science refers to a system of acquiring knowledge. This system uses observation and experimentation to describe and explain natural phenomena. The term science also refers to the organized body of knowledge people have gained using the system. Less formally, the word science often describes any systematic field of study or the knowledge gained from it. (Poincare, 1908) coined that science is built up with facts as a house is with stones. But a collection of facts is no more a science than heap of stones in house. (Kothari Commission, 1964-66) has
Introduction

rightly remarked as science is universal and so can be its benefits. Its material benefits are immense and for reaching industrialization of agriculture and release of nuclear energy, to mention two examples but even more profound is its contribution to culture. (Conant, 1957) described, science is an interconnected series of concepts and conceptual schemes that have developed as a result of experimentation and observation and fruitful for the experimentation and observation. Science is a cumulative and endless series of empirical observations and results in the formation of concepts and theories, with both concepts and theories being subject to modification in the light of further empirical observation (Frederick, 1960). Science is both body of knowledge and process of acquiring it. It is also defined as science is what scientists do. In order to understand it, science prefers problems where variables can be rigidly controlled.

1.3 IMPORTANCE OF INCLUSION OF SCIENCE IN SCHOOL CURRICULUM

Science is one of the compulsory subjects in the school curriculum of India. It paves way to the career deciding courses at +2 stages. The acquisition of the knowledge of scientific terms, principles, concepts and clear understanding of them, the ability to use such knowledge in different situation in life and in the development of skills should be the outcomes of teaching and learning of science. Moreover, by inclusion of science in the curriculum students develop a proper attitude toward the science and develop an active interest in the subject, besides appreciating the importance of science in human life and civilization. All these should be assessed by terminal examination conducted at the end of each class. (Ministry of Human Resource development, 2006) reported that the result of +2 class of C.B.S.E. of science subject in Punjab has not crossed above 45% for many years. Practical is prime part of science curriculum and learning in science involves children advancing their ideas by trying them out in practical investigation. (National Policy on Education, 1986) has given due emphasis on child centered education and inculcation of scientific temper in students. (Gee & Clackson, 1992) listed a whole reason for carrying out practical work in science lessons and some of them are - that it motivates pupils and helps to keep them interested, skillful and help to promote logical thinking, theory and practice. The growing need for scientists, engineers and technologists in our country has made it all the more imperative to provide a science predominant curriculum in the system of our education. Today very few students are opting scientific career. Serious efforts are therefore necessary to provide facilities for providing science education. Therefore, inclusion of science in the
Introduction

Curriculum is an important aspect in the history of science education but teaching of science is equally important because without a good teaching it is not possible to understand and achieve the goal.

1.4 IMPORTANCE OF TEACHING OF SCIENCE

There is a long standing complaint that middle schools have made no provision for technical and applied science subjects. To meet this criticism attempts have been made from time to time to revise the curriculum according to the need of time. (National Policy on Education, 1986) made many recommendations and placed many suggestions for the revision of the curriculum for the future schools up to secondary level. Science has become an essential subject in present day classroom. The greatly changing conditions of life and world events are demanding a new perspective for the teaching of science. Another importance of science teaching lies in creating an enlightened citizenship, in providing training to our citizens to understand the scientific world in which we live as well as in preparing enough of them to be able to pass the frontiers of necessary knowledge. Advances in science and particularly the applications to the home, to industry, to agriculture and to community living have changed our environment. The poor state of science education in India is reflected in the reviews of Government of India during 1977. Science even did not form a school subject in the beginning of the twelve century. (Indian Education Commission, 1964-66) revealed that our science education is really in bad shape and condition and would become worse if we fail to reckon it with the explosion of knowledge. (Education Commission, 1964-66) has rightly reported that at the secondary school level, science as a discipline of education deserves a special emphasis. It was further declared that the purpose of science teaching is not only to acquaint the students with knowledge of scientific facts, concepts and principles but also to develop practical skills and scientific attitude in them. According to (UNESCO, 1962) report, learning science principles and getting generalization is possible by doing experiments. Number of studies found and revealed practical skill of science is important, that practical activity must involve planning based or hypothesizing and predicting, gathering of information by observation, control of variables, interpretation of data and communication of results. All India Seminar on teaching of science (Taradevi Report, 1956) made the following observations about the aim of science education at secondary level.

