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1. INTRODUCTION

With the passage of time the system of teaching learning process became ineffective mainly due to emergence and specialization in every field of knowledge. In the traditional method of teaching, often used in the classrooms, teacher has the maximum control over learning and students are just passive listeners. The students in the traditional method of teaching are almost never required to make analysis, observations, formulate hypotheses and perform higher order intellectual operations. Each student learns at the same rate and have varying learning preferences, which may not suit students of varying capabilities.

The emphasis now is shifting from teacher-centered to student-centered methods of instructional delivery so as to meet the needs of an individual learner and optimize his learning. Skinner (1954) criticized the traditional/lecture method of instruction and suggested its replacement with properly structured learning steps and the students advancing through the steps at their rates. Chand (2006), “The difference between the old and new methods of teaching can be better understood by their characteristics-as to the nature and aims or goals. The old or traditional methods are characterized by mastery of logically organized subject-matter. The new or progressive methods place more emphasis on thinking and less upon memorizing. In modern era, for making teaching effective, teacher has to select proper methods, strategies, techniques and teaching aids. It has become increasingly evident that the teacher acts as facilitator and director of learning activities in the classroom”.

Apple Computer Inc. (2002), “As the world becomes so complex, the skills that students need to acquire and masters are quickly changing. The rise of the global economy, multicultural society and rapid changes in technology requires students to learn and apply new skills in their academic and career endeavours. Students need to learn to communicate more effectively both through speech and written word.” Entwistle (1981), Schmeck (1988), Ford & Chen (2001), “When learners can learn in a way that suits them, improvements in the effectiveness of the learning process normally ensue”. Ford and Chen (2001), “Matching/mismatching between teaching and learning styles can have significant effects on learning outcome”.

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Apple Computer Inc. (2002), “Recent history has witnessed technology as the most powerful agent in changing human culture. Technology has helped to improve the quality and pace of activity as well as production in most aspects of human endeavours’. It has resulted in the introduction of innovation in the second half of the last century include teaching machines, audio-visual aids, devices, filmstrips etc. Technology can help instill in students an eagerness to learn that will follow them throughout life and better enable them to reach their goals. The fundamental skills of reading, writing and arithmetic remain the cornerstone’s of schooling and student learning. As a result, they spend more time in learning and practicing the basic tasks than students who approach the same tasks in a traditional paper and pencil manner”.

Chandra (2005), “Students are more motivated to learn when technology is part of their daily school experience. At-risk students show substantial improvement when technology is introduced into their curriculum”. Apple Computer Inc. (2002), “Some studies have revealed that in classrooms where technology is used, students interact more with their peers and teachers than in traditional classrooms. Students, who have the opportunity to use these tools, gain a deeper understanding of complex topics and concepts and are more likely to be able to recall information later in life and use it to solve problems in non-school situations. Studies show that students, who participate in student-centered learning, score consistently higher in every subject on standardized tests. Students respond positively when given the chance to actively process via technology.”

Nickerson (1995), “While technology does not promote understanding in and of itself, it is a tool that can help students view learning as a constructive process and use simulations to draw students' attention”. delMas, Garfield & Chance (1999), “It provides a supportive environment that is rich in resources, aids exploration, creates an atmosphere in which ideas can be expressed freely, and provides encouragement when students make an effort to understand”.

Accountancy is an important subject in school curriculum that has three major problem areas that cause ineffective learning; less emphasis on practical learning, lack of audiovisual aids and lack of efficient teachers. It is believed that computers help to overcome these problems by providing self-pacing instructions and enhancing the quality of Accountancy teaching and learning. Today, easy to use software has become available. Teachers can easily modify the content, produce their own presentations and teaching
according to needs of their own class. There have been many approaches to bring revolutionary changes in the field of commerce education especially in the use of innovative teaching strategies for Accountancy. One of the strategies is computer assisted instruction package. The present research investigated the significance of computer assisted instruction method as an instructional strategy on acquisition of concepts in Accountancy and its effect on achievement of students in relation to problem solving ability and learning styles.

1.1 COMPUTER ASSISTED INSTRUCTION

The greater contribution of cyber age technology is the development of computer and its use in all walks of life. The use of computer in teaching learning process has stepped many stages of its revolution. In western countries, a great deal of research has been conducted on the effects of using computers as a teaching tool on students’ achievement, attitudes, learning rates, retention etc. Computer understands just as a good teacher does, and to use this understanding as to determine its teaching actions (O’Shea & Self, 1983). Douglas (2009), “Computer assisted instruction is a kind of teaching and learning process that involves the use of computers”.

Bower (1977), “Computer assisted instruction has now taken as so many dimensions that it can no longer be considered as simple derivative of the teaching machine or the kind of programmed learning that Skinner introduced.” Dambatta (2012), “Information that helps to teach or encourages interaction can be presented on computers in the form of text or in multimedia formats, which include photographs, videos, animation, speech, and music. The guided drill is a computer program that poses questions to students, returns feedback, and selects additional questions based on the students' responses. Recent guided drill systems incorporate the principles of education in addition to subject matter knowledge into the computer program”.

O’Shea, Kimmel & Novemsky (1990), “Opportunities can range from achieving greater independence and maximizing productivity to connect with the virtual communities across the world and sharing information and ideas”. Roblyer (2003) compiled a list of reasons why technology should be used on current research, “technology provides motivation for students by gaining learner attention, technology offers unique instructional capabilities such as linking learner to information and educational resources, helping learners visualize problems and solutions, it gives support for new instructional approaches, such as cooperative learning, share intelligence, technology increases teacher productivity by freeing time to
work with students by helping with production and record-keeping tasks. Many types of traditional learning activities can be extended for use for technology integration”.

Daniel (1999), “Computer aided instruction has a rich history and developed concurrently with the development of electronic computers”. Computer assisted instruction began in the mid-1950s as a collaboration between Stanford University and International Business Machines Corporation but grew slowly until the arrival of personal computers in the 1980s. The computer assisted instruction, which is the resultant of the findings of educational technology, is a boon for individualization of instruction. Computer assisted instruction is a way of individualizing instruction by using the capabilities of the computer to provide interactive experiences. The sequences of presentation that computer assisted instruction can provide differ from those provided by programmed instruction in being more flexible, in using a variety of media, and in being genuinely individualized. There are several different modes of instruction. They involve different relationship between students and the system and identify different pattern of instruction.