- To familiarize the students with the world in which he lives and impact of science on society.
Introduction

- To acquaint him with scientific method as science should be taught as the
discipline of mind.
- Diversification of courses should be there to facilitate specialization.

Whatever may be the aim of teaching science, the basis of their formation should be
child, society and subject matter. Apart from these aims discussed the most important
function of science education should be development of all dimensions of child's
efficiency and this can only be possible if we shift our focus from acquisition of
knowledge to development of scientific attitude, reflective thinking, skills, desirable
habits, divergent thinking, interest and use of science in daily life situations etc. This
can be possible only by the effective teaching that can put the students at the paves
of science by inculcating interest and scientific attitude among them. So to find out the
solution, first of all it is necessary to know the position of science education in India.

1.5 POSITION OF SCIENCE EDUCATION IN INDIA

“Science should emerge as something alive, fallible, and therefore exciting. Such a
model will meet the wider aims of science education, and at the same time is more
likely to encourage students to want to study it.”

Mukherjee (2007)

“Every effort will be made to extend science education to the vast numbers who have
remained outside the pale of formal education.”

National Policy of Education (1992)

With Independence came a model of economic development that set great store by
science and technology. Nehru’s dream was of a modern, prosperous India propelled by
science and technology. Naturally, school science education received special attention
in the brave new world of Nehru’s India, though not in a systematic fashion. The
development of science in India was greatly accelerated after August 1947. In 1950 the
Government of India appointed a planning Commission for preparing a blueprint of all
round economic development. In 1954 the Indian Government laid fullest emphasis on
the development of science and technology. (Kothari Commission, 1964) reported the
benefits of industrialization, improvement of agriculture and nuclear energy that has
revolutionized the culture. Scientists were the pilots of this new India, and there was an
understandable desire to produce more and better scientists. This perhaps explains the
direction of school science education took after Independence.
1.5.1 SCHOOL SCIENCE EDUCATION IN INDIA

In the beginning of twentieth century science was not a school subject in our country. The report of the (Secondary School Commission, 1953), recommended the teaching of General Science as a compulsory subject in the high and higher secondary schools.

All India Seminar on the Teaching of Science in Secondary Schools (1956) dealt with almost all the problems facing the inclusion of General Science as a core subject for the Higher Secondary Classes-syllabus, apparatus, teaching aids, text-books, science clubs, science museums, examination techniques etc. It suggested a uniform system of science teaching for the entire country suited to its needs and resources.

Indian Parliamentary and Scientific Committee (1962) studied the allied problems of Science education in schools like:
- Growth of school population.
- Shortage of qualified science teachers.
- Accelerated achievement in science.
- Demand for increase in technically trained manpower.
- Growing importance of science in the affairs of mankind.
- Changes in the processes and goals of science.

It has been investigated that 45% of the students of C.B.S.E. schools of 4th standard are not able to perform well in science tests and even cannot read it. Data presented in the report of India Science and Technology (2008) S & T Human Resources percentage of students appearing in Physics, Chemistry, biology and Mathematics are declining in Punjab. Percentage of students appearing in science streams in C.B.S.E. schools of other states like U.P, Bihar is 40% whereas students appearing in Punjab are only 20% and the rate is declining day by day (Vipin Kumar, Naresh & Nitin Gupta, 2008).

The gross tertiary science enrollment ratio (i.e. percentage of school leavers entering the science stream) in India during the period 1995-97 was a mere 23 percent. Moreover, the Human Development Report (2004) indicated that only 25 percent of all students enrolled in tertiary institutions are studying math, science and engineering programs.