Computer assisted instruction can be used to display lesson material, reinforce learning, stimulate environmental conditions, provide drill and administer tests and so on. The different modes of computer assisted instruction are problem solving, inquiry mode, drill and practice modes, simulation, gaming, tutorial mode and combination of modes. Computer assisted instruction refers to educational software that can be run by students with little or no teacher assistance. Computer assisted instruction, where the teacher and computer are supportive, computer based instructions, and computer manages instructions, to maintain performance of records, diagnostics and prescription (Pandian, 2003). In computer assisted instruction, computer presents information, ask questions and verify responses in the same way a teacher does. Unlike traditional means of instructions, however computer assisted instruction allows students to work at their own paces and levels. Computer assisted instruction can be geared towards students’ needs, interests and expertise. It is generally considered to increase student motivation to learn.

1.1.1 COMPUTER ASSISTED INSTRUCTION SOFTWARE FOR COGNITIVE DOMAIN

Kausar, Choudhry & Gujjar, (2008), “Many classifications of computer assisted instruction available in market, six specific types by Spiro and Jehng (1990) to be most often utilized for educational purposes:
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(i) Drill and Practice instructional programs simply assist the student in remembering and utilizing information that the teacher has already presented, reinforcing previous learning through repetition. It is most important to improve knowledge level.

(ii) Tutorials are designed to introduce new subject matter. The format of a computer tutorial often emulates a dialogue between the computer and the student, i.e. information is presented, questions are asked of the student and on the basis of the response given, a decision is made to move on to new material or review what has already been presented. These first two computer assisted instruction types are most successful at improving the knowledge and comprehension levels of Bloom’s taxonomy.

(iii) Instructional Games present course content in a competitive and entertaining manner, in an effort to maintain a high level of student interest. Though most frequently used to reinforce factual knowledge at the lower levels of the taxonomy, it is quite possible to create instructional games that demand application skills from all levels.

(iv) Simulations require the student to apply acquired knowledge to a novel situation. As a result, the student must analyze a presented scenario, make decisions based on the information given and determine a course of action. The simulated environment must change and based on the course of action taken, presenting a significant challenge to the programmer. Successful performance relies on skills up to Bloom’s level of analysis.

(v) Problem-Solving software requires the student to use high level cognitive abilities in the process of considering the problem at hand, analyzing the problem situation and its various solutions, predicting respective outcomes, determining which specific plan to attempt, and enacting the appropriate action(s).

(vi) Discovery-Environment in addition to the delineated types of computer assisted instruction; it is also possible to provide a discovery environment within which the student is given a high level of freedom in determining the specific information presented during each session, as well as the order of presentation” (Kausar, Choudhry & Gujjar, 2008).

Parker (2003), “The use of computers to present drills, practice exercises, and tutorial sequences to the students, and sometimes to engage the students in a dialogue about the substance of the instruction is known as computer aided instruction or computer assisted learning”. This is used for both initial and remedial training, and typically it does not require
that a computer be connected to a network or provide links to learning resources outside of the course.

Coburn, Kelman, Roberts, Snyder, Watt & Weiner (1982), “Some of the first computer assisted instruction was developed by Patrick Suppes at Stanford University during the 1960s, set standards for subsequent instructional software. After systematically analyzing courses in arithmetic and other subjects, Suppes designed highly structured computer systems featuring learner’s feedback, lesson branching, and student record keeping. During the 1970s; particularly a widespread and influential source of computer assisted instruction was the University of Illinois Programmed Logic for Automated Teaching Operations (PLATO) system. This system included hundreds of tutorial and drill and practice programs. Like other systems of the time, PLATO’s resources were available through timesharing on a mainframe computer”.

Cohen (1985), “Many features of tutorial computer assisted instruction are consistent with the traditional classroom. Tutorial computer assisted instruction provides a one-way transmission of knowledge; it presents information and the student is expected to learn the information presented. Computer assisted instruction is designed for use by a single student and can be accommodated into a regular class schedule”. Access Center (2004), “Computer programs are interactive and can illustrate a concept through animations, sound and demonstration. They allow students to progress at their own pace and work individually or problem solve in a group. Computers provide immediate feedback, letting students know whether their answer is correct. If the answer is not correct, the program shows students how to correctly answer the question. Computers offer a different type of activity and a change of pace from teacher-led or group instruction”.

Lavine & Sharon (1981), “Following are certain advantages of computer assisted instruction: Greater attention is given to the acquisition of higher order thinking and problem solving skills. Basic skills are learned not in isolation, but in the course of undertaking (often on collaborative basis) higher level ‘real-world’ tasks where execution requires the integration of a number of such skills. Information resources are made available to be accessed by the students at that point in time when they actually become useful in executing the particular task at hand. Fewer topics may be covered than is the case within the typical traditional curriculum, but these topics are often explored in greater depth. The students assume the central role as the active architect of his or her own knowledge and skills.”
Because of computer assisted instructions’ versatility and provision for individualization, several advantages of this type of instruction are (a) errors can be analyzed and positive reinforcement can be given, (b) testing can become a learning process and (c) it can provide almost unlimited opportunity for drill and practice. Almost any written material can be adapted for computer exercises using the drill and practice, tutorial, testing, dialogue, or simulation and gaming modes”.

Personalizing information allows computer-assisted-instruction to increase learner’s interest in given tasks (Padma & Ross, 1987) and increase the internal logic and organization of the material (Anderson, 1984; Ausubel, 1968; Rumelhart & Ortony, 1977, Mayer & Massa, 2003). According to Maggery (1989), the challenges and problem faced by the modern educational system can be removed with the help of computers.

Collins, Deck & McCrickard (2008), “To address many of the shortcomings – perceived and real – of Computer assisted instruction, Walbert (1989) offers specific suggestions for enhancing computer assisted instruction such as:

(i) Include menu-driven open-model simulations, database spreadsheets, and an electronic sketchpad.

(ii) Engage the student in Socratic dialogues with interactive questions and answers leading to the learning objective.

(iii) Allow freedom of navigation so that the student can return to previous explanations or skip a particular troublesome problem.

(iv) Provide an electronic sketchpad using the mouse to point to, draw, and modify graphs in response to questions.

(v) Give immediate feedback to correct and incorrect answers.

(vi) Include a help facility to answer students’ questions or provide a reference to the text.