At present problem poised for science education in our country are both qualitative and quantitative in nature.
1.5.2 GOVERNMENT INITIATIVES IN EDUCATION

Anuradha Parekh (2011) reported in “THE BETTER INDIA” (http://www.thebetterindia.com/355/government-initiatives-in-education/) that the Sarva Shiksha Abhiyaan program set up by the government to bring elementary education to millions of children has been successful to a large extent, and has thus created a need for strengthening secondary education infrastructure across the country. The HRD Ministry has taken note of this, and now plans to implement a secondary education scheme called Rashtriya Madhyamik Shiksha Abhiyaan (RMSA) during the 11th plan at a total cost of Rs.20,120 crore. The Union Minister for Human Resource Development, Kapil Sibal, (July 04, 2011, TIMES OF INDIA) (http://my education times.com) held a meeting with the members of the recently constituted Advisory Committee of Science and Technology and said that the committee would be advising the Government on a holistic approach to research in science and technology on strategies, schemes and measures that provide a vision and show a specific path for implementation. The minister pointed out that the committee could undertake the following:

(i) To lay down the vision for science and technology development in the university system in the next decade with targets for achievement.
(ii) Delineate strategies and measures to attract students to science and math at the secondary level and simultaneously improve teaching of science and math in schools.
(iii) Identify emerging areas in science and technology for focusing through the university system.
(iv) Specify schemes with investment plans to facilitate creation of research infrastructure expanding the number of institutions of quality involved in research.
(v) Develop schemes to attract global talent in research to Indian universities and initiatives for faculty potential enhancement.
(vi) Develop mechanisms for competitive research funding and research audit of institutions.

1.5.3 PROBLEMS RELATED TO SCIENCE EDUCATION:

- Students dislike science education:

Education Commission (1966) rightly reported that if science is poorly taught and badly learnt it is little more than burdening the mind with dead information and it could
Introduction
degenerate even into a new superstition. Students are losing interest in science due to many factors (Kalra & Datta, 1999) & (Avtar, 2000). It was concluded that mismatch between level of understanding and thinking of students and intellectual demands of subject is one of the major causes of disinterest and failure in science subject. Practical work has been neglected which has become the major cause of less understanding of subject.

➤ Teachers do not update Knowledge:
There is no professional growth of the teachers. They do not consult libraries and are also not inspired to do so. Seminars and extension lectures for the professional growth of teachers is totally neglected. Libraries are not well equipped with books to update their knowledge. Hence they are teaching what they were taught.

➤ Traditional method of Teaching:
Teachers use only text-books for teaching science. They are using traditional way of simply reading aloud the book and asking students to underline the answer of the question given at the end of the chapter. Teaching learning process at the lower level is limited only to chalk and talk to load the students with information. It is surveyed that students those who join high schools, senior or secondary school, colleges and universities for higher education they also face the same problem. Students for this reason, who opt science, out of these only very small percentages take up the study of science as a subject at higher level or enter training in which a higher knowledge of one or two branches of science is directly involved. Secondary Education Commission (1953) stated the present practice of mechanically applying the same methods to dull, average as well as bright children is responsible for much of the ineffectiveness of the instructions given in schools. Planning mission UNESCO, (1964) visited India in and expressed their dissatisfaction towards science education in the following words: “The professional training of a student in a teacher training college should not boil down to methodology training alone.”

➤ Emphasis on rote memory:
School system in school is such that large part of school time is spend in learning the content which is not relevant to their life and lost its importance in present scenario and often student may not relish. A large number of chemical reactions are to be memorized without being witnessed, or their practical application understood. For instance, numerous botanical and zoological names and classifications that children are forced to memorize found to have no use. All children know what the 'consequences' are if do
not learn by rote these and nothing else. Coaching centers, study guides and mock exams, what have they, all have one purpose - *get it somehow into your heads and hold it until the final exams are over!*

- **Outdated syllabi:**
  This is another problem faced by educators and students. If not every year, science syllabuses must be revised after every two years. Science is widening day by day, there occurring so many discoveries and inventions at every step and at every second, which must be introduced a little bit to the syllabus. So after two year there must be change in the syllabus. But we continue to teach what we learnt in our school days.

- **Examination-oriented system:**
  Questions from students are often discouraged and experiments i.e: any kind of activity and demonstrations are few. Hence their initiative for science is killed. System has become examination oriented. It has been found that emphasis is given on covering, completing syllabus, rote learning and only to appear in examination or passing with high percentage. Factual contents are being taught to rote only the subject matter. Consequences of this one-way of transmitting knowledge induce a low level of dry memorization by the students. Hence it results in weak foundation for science, lack of interest, poor scientific attitude and low academic achievement in science.

- **Over crowded classes:**
  Large classes are one of the major problems in India. In one class the students taken are sometimes more than fifty. Due to large number of students teacher cannot get feedback. There becomes indiscipline in the class. Teacher can not pay individual attention toward the students. Teacher gets more workload by paying attention to make their work checked.

- **Ill-equipped laboratories and Lack of Practical work:**
  The sciences are practical subjects. Demonstration is totally neglected. Practicals done in laboratories are not a process of investigations but done in monotonous way without adventure, to complete the formalities. They do not provide exploration in the area of scientific knowledge, skill or any insight to solve problems. These laboratories are generally under-equipped, overcrowded and poorly staffed. Students in some schools even not have seen the laboratory of their school. Due to ignored practical work or lack of laboratory facilities, science is taught unimaginatively and learnt by rote.
Introduction

- **Ill-equipped libraries and poor reading habits:**
  Books are only for our examinations and for nothing else which create poor reading habits among students. Libraries lacks in adequate amount of books. There is no motivation to read the books by the teachers. Some schools even do not have proper room for library. Books are placed at the corner of classroom which is considered as a corner library. This particularly is happening in the government schools. In case of private schools if some how library is available, no extra library period is provided in the time table for the students to get its facility. Books have become merely a show piece. Dust has become a cover guard of the books.

- **Lack of proper facility and funds:**
  Continuous electricity failure in laboratories is a big problem and teachers don't get sanctions to purchase generators. This is a fundamental problem, which gives poor general academic framework for learning science. Large outlays are required to upgrade laboratories, purchase of chemical compounds and lab equipment. Hire skilled technicians for maintenance etc are required but funds for them are simply not available. Even if few talented teachers want to pursue the sciences at a higher level, their aspirations are likely to be quashed by funding failures. The schools are slowly moving away from scientific activities and if trend continuous, science education may lose its technical form and schools may find it difficult to continue the science stream further. From the above discussion, it is very clear that science education is in deteriorating position in India.

This compels the investigator to think over the emerging problem in the field of science. To avoid the dropouts and declining position of science it is necessary to know the reason behind it. The surveys have shown teacher centered method, ill-equipped laboratories, examination oriented approach and lack of motivation has resulted in low achievement of students in science. Teacher's efforts go fruitless unless the classroom learning environment & the ways of teaching become effective. Above discussion shows that declining position of science education is only because stereotyped teaching. Teacher who knows the effective teaching strategies and the individual differences could know why the students dislike science and only then they will try to improve teaching.

So it becomes necessity for the teacher to know the concept of teaching and instructional strategies.
1.6 **TEACHING**

It is defined as a process of imparting knowledge to an individual or group of individuals by another person in a formal situation.

Teaching is a system of actions intended to produce learning (Smith, 1963). In other words teaching is the system of action involving an agent, an end in view and a situation including two sets of factors those over which the agent has no control (class size, characteristics of pupils, physical facilities etc) and those he can modify (such as techniques and strategies of teaching).

Gage (1963) stated that teaching is a form of interpersonal inference aimed at changing the behavior potential of another person. Through teaching teacher attempts to bring desired behavioral changes in students and there appears change in the way of thinking, feeling and acting of students. Teaching provides useful information to the students and develops harmonious relationship between the teacher, the student and the subject matter. It guides the student’s activities and trains their emotions.