(vii) Allow students to change the parameters in the spreadsheets.

(viii) Vary level of difficulty of problems so that some require only recollection of facts and arguments from the text, others require the student to analyze a problem, and still others require the student to synthesize the techniques.

(ix) Include high-quality graphics, animation, and sound.

(x) Provide spreadsheets with graphical capabilities.

(xi) Write software for a specific textbook and do not try to replace the text.
Cotton (1992), “Computer-assisted instruction can play an important role in classrooms and laboratory work not as substitute for other activities but as an additional tool. This line of inquiry has brought most researchers to the conclusion that the use of computer assisted instruction leads to more positive student attitudes than the use of conventional instruction”. The following seven steps are involved to construct a computer assisted instruction package:

(i) Selection of the subject area
(ii) Selection of objectives
(iii) Defining the entering and terminal behavior
(iv) Content analysis and sequencing
(v) Writing the frames
(vi) Editing and review of the programme
(vii) Testing of the programme
(viii) Evaluating of the programme

1.2 ACHIEVEMENT

Driver (1989), “In a classroom students are involved in developing and reconstructing knowledge through experience, motivation, cooperation, exploring talk and teacher’s intervention”. Blumenfield (1993), “Students need opportunities to construct knowledge by solving real problems through asking and refining questions, designing and conducting investigations, gathering, analyzing and interpreting information and data, drawing conclusions and reported findings”. Balasubramanayan(1997), “In the present context of education, achievement in academic subjects is the main concern of the teachers, students and parents. Achievement is regarded as the end product of all educational endeavours”.

Prasadh (2005), “Achievement of students had a significant positive relationship with home, educational and emotional adjustment”. Achievement is a psychological necessity of man. He needs it not only to establish himself in the eyes of others but also for self-satisfaction. Academic achievement generally refers to the degree or level of success or proficiency attained in some specific area concerning scholastic or academic work. According to Crow and Crow (1997), “Academic achievement is the extent to which learner is profiting from instructions in a given area of learning and academic achievement of pupil is the knowledge attained and skill developed by him in the subject in which he is imparted
training in school and subsequent success in life.” According to Garrett (1968) defined achievement as actual performance.

Steinberger (1993), “Achievement encompasses student ability and performance, it is multidimensional, it is intricately related to human growth and cognitive, emotional, social and physical development; it reflects the whole child; it is not related to a single instance, but occurs across time and levels, through a student’s life in school and on into post secondary years and working life”.

Spence & Izard (1985), “The United States has historically been recognized as an achievement oriented society. The concepts of achievement, then, are rooted in a broader philosophy of individualism and materialism. Most parents, with the approval of child psychologists, attempt to train their children to become independent-self reliant and able to stand their own”. It is now a scientifically established fact that academic achievement is inextricably bound with and dependent also upon intelligence and ability. But achievement not only implies intelligence as the crucial factor but is also dependent upon certain non-intellectual factors such as environmental conditions and personality differences, the beliefs, attitudes, learning styles and locus of control etc. The physical, social, emotional and intellectual aspects of personality are directed linked with the academic achievement of the children. The factors responsible for high and low achievement of the individual’s may be individual factors or environmental factors. The individual factors include the cognitive factors i.e. intelligence, perception, attention, memory etc. and non-cognitive factors self-esteem, self concept, aspirations, self habits etc. On the other hand, the environmental factors include the home environment i.e. status of family, family relationships and parental expectations etc. and school environment i.e. curriculum, teaching methods, teacher’s personality etc.

1.2.1 FACTORS AFFECTING ACHIEVEMENT
Considine & Zappala (2002), “Factors that influence educational performance/achievement:
(i) Socio-Economic Status: Socio-economic status is determined by individuals’ achievements in education, employment, occupational status, income and wealth. Several comprehensive reviews and studies make it clear that children from low socio economic status families are more likely to exhibit the following patterns in terms of educational outcomes compared to children from high socio economic status families:
(a) They have lower levels of literacy, numeracy, comprehension and retention rates.
(b) They have lower higher education participation rates.
(c) They exhibit higher levels of problematic school behavior.
(d) They are less likely to study specialized maths and science subjects.
(e) They are more likely to have difficulties with their studies and display negative attitudes towards school.

It is argued that families where the parents are advantaged socially, educationally and economically, foster a higher level of achievement in their children.

(ii) Family Structure: Other factors in sole parent families that are likely to adversely affect educational outcomes of children compared to those from two parent families are said to include:

(a) They reduced contact between the child and non-custodial parent.
(b) The custodial parent having less time to spend with children in terms of supervision of school-work and maintaining appropriate levels of discipline.
(c) The lack of an appropriate role model, especially for males.
(d) Increased responsibilities on children such as childcare roles, domestic duties which impede the time available for school work.
(e) The nature of parent-child relationships in sole parent families may cause emotional and behavioural problems for the child (Considine & Zappala, 2002)

(iii) Type of School: While research in the United Stated has found that socio economic status variables continue to influence educational attainment even after controlling for different school types, the school context tends to affect the strength of the relationship between socio economic status and educational outcomes. While school-related factors are important, there is again an indirect link to socio economic status, as private schools are more likely to have a greater number of students from high socio economic status families, select students with stronger academic abilities and have greater financial resources (Considine & Zappala, 2002).

(iv) Absences: Truancy can be modelled both as an educational outcome and as a causal factor in explaining educational performance. Truancy tends to be higher among students from low socio economic status backgrounds. Truancy, even occasional, is associated with poorer academic performance at school (Considine & Zappala, 2002).
(v) Gender: Educational performance at school has also been found to vary according to the students’ sex (Horne, 2000). In particular, reviews of the evidence suggest that boys suffer an educational disadvantage relative to girls, especially in terms of performance in literacy. There are several explanations for this increasing gender gap which include biological differences, gender biases, teaching, curricula and assessment (for instance less structured approaches to teaching grammar may have weakened boys’ literacy performance) and socioeconomic factors. Girls have been found to out-perform boys within high or low socio-economic groups. Furthermore, the performance of boys deteriorates more rapidly than the performance of girls as they move down the socio-economic scale (Considine & Zappala, 2002).

(vi) Ethnicity: The ethnic background or immigrant status of parents is also an important mediating variable on the influence of children’s’ educational performance. Studies of the academic performance of second-generation school students in the United States have found that while their performance is also influenced by the socio economic status of their parents and type of school, their national background plays a significant independent role. As with the United States research, however, there is a great deal of variation between different ethnic groups.