1.6.1 **VARIABLES OF TEACHING**

Teaching is affected by a number of factors/variables. Main variables which are responsible for determining the strategy of teaching are:

- Nature of the objectives to be achieved.
- Nature of the content.
- Characteristics of the learner.
- Instructional procedure.
- Learning environment.
- Feedback.

Teaching becomes effective when these variables are used as a goal to teach science. Students are actively and mentally involved in processes like - exploration, experimentation, learning by doing, collecting, categorizing the data, generalization and utilization etc and hence enhancing the learning. Teaching with activity and demonstration is needed to clear the concept of science.

For effective teaching with activities, strategies can be planned by the teacher. Strategy is a part of teaching in many more activities are involved and is the blue print of teaching which takes into consideration all those activities which are needed to generate educative environment. This can help the teacher to create interest in science which seems to be lacking in students. It involves methods, techniques and various skills. The interest in science among pupils should be created from early school days, which is
possible only through adopting effective and interesting instructional strategies in science teaching.

1.7 RATIONALE OF THE STUDY

India has been a major seat of learning for thousands of years. In spite of it, is well-renowned culture of education but still it is dealing with challenges in its primary education and striving to reach 100% literacy. Modern education in India is often criticized for being based on rote learning. The poor state of science education in India is reflected in the reviews of Government of India during 2011. It is seen that the students undergo passive type of learning in schools which does not help to understand the subject effectively. Due to lack of understanding of subject, our young future scientists who reach the secondary classes have to cram the content. Science education is supposed to perform a two-fold task. The first is, the cultivation of a scientific temper, which includes a spirit of enquiry, a disposition to reason logically and dispassionately, a habit of judging beliefs and opinions on available evidence, readiness to reject unfounded theories and principles, the courage to admit facts, howsoever, unsettling or disagreeable they might be, and, finally, recognizing the limits of reasoning power itself. Secondly, it is expected from science education that it would give individuals a firm grasp of the concepts, processes of science and impart to them the ability to use the scientific method of problem solving, the techniques of observation and experimentation in handling problem of comprehension or life. But emphasis is laid on passing examinations with high percentage.

Attention is not being paid to develop scientific attitude of the students. Since the rate at which present day knowledge in science gets obsolete is very high compared to that in the forties or fifties, it is essential that the emphasis of science education should be on the development of abilities and dispositions of mind rather than merely the transfer of dead subject matter.

Researchers’ show that intelligence is perhaps the single most effective prediction of academic achievement. It has been observed and discussed that outcomes i.e. achievement, attitude and interest of students in science depends upon the way teacher teaching in the classroom, what objectives are kept in mind while planning the lesson, the way or direction he chosen to achieve desired goals and objectives. It has been proved in various studies that when students are actively and mentally involved in learning, the outcome in the form of achievement, scientific attitude, creativity, motivation and self-concept enhances upto a large extent. Number of studies has been
Introduction

reported (discussed in chapter- III, Review of Literature) about work done on outcome of various Instructional strategies studies in the area of CAI, problem solving, self instructional module, activity oriented learning etc. But none of the study has been reported where computer assisted instructional strategy has been compared with the activity –oriented instructional strategy. Both of the strategies required students to explore, experiment, search, think etc but which is better and how they different from conventional method do not searched by anyone. Apart from science teaching a teacher may also develop scientific attitude, creativity and achievement in science but none of the study has been done in the area of creativity, scientific attitude has seen after survey of related literature.

While teacher teaches in the class not only he imparts knowledge but development of scientific attitude and creativity take place which are in the scope of the present study.

In the present study the investigator tried to investigate how does the conventional method contribute to develop creativity and scientific attitude in contrast to computer assisted instructional strategy (CAIS) & activity –oriented instructional strategy (AOIS). Comparison of conventional method of teaching with other strategies will reflect about the direction of efforts to be made for better outcomes in terms of achievement, scientific attitude and creativity. After reviewing the literature it has been find out that none of the study has still compared these methods in developing achievement in science, scientific attitude and creativity. Studies have been referred in the review of literature, these are of: Austin (1983), Deopuria (2000), Jhag (1979), Jothikani and Thiagarajan (2004), Kumar and Sharma (1982). From these studies it is very clear that none of the study has been reported to compare strategies of computer-assisted instructional strategies, activity-oriented instructional strategies. No one find, which strategy is most appropriate to inculcate scientific attitude, creativity and interest among students? Research in science education await answers these problems. Apparently both the strategies (CAIS & AOIS) seem to be very effective and student centered. In the present study their effectiveness in the form of achievement in science is compared.

In nut shell, present investigation is aimed to find out the use of suitable instructional strategy leading to enhancement of creativity and scientific attitude to improve upon the academic achievement of the students of science.
1.8 STATEMENT OF THE PROBLEM

The problem under investigation hence reads as: **EFFECTIVENESS OF COMPUTER ASSISTED AND ACTIVITY ORIENTED INSTRUCTIONAL STRATEGIES ON ACHIEVEMENT IN SCIENCE IN RELATION TO SCIENTIFIC ATTITUDE AND CREATIVITY.**

1.9. TERMS USED IN THE STUDY

1.9.1 Computer-Assisted Instructional Strategy (CAIS)

Computer Assisted Instruction is a method of learning in which there is purposeful interaction between a learner and teacher with the help of computer device for helping the learner to achieve the desired learning objectives with his own pace and abilities at his command. It is the interaction between a student, a computer and a teacher for the purpose of achieving educational outcomes through internet blog, e-mail source like e-learning.

1.9.2 Activity-Oriented Instructional Strategy (AOIS)

It is a process whereby learners are actively engaged in the learning process, rather than "passively" absorbing lectures. It includes exploring, experimentation, observation, data collection, analyzing, and justification communicating, or using new information or experience. Hands-on materials are used instead of text-books and students are encouraged to think, rationally, logically critically and explore & explain their reasoning instead of memorizing and reciting facts.

1.9.3 Conventional Instructional Strategy (CIS)

The method of teaching science, which is widely being used by school teacher at present, is referred to as the conventional method. This method is textbook centered, teacher dominant, chalk-to-chalk based and examination oriented.

1.9.4 Science Achievement

Science achievement refers to the degree or level of success or proficiency attained in some specific areas concerning science. In general it refers to the scores obtained in the annual exam of science. In the present study the word science achievement is used to denote the performance of the students on academic tests or examinations of science subject expressed in marks. **Good (1973)** defined academic achievement as knowledge
Introduction

attained or skill developed in the school subject usually designated by test scores or marks assigned by the teacher or both.

1.9.5 Scientific Attitude (S.A)
Scientific attitudes are predispositions (tendency, inclination, mental set or habit of mind) to think and act in a certain way. It consists of attitude or readiness to be confident. Constituents of scientific attitude are: suspended judgment, honesty, objectivity, open-mindedness, curiosity, logical thinking, verification of problem, rational outlook, aversion to superstitions, flexibility and critical approach. Thrustone (1962) defined attitude as the degree of positive or negative effect associated with some psychological object.

1.9.6. Creativity (C)
Creativity involves generation of new ideas. It brings into existence something new. It consists of fluency, flexibility and originality and expressed accordingly by subject scores. It is describable as novel, useful and understandable ideas come into mind. Creativity means numerous things to different people can be defined in number of ways. It is a divergent thinking usually includes the ability to elaborate and think of diverse and original ideas. Creativity is a multidimensional (verbal and non-verbal) attribute differentially distributed among people and includes chiefly the factors of solving problems, fluency, flexibility, originality acquisitiveness and persistency (Passi, 1973).