(vii) Housing Type: Lower educational attainment has also been found to be associated with children living in public housing compared to those in private housing. This may be due to the effects of overcrowding, poor access to resources and a lack of social networks, and in this sense, housing type may also be a measure of neighbourhood influence (Considine & Zappala, 2002).

1.3 PROBLEM SOLVING ABILITY

A problem is a task which a child can understand but for which he does not have an immediate solution. Problem solving, accordingly, is the process by which the child goes from the task or problem as he sees it to a solution which, for him, meets the demands of the problem. Problems arise when children are confronted by an obstacle or a novel situation for which they have no direct answer in behaviour. Therefore, problem solving is likely to be more complex than the associative thinking and is more dominated by the objectives, external obstacles or situation than by the autistic factors which affect children’s fantasy. Problems can be practical or speculative (Russell, 1956, p.251). Probably the most influential analysis
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of problem solving is that of Dewey in ‘How We Think’, first published in 1910. From a
study of introspection, with illustrations of his own thinking, he derived the five main steps in
thinking which have influenced so many subsequent reports. These four main steps in
thinking are as follows:

(i) A felt difficulty
(ii) Its location and definition
(iii) Suggestion of possible solution.
(iv) Development by reasoning of the bearings of the suggestion (Russell, 1956, p.256).

In general, the main steps of problem solving process are problem definition,
problem analysis, setting goals, generate possible outcomes or solutions, analyzing and
implementation. Problem solving is a planned attack upon a difficulty for the purpose of
finding a satisfactory solution. Problem solving is that process which begins from cognitive
situations and ends in achieving desired goals. It is an ability to choose among various
responses in order to accomplish a task successfully. Problem solving is the frame-work or
pattern within which creative thinking and reasoning take place. It is the ability to think and
reason on given levels of complexity. People who have learned effective problem solving
techniques are able to solve problems at higher levels of complexity than more intelligent
people who have not such training.

When an individual faces a problem, the state of tension is created in mind. He exercises
his greatest effort and uses all his abilities, intelligence, thinking, imagination observation etc.
Some individuals are able to solve problems sooner than others. That indicates that there are
levels of problems solving ability-ranging from average ability to highest ability depending
upon the difficulty level of the problems. A simple problem can be solved by the person
having average problem solving ability, while high level of ability is required to solve
complex problems. Perhaps man's greatest use of sentence language has been the system that
he has developed for its application to problem-solving. It is not language alone but also the
way in which he uses language.

Gick (1986), “Schema-theoretic conceptions of problem solving opened the door for
different problem types by arguing that problem-solving skill is dependent on a schema for
solving particular types of problems. If the learner possesses a complete schema for any
problem type, then constructing the problem representation is simply a matter mapping an
existing problem schema onto a problem. Existing problem schemas result from previous experience in solving particular types of problems, enabling the learner to proceed directly to the implementation stage of problem solving and trying out the activated solution”. Sweller (1988), “Experts are better problem solvers because they recognize different problem states which invoke certain solutions”.

Shergill (2012), “Simple problems can well be solved by instinctive and habitual behaviours. More difficult problems require a series of solution attempts, until the successful solution is reached problems still more difficult require a degree of understanding, a perception of the relationships between the significant factors of a problem. It has been found that persons having higher intelligence and reasoning ability can solve the complex problems quickly. Therefore, it is necessary that on one hand we try to developed intelligence, reasoning as well as problem solving ability”.

Problem solving takes place as soon as the problem is perceived by the problem solver and is aimed at to reach the goal stated by the problem. The problem is supposed to be not only new and novel, but also at the same time, there is supposed to be no direct solution available to the problem solver at the time of its presentation. Problem solving involves understanding of the problem, analysis of data, looking for hidden questions, estimating a reasonable answer, setting up and solving the conditional statements and checking the answers. The problem solving is a process of overcoming difficulties that appear to interfere with the attainment of a goal. It has been found that persons having higher intelligence and reasoning abilities can solve the complex problems quickly.

Goldstein & Levin (1987), “Considered the most complex of all intellectual functions, problem solving has been defined as higher-order cognitive process that requires the modulation and control of more routine or fundamental skills”. The five levels of problem solving are as follows:

(i) Uncleared and habitual problem solving behavior
(ii) Trial and error problem solving behaviour
(iii) Insight problem solving behaviour
(iv) Vicarious problem solving behaviour (solving complex problem)
(v) Scientific method of problem solving

Theories of problem-solving are dominated by the work on general problem solver (Newell & Simon, 1972). This work established the information processing paradigm for the study of problem-solving and the concepts of "means-ends-analysis" and "problem space".
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According to the General Problem Solver framework, problem-solving involves the identification of subgoals and the use of methods (especially heuristics) to satisfy the subgoals. Schoenfeld (1985) presents a theory of problem-solving in mathematics that involves four aspects: resources, heuristics, control, and beliefs. Although this framework was specifically developed for mathematical problem-solving, it seems more generally applicable. Problem-solving skills appear to be related to many other aspects of cognition (Frederiksen, 1984) such as schema (the ability to remember similar problems), pattern recognition (recognizing familiar problem elements) and creativity (developing new solutions). The issue of transfer is highly relevant to problem solving. A good summary of problem-solving research as it applies to instruction is provided by Tuma and Rief (1980).

Problem-solving skills are fundamental to many professional domains such as engineering or medicine. Students with high-level problem-solving abilities are described as not only being able to analyze a situation and make decisions but also being capable of managing multiple conditions simultaneously. They can think about the underlying relationships in a problem, solve it systematically, check their work, and communicate the results. Students with low-level problem-solving abilities are generally not capable of drawing data from multiple sources, comparing, contrasting and integrating the data into the development of a solution to a multi-faceted problem. These are the very skills that are increasingly necessary.