1.10 DELIMITATIONS
1. The study is limited to the students of urban area of Faridkot district of Punjab.
2. The study is limited to VII  in class students studying in school affiliated to P.S.E.B.
3. The study is limited to students from schools run by Government and Private managements of Faridkot district of Punjab.

1.11 OBJECTIVES
1. To study the effect of computer assisted, activity oriented and conventional instructional strategies on academic achievement in science teaching.
2. To study the effect of computer assisted, activity oriented and conventional instructional strategies on scientific attitude in teaching science.
3. To study the effect of computer assisted, activity oriented and conventional instructional strategies on creativity in teaching science
4. To the study interactional effects of scientific attitude and creativity of students on academic achievement in science, taught through computer assisted, activity oriented and conventional instructional strategy in science.

5. To compare the interactional effect of scientific attitude and creativity of students on academic achievement in science taught through computer assisted, activity oriented and conventional instructional strategy in science.

6. To study the gender difference in academic achievement in science, scientific attitude and creativity of students taught through computer assisted, activity-oriented and conventional instructional strategy in science.

6.a. To study the gender difference in academic achievement in science of students taught through computer assisted instructional strategy in science.

6.b. To study the gender difference in scientific attitude of students taught through computer assisted instructional strategy in science.

6.c. To study the gender difference in creativity of students taught through computer assisted instructional strategy in science.

6.d. To study the gender difference in academic achievement in science of students taught through activity-oriented instructional strategy in science.

6.e. To study the gender difference in scientific attitude of students taught through activity-oriented instructional strategy in science.

6.f. To study the gender difference in creativity of students taught through activity-oriented instructional strategy in science.

6.g. To study the gender difference in academic achievement in science of students taught through conventional instructional strategy in science.

6.h. To study the gender difference in scientific attitude of students taught through conventional instructional strategy in science.

6.i. To study the gender difference in creativity of students taught through conventional instructional strategy in science.

7. To study the difference in academic achievement in science, scientific attitude and creativity of students in relation to type of schools taught through computer assisted, activity-oriented and conventional instructional strategy in science.
7.a. To study the difference in academic achievement in science of students taught through computer assisted instructional strategy in relation to schools run by government and private management of urban area.

7.b. To study the difference in scientific attitude of students taught through computer assisted instructional strategy studying in schools run by government and private management of urban area.

7.c. To study the difference in creativity of students taught through computer assisted instructional strategy studying in schools run by government and private management of urban area.

7.d. To study the difference in academic achievement in science of students taught through activity-oriented instructional strategy studying in schools run by government and private management of urban area.

7.e. To study the difference in scientific attitude of students taught through activity-oriented instructional strategy studying in schools run by government and private management of urban area.

7.f. To study the difference in creativity of students taught through activity-oriented instructional strategy studying in schools run by government and private management of urban area.

7.g. To study the difference in academic achievement in science of students taught through conventional instructional strategy studying in schools run by government and private management of urban area.

7.h. To study the difference in scientific attitude of students taught through conventional instructional strategy studying in schools run by government and private management of urban area.

7.i. To study the difference in creativity of students taught through conventional instructional strategy studying in schools run by government and private management of urban area.

1.12 HYPOTHESES

H_{01}: There will be no significant difference in the level of academic achievement in science among students taught through computer assisted, activity oriented and conventional instructional strategies in science.

H_{02}: There will be no significant difference in the level of scientific attitude among students taught through computer assisted, activity oriented and conventional instructional strategies in science.
**Introduction**

$H_{03}$: There will be no significant difference in the level of creativity among students taught through computer assisted, activity oriented and conventional instructional strategies in science.

$H_{04}$: There will be no significant interactional effect of scientific attitude and creativity among students on academic achievement in science, taught through computer assisted, activity oriented and conventional instructional strategy in science.

$H_{05}$: There will be no significant difference in the interactional effect of scientific attitude and creativity among students on academic achievement in science taught through computer assisted, activity-oriented and conventional instructional strategy in science.