Jonassen and Tessmer (1997), “Distinguished well-structured from ill-structured problems and recommended different design models for each, because they call on distinctly different kinds of skills. The most commonly encountered problems, especially in schools and universities, are well-structured problems. The well-structured present all elements of the problem, presented well-defined problems with a probable solution (the parameters of problem specified in problem statement), Engage the application of a limited number of rules and principles that are organized in a predictive and prescriptive arrangement with well-defined, constrained parameters, involve concepts and rules that appear regular and well-structured in a domain of knowledge that also appears well-structured and predictable, possess correct, convergent answers, possess knowable, comprehensible solutions where the relationship between decision choices and all problem states is known or probabilistic, have a preferred, prescribed solution process.”
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Jonassen and Tessmer (1997), “Ill-structured problems are the kinds of problems that are encountered in everyday practice, so they are typically emergent dilemmas. Because they are not constrained by the content domains being studied in classrooms, their solutions are not predictable or convergent. They may also require the integration of several content domains. Solutions to problems such as pollution may require components from math, science, political science, and psychology. There may be many alternative solutions to problems. However, because they are situated in everyday practice, they are much more interesting and meaningful to learners, who are required to define the problem and determine which information and skills are needed to help solve it”. Jonassen and Tessmer (1997) explained the ill-structured problems as follows:

(i) Appear ill-defined because one or more of the problem elements are unknown or not known with any degree of confidence
(ii) Have vaguely defined or unclear goals and unstated constraints
(iii) Possess multiple solutions, solution paths, or no solutions at all that is, no consensual agreement on the appropriate solution
(iv) Possess multiple criteria for evaluating solutions
(v) Possess less manipulable parameters
(vi) Have no prototypic cases because case elements are differentially important in different contexts and because they interact
(vii) Present uncertainty about which concepts, rules, and principles are necessary for the solution or how they are organized
(viii) Possess relationships between concepts, rules, and principles that are inconsistent between cases
(ix) Offer no general rules or principles for describing or predicting most of the cases
(x) Have no explicit means for determining appropriate action
(xi) Require learners to express personal opinions or beliefs about the problem, so ill-structured problems are uniquely human interpersonal activities
(xii) Require learners to make judgments about the problem and defend them (Jonassen & Tessmer, 1997).

Simon, 1978, “Researchers have long assumed that learning to solve well-structured problems transfers positively to learning to solve ill-structured problems. Although
information processing theories believed that "in general, the processes used to solve ill-structured problems are the same as those used to solve well structured problems".

The main goal of the psychologist in the study of problem solving is to uncover the essence of the process. Traditionally, the psychologists has been interested primarily in what is left after the process has been stripped of what is specific to the particular problem or class of problems at hand. Conversely, much of what goes into solving particular problems ordinarily will be of only secondary interest to the psychologists. In attempting to uncover underlying processes, psychologists have employed a number of different strategies. For example, they have had subjects simply verbalize their thoughts as they attempt to solve problems. The records then are analyzed to see if useful hypotheses can be formulated to explain how people solve problems. Many techniques, of course, have been used to formulate hypotheses: introspection, informal clinical observation, and previous experimental findings are just a few. Whatever the sources of hypotheses, however, the vast majority of experimental studies of problem solving have attempted to deal with the process in its full complexity. That is, most problem-solving studies have employed problem situations which involve both specific problem solving competencies and general cognitive processes. Understanding problem solving from the standpoint of individual differences amounts to identifying test measures that correlate with problem-solving ability (Joseph, 1977).

1.3.1 FACTORS IN PROBLEM-SOLVING

Russell 1956, "The factors which affect problem-solving ability may, for convenience, be grouped into four categories, although it must be remembered these factors are obviously overlapping and seldom operate in isolation. Problem-solving activity seems to vary with the following:

(i) Factors inherent in the nature of the problem
(ii) The method of attack on the problem
(iii) The characteristics of the solver or factors associated with the problem solver:
   (a) The level of previous learning or training
   (b) Interest and motivational level of the problem solver
   (c) Understanding and analysis of the problem
   (d) Mental set
Nayab (2011), “Problem solving entails perceiving and resolving a gap between a present situation and a desired goal by tackling the known or unknown obstacles that block the goal. The ability to solve problems however depends on many factors:

(a) **Identification of the Problem**: The most important of factors that affect problem-solving activities is realization of the problem. Identification or realization of the problem, keeping the big picture in mind, is the first and most important step toward problem solving. They key to doing so lies in understanding the purpose of the action. The basic steps toward this direction include:
   1. Defining the problem.
   2. Identifying the potential causes for the problems.
   3. Listing out the various solutions.
   4. Selecting the best alternative.
   5. Planning implementation.
   6. Monitoring and verifying the implementation.

(b) **Personality Types**: Individuals preferring introversion take time to think and clarify their ideas before acting, while those preferring extroversion talk through their ideas to clarify them before acting. Introverts remain concerned with their own understanding of important concepts and ideas, whereas extroverts seek feedback from the environment.

(c) **Temperament**: People motivated toward a goal, or those who are high achievers, take that extra effort and initiative to find the root cause of problems and solve it. Others go by the routine procedure and do the minimum required.

(d) **Thinking Patterns**: The major thought process dimensions include strategic thinking or a bigger long-term focus instead of short-term departmental focus, emotional thinking or judging whether a solution is right or wrong based on emotional commitment, realistic thinking or the approach of starting from what can be done and fixing the essential problem first, empirical thinking or judging whether the situation is right or wrong based on past experiences”.

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Functional fixedness

Mental and physical state of the problem solver

The time spent on solving the problem

Social or group factors in the situation”. (Russell 1956, p.263).
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(e) Skills and Technical Competency: At times problem-solving requires creativity and innovation, which again depends on the personality and temperament of the person, and the culture of the organization.

(f) Hierarchies: Hierarchical organizations that tend to give importance to designations and fixed job descriptions, insist on adherence to procedures, and do not encourage ad hoc measures, stifle creativity and innovation and have a profound impact on problem-solving activities.

(g) External Environment: The external environment of an organization remains the root cause of many problems in a project, and the solution depends on the external environment itself.

Mangal (2007), “Problem-solving is a deliberate and serious act, involves higher thinking and systematic planned steps for the realization of set goals. One can adopt some useful strategies for effective problem solving in the shape of algorithms (strategy for generating a solution by exhausting every possible answer for ending up with the correct solution), heuristics (rule of thumb for arriving at a quick solution) like sub-goal analysis, means and ends analysis, working backward and using an analogy etc., a trial-and-error (involves trying a number of different solutions and ruling out those that do not work) and insight (occur because one realize that the problem is actually similar to something that they have dealt with in the past)”.

1.4 LEARNING STYLE

Before examining the learning styles and models, it is necessary to explain “What is the key concept in learning style?” and “What does style mean?” Style is a concept used in the fields of fashion, art, sports and media. From this point of view, individual’s preferences are central. When this concept is considered in educational content, it is seen that every student has his/her own learning style. These differences (personality, perception, ability, intelligence) affect students’ motivation and attitudes towards the lessons. As a result, these differences affect the effectiveness of the lesson. Beside those, the student’s gender, intelligence and personal characteristics influence the learning style as well (Erden & Altun, 2006). As the learning style is related to individual characteristics and preferences, learning styles reflect the students’ preferences on how they perceive the environment, interact with this environment, react and experience learning in this process. When individual learning
styles are determined, both the kind of the teaching environment they need to be in and the way to precisely determine the issues to be learned inside and outside of the class may be raised. When the lessons are taught by taking into consideration the individuals’ learning styles; their interests and successes increase considerably. What is important here is that learning styles are neither better nor worse than each other. If a teacher keeps this matter in mind, s/he can turn this difference into an advantage (Kazu, 2009).

Learning styles are the approaches that students prefer to adopt while learning and they become generally consistent behaviour. The way a person prefers to learn is called his/her learning style. It has everything to do with the way a person’s brain works to learn and store information efficiently. This approach to learning emphasizes the fact that individuals perceive and process information in very different ways. Learning style is a concept that has been developed from the extensive work into cognitive styles. Learning is an important cognitive function that all organisms indulge into, adapt and survive in their environments. The level of learning achieved by a learner is one of the most important factors which indicate the success of a learning environment. Individuals may have different preferences with regard to when, where and how often to learn.

Dunn and Dunn (1978) have given a theory of learning styles which is also widely used in education. This theory includes different learning styles divided into four main categories which have been presented in table 1.1.

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Category</th>
<th>Styles Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Environmental</td>
<td>Sound, light, temperature, design</td>
</tr>
<tr>
<td>2</td>
<td>Emotional</td>
<td>Motivation, persistence, structure, responsibility</td>
</tr>
<tr>
<td>3</td>
<td>Sociological</td>
<td>Self, peers, team, adult varied</td>
</tr>
<tr>
<td>4</td>
<td>Physical</td>
<td>Perceptual, intake, time, mobility</td>
</tr>
</tbody>
</table>

In view of Schmeck (1982) “Learning style is a pre-disposition on the part of the learning strategy regardless of the specific demands of the learning tasks”. Shuell (1986) explains that “Different ways used by individuals to process and organize information or to respond to environmental stimuli refer to their learning styles”. Kemp, Morrison & Ross
(1998), “For the effectiveness of teaching environments, it is important to take account of group or individual learners’ characteristics, competence and experiences (pre-learning) throughout the process of planning learning environments”. Though all human beings have common bio-psychological and social characteristics in learning process, but individual preferences concerning the ways of giving meaning and acquiring information may vary. One of these individual-specific differences is the learning style. Individual differences exist in the style of learning. Learning styles are the affective component of education that motivates a student to learn (Yilmaz-Soylu & Akkolyunlu, 2002)

Learning styles are characteristic ways in which an individual acquires, perceives and processes information. It refers to individual differences in perception, thinking, and problem solving, learning and relating to others. Learning styles are concerned with form rather than the content of learning activity. In literature there exist numerous learning styles and learning style models. The differences among definitions and models result from the fact that learning is achieved at different dimensions and that theorists define learning styles by focusing on different aspects (Yilmaz-Soylu & Akkolyunlu, 2002). James and Gardner (1995) defined learning styles as the “Complex manner in which learner most efficiently and effectively perceive process, store and recall what they are attempting to learn. Jensen (1998) defines learning style as a “Sort of way of thinking, comprehending and processing information”.

Kolb (1984), “A major function of education is to shape students’ attitudes and orientations towards learning to instill positive attitudes towards learning and a thirst for knowledge and to develop effective learning skills”. Kolb (1984) defined “learning style is a method of personal choice to perceive and process information. In this sense, learning style is, on one hand, sensory and, on the other hand, mental”. Kolb states that experiential learning theory, which defends that learning, is a combination of experience, cognition, perception and behaviour, lays the foundation of learning style model. He proposed a theory of learning styles to be applied in school settings. According to his theory, there are four basic types of learning styles:

(i) The Converging Learning Style: Individuals with this style are abstract conceptualizers and like to use deductive reasoning. They are interested in active experimentation and focus on specific problems. They would rather deal with technical tasks and problems than social and interpersonal issues. They like to experiment with new ideas, simulations, laboratory
assignments and practical applications. They best at finding practical uses for ideas and theories. Basically deals with ‘How’.

(ii) The Diverging Learning Style: Individuals who prefer the diverging learning style tend to be imaginative and emotional in their dealings with people and things. They prefer concrete experiences and reflective observation. They are opposite to the convergers in some respects. They prefer to watch rather than do, tending to gather information and use imagination to solve problems. They perform better in situations that require ideas generation, brain storming and like to work in groups. Basically deals with ‘Why’.

(iii) The Assimilating Learning Style: Individuals who prefer this style tend to abstract conceptualizers and reflective observers. They use inductive reasoning to assimilate disparate observations into integrated explanation. They like to create theoretical models, are more interested in abstract concepts than in people. They prefer readings, lectures, exploring analytical models. Ideas and concepts are more important than people. They excel at understanding wide range information and organizing in a clear logical format. They asks what is there I can know.

(iv) The Accommodating Learning Style: Individuals who prefer this style of learning like concrete experiences, active experimentation and taking risks. Relies on intuition rather than logic. These people use other people’s analysis and prefer to take up practical and experimental approach. Basically deals with ‘What If’. They prefer to work with others and do field work. The Kolb’s learning styles or preferences are given below in fig. 1.1.

<table>
<thead>
<tr>
<th>Concrete Experiencing (CE)</th>
<th>Diverging</th>
<th>Assimilating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodating</td>
<td>CE/RO</td>
<td>AC/RO</td>
</tr>
<tr>
<td>Feel and Do</td>
<td>Active (AE)</td>
<td>Think and Watch</td>
</tr>
<tr>
<td>Reflective Observation</td>
<td>CE/AE</td>
<td>AC/AE</td>
</tr>
<tr>
<td>(RO)</td>
<td>Converging</td>
<td>Abstract conceptualizing (AC)</td>
</tr>
<tr>
<td>Think and Do</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Fig. 1.1: Kolb’s learning styles or preferences**

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different parts of brain. By involving more of the brain during learning, we learn more of 
what we learn. Researches using brain-imaging technologies have been able to find out key 
areas of brain responsible for each learning style and by understanding learning styles. 
Teacher can learn to create an environment in which everyone can learn from him, not just 
those who use his preferred style”.