$H_{06}$: There will be no significant gender difference in academic achievement in science, scientific attitude and creativity of students taught through computer assisted, activity oriented and conventional instructional strategies in science.

$H_{07}$: There will be no significant gender difference in academic achievement in science of students taught through computer assisted instructional strategies in science.

$H_{08}$: There will be no significant gender difference in scientific attitude of students taught through computer assisted instructional strategy in science.

$H_{09}$: There will be no significant gender difference in creativity of students taught through computer assisted instructional strategy in science.

$H_{10}$: There will be no significant gender difference in academic achievement in science of students taught through activity-oriented instructional strategy in science.

$H_{11}$: There will be no significant gender difference in scientific attitude of students taught through activity-oriented instructional strategy in science.

$H_{12}$: There will be no significant gender difference in creativity of students taught through activity-oriented instructional strategy in science.

$H_{13}$: There will be no significant gender difference in academic achievement in science of students taught through conventional instructional strategy in science.

$H_{14}$: There will be no significant gender difference in scientific attitude of students taught through conventional instructional strategy in science.
Introduction

$H_{6c}$: There will be no significant gender difference in creativity of students taught through conventional instructional strategy in science.

$H_{6g}$: There will be no significant difference in academic achievement in science, scientific attitude and creativity of students studying in relation to type of schools taught through computer assisted, activity-oriented and conventional instructional strategy.

$H_{7a}$: There will be no significant difference in academic achievement in science of students taught through computer assisted instructional strategy in relation to schools run by government and private management of urban area.

$H_{7b}$: There will be no significant difference in scientific attitude of students taught through computer assisted instructional strategy in relation to schools run by government and private management of urban area.

$H_{7c}$: There will be no significant difference in creativity of students taught through computer assisted instructional strategy in relation to schools run by government and private management of urban area.

$H_{7d}$: There will be no significant difference in academic achievement in science of students taught through activity-oriented instructional strategy in relation to schools run by government and private management of urban area.

$H_{7e}$: There will be no significant difference in scientific attitude of students taught through activity-oriented instructional strategy in relation to schools run by government and private management of urban area.

$H_{7f}$: There will be no significant difference in creativity of students taught through activity-oriented instructional strategy in relation to schools run by government and private management of urban area.

$H_{7g}$: There will be no significant difference in academic achievement in science of students taught through conventional instructional strategy in relation to schools run by government and private management of urban area.

$H_{7h}$: There will be no significant difference in scientific attitude of students taught through conventional instructional strategy in relation to schools run by government and private management of urban area.

$H_{7i}$: There will be no significant difference in creativity of students taught through conventional instructional strategy in relation to schools run by government and private management of urban area.
1.13 CHAPTER FRAME WORK OF THE STUDY

Chapter -I (Introduction) dealt with the theoretical basis of emergence of the problem formation of Hypotheses, objectives, sample and delimitations.

Chapter- II Conceptual Framework of the study. In this chapter Operational definition of the terms is described. This chapter will deal with the concept of variables and instructional strategies used in the study.

In the Chapter-III Review of Related Literature, literature of the variables related to the study is described.

Chapter- IV Method and Procedure will contain the method and the procedure which is adopted by investigator to find the solution of the problem. It include problem of the study, method, procedure, research design and procedure for collection of the data.

Chapter-V Development of Tool and Learning material, This chapter will consist of development of the tool that is to use in the study and description of the learning material in the form of unit plan and study matter that is to be use in computer.

Chapter-VI Analysis, Interpretation and discussion, This chapter will consist of analysis of the data its interpretation and discussion of the results along with graphics.

Chapter-VII Summary, conclusion and suggestions, will consist of the brief of the steps of research work that is done by the investigator.

Bibliography: This will consist of lists of references taken from various books, surveys, journals, research studies and papers, Ph.D. thesis and International reports etc.

Appendices: This will contain all the tools used and construct.