Yilmaz-Soylu & Akkolyunlu (2002), “Though learning styles are not stable and ' 
unchangeable elements, but take some time to change. That is why, it seems as an easier and 
more effective way to select and organize methods and strategies, classroom environment and 
teaching materials according to learning styles rather than expecting the students to adapt to 
the existent organization. The literature is rich in studies focusing on learning environments 
which are designed with respect to the characteristics of the learner”.

1.4.1 IMPORTANTACE OF LEARNING STYLES

Kazu (2009), “It is very important for an individual to know his/her learning style. 
The reason is that one of the most significant issues in learning to learn, or in becoming 
effective in the process of learning, is an individual’s taking the responsibility for his/her own 
learning. For this purpose, the individuals should know what their own learning styles are and 
what characteristics this style has and they should thereby behave according to this style. In 
this way, the individual can acquire the constantly changing and increasing amount of 
information without need for the assistance of others (Biggs, 2001; Coffield, Moseley, Hall & 
Ecclestone, 2004; and Kazu & Yavuzalp, 2008). When the learner takes the responsibility of 
his/her own learning, s/he attributes meaning to the process of learning. S/he develops an 
understanding of his/her own form of learning style and becomes much more satisfied with 
the environment s/he interacts with. Every opportunity for learning is a chance for him/her. It 
is in the learner’s hand to use different ways and develop the learning styles to some extent” 
(Kazu, 2009).

Kazu(200), “Learning style is important for many reasons, however, there are three 
vital ones. First of all, people’s learning styles will vary because everyone is different from 
one another naturally. Secondly, it offers the opportunity to teach by using a wide range of 
methods in an effective way. Sticking to just one model unthinkingly will create a 
monotonous learning environment, so not everyone will enjoy the lesson. In other words, 
learning and teaching will be just words and not rooted in reality. Thirdly, we can manage
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many things in education and communication if we really recognize the groups we are called to”. Of course, we may not know every detail; however, being aware of our students’ learning styles, psychological qualities and motivational differences will help us regulate our lessons appropriately and according to the conditions (Della-Dora & Blanchard, 1979; Felder & Silverman, 1988 and Coffield, Moseley, Hall & Ecclestone, 2004).

1.4.2 ADVANTAGES OF IDENTIFYING LEARNING STYLES

Kazu (2009), “Research on learning styles shows that individuals have another learning style besides the dominant one. In other words, an individual has one or more than one learning styles. Learning style has cognitive, affective and psychological aspects. Cognitive components are about the internal control of the system of running the knowledge and these can be changed through education”. Acikgoz (1996), “Affective and psychological components affect the preferences of the individual, and suggest answers to both education and teaching strategies (Another advantage of the identification of the own learning style by the student is that it will help the student to become an effective problem solver”. Fidan (1986), “The more successful the individual is at solving the problems s/he faces, the more control s/he will take over his/her own life”.

Kazu (2009), “It is important that individuals receive education in areas suitable for their learning styles. A person educated in an area having no relationship to his/her learning style may lack confidence and s/he may be less successful; s/he may as a result become frustrated. Knowledge of learning style also provides information to the student as to why s/he has learnt in a different way than others. It helps to control the process of learning. It is vital because one of the most important signals in learning is to learn to be autonomous, that is, for the individual to take responsibility for his/her own learning. Because of this, s/he should know what learning style is. This has to be part of the learning process to enable the individual to obtain knowledge, which constantly shifts and changes, without any help from others”.

Kazu, 2009, “Briefly, confidence in learning will consistently rise when learners know how to learn. Learning to learn and grasping knowledge in a suitable manner will lessen the need for an overbearing control by teachers. At this point, teachers guide the students. The students take responsibility for their learning, they are at the center of the process and everything is under their control. They search answers to the problems and benefit from their unique performances and preferences in their learning styles. Those people
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will identify their aims, unlike those whose learning style preferences are not identified. They know what they want to learn and “how”. This awareness will change their perspectives on learning new things”.

Felder (1993), “Additional teaching methods in a class which may therefore be sufficient to meet the needs of all of the students. These teaching methods are as follows:

• Motivate presentation of theoretical material with prior presentation of phenomena that the theory will help to explain and will be used to solve problems (sensing, inductive and global).

• Balance concrete information, descriptions of physical phenomena, results from real and simulated experiments, demonstrations, and problem-solving algorithms (sensing) with conceptual information theories, mathematical models, and material that emphasizes fundamental understanding (intuitive) in all courses. Give the relations between torque, moments, and angular motion but first get students to exert pressure on a door at different perpendicular distances from the hinges and then have them try to interpret the results (Felder, 1993)

• Make extensive use of sketches, plots, schematics, vector diagrams, computer graphics, and physical demonstrations (visual) in addition to oral and written explanations and derivations (verbal) in lectures and readings.

• Show flow charts of the reaction and transport processes that occur in particle accelerators, test tubes, and biological cells before presenting the relevant theories, and sketch or demonstrate the experiments used to validate the theories.

• To illustrate abstract concepts or problem-solving algorithms, use at least some numerical examples (sensing) to supplement the usual algebraic examples (intuitive).

• Use physical analogies and demonstrations to illustrate the magnitudes of calculated quantities (sensing, global).

• Give some experimental observations before presenting the general principles and have the students (preferably working in groups) see how far they can get toward inferring the latter (inductive).

• Provide time in class for students to think about the material being presented (reflective) and for active student participation (active) (Felder, 1993)
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• Encourage or mandate cooperation on homework (active). Students who participate in cooperative (team-based) learning experiences both in and out of class are reported to earn better grades, display more enthusiasm for their chosen field, and improve their chances for graduation in that field relative to their counterparts in more traditional competitive class settings.

• Demonstrate the logical flow of individual course topics (sequential), but also point out connections between the current material and other relevant material in the same course, in other courses in the same discipline, in other disciplines, and in everyday experience (global) (Felder, 1993).

1.5 REVIEW OF RELATED LITERATURE

Survey of related literature is a crucial aspect in the planning of the study. It is an exacting task, calling for a deep insight and clearer perspectives of the overall field which invariably minimize the risk of dead ends and is a fruitful source of hypothesis. This familiarity with the related studies provides ideal theories; explanations or hypothesis valuable in formulating the problem. The overview of related literature helps the researcher to delimit and define her problem, and also to avoid sterile problem areas. Some of the researches related to the variables in the study are presented under the following subheadings:

1.5.1 Related Studies on Computer Assisted Instruction
1.5.2 Related Studies on Problem Solving Ability
1.5.3 Related Studies on Learning Styles
1.5.4 Review of Researches

1.5.1 RELATED STUDIES ON COMPUTER ASSISTED INSTRUCTION

Kulik, Kulik and Cohen (1980) conducted a study on effectiveness of computer-based college teaching: A meta-analysis of findings. They reviewed fifty-nine research studies using meta-analytic techniques about college teaching. They found that computer assisted instruction made a small but significant contribution to the achievement of college students with positive attitudes toward the subject matter.

Hasselbring and George (1984) conducted a research on the effectiveness of computer-based instruction: A review. They summarized results of research studies and metaanalyses
on the effects of computer-based instruction on student achievement and attitudes, where results favour the use of computer-based instruction over traditional instruction.

Mevarech and Rich (1985) conducted a three-year study on the effects of computer-assisted instruction on disadvantaged third, fourth, and fifth grade Israeli students. The study divided the participants into two groups: one group receiving traditional mathematics instruction supplemented by computer-assisted instruction and the other receiving traditional mathematics instruction only. Results which compared the type of instruction to grade level and gender on the Israeli Ministry of Education's Arithmetic Achievement Test showed that at all three grade levels, computer-assisted instruction students scored significantly higher on arithmetic achievement than students who received traditional instruction only.

Fox (1986) conducted a study on comparison of lecture-based instruction and computer-based individualized instruction. The findings revealed that a computer-based individualized instructional delivery system for educating students in a general education science course was not as effective as a lecture-based instructional delivery system.

Makros and Tinker (1987) conducted studies to conclude how middle school students learn graphing skills through microcomputer-based laboratories. Results of the study pointed out that the scores on graphing items were significantly improved in students' ability to interpret and use graphs from pre-tests to post-tests when the microcomputer-based laboratory was used.

Ganguli (1990) explored the effectiveness of the microcomputer in the form of demonstration tool on the achievement and attitudes. Participants of the study were college students in the intermediate algebra class in which two classes were taught chosen units with teacher-demonstrated microcomputer graphs and two classes were taught the same chosen units with graphs drawn by the teacher on the chalkboard. Results of the study indicated that the treatment effect was significant for the comprehensive examination but not for the post-test.

Singh, Ahluwalia and Verma (1991) conducted a study centered upon the problem of effectiveness of computer-assisted instruction and of the conventional method of instruction in terms of achievement in mathematics and direction of change in attitude towards mathematics. Findings revealed that students who used the computer scored significantly higher than those taught mathematics through conventional method. The students who used
the computer showed significantly highly favourable attitude towards mathematics than those who did not use the computer.

George (1992) developed six computer assisted learning modules in geography and evaluated in terms of impact on achievement, attitudes and classroom psychosocial environment. Compared with control students, computer assisted learning students had higher achievement and attitude scores.

Agarwal (1995) compared conceptual understanding by programmed instruction and computer assisted instruction and found that both were very effective, however programmed instruction was found better than computer assisted instruction for students with lesser intelligence quotient. Computer assisted instruction was found to be better than programmed instruction for students of higher intelligence quotient and for students of higher socio-economic strata.

Christmann (1997) conducted a study that used meta-analysis to compare the academic achievement during a twelve year period of secondary students who were instructed through traditional methods, traditional methods supplemented with computer assisted instruction, or computer assisted instruction alone. Results were compared with earlier research and indicated that the effect of computer assisted instruction on academic achievement has declined.

Reeves (1998) studied the impact of media and technology in schools and reported that the computer based instruction has been shown to impact student performance in a number of different academic areas like mathematics, science. This positive impact takes the form of increased performance on standardized measures of student achievement, increased student motivation and faster rates of learning.

Kadhiravan (1999) investigated the effectiveness of computer assisted instruction in relation to student’s use of self regulated learning strategies. The objectives were to find out whether there is any difference among the three instructional strategies viz. lectures method, computer assisted instruction as individualized strategy and computer assisted instruction with peer interaction in terms of their effectiveness in improving the performance in physics with different levels of cognition. The results were that among the instructional strategies viz. lecture method, computer assisted instruction as individualized strategy and computer
assisted instruction with peer interaction was the most effective instructional strategy in terms of realizing the instructional objectives in the context of contents with low difficulty level. There was a differential effect on the cognitive development of the students in Physics due to their self-regulated learning strategies.

Meera (2000) conducted a study on relative effectiveness among different modes of computer based instructions in relation to students’ personality traits. The objectives of the study were to find out whether there is any significant difference between conventional lecture method and the computer assisted instruction as an individualized structural strategy in terms of their effectiveness and realizing the instructional objectives in Biology of class XI and to find out the significant difference among the different modes of computer based instructions viz. tutorial, drill and practice in simulation. Findings revealed that different modes of computer based instruction i.e. drill, practice, simulation was more effective than conventional lecture method in realizing the instructional objectives in Biology of class XI.

Jenks and Springer (2001) conducted a study on a view of the research on the efficacy of computer assisted instruction. The objective of the study was to show that computer assisted instruction can be an effective mode of instruction in the educational environment. It was also intended to address three major issues within the body of research on the effectiveness of computer assisted instruction (a) an aging body of literature (b) the greater effectiveness of using computer assisted instruction as a supplement to conventional instruction(c) the alleged superiority of computer assisted instruction on conventional instruction.

Boling, Martin and Martin (2002) determined the effect of computer assisted instruction on first grade students’ vocabulary development. The students in both groups were involved in DEAR (Drop Everything and Read) as part of their instruction in a balanced literacy program. During their normal DEAR time, the control group used a book and tape to explore stories. The experimental group explored stories using computerized storyboards. The results of the study showed a significant difference for both groups on pre tests and post tests. However, the mean difference demonstrated a much larger gain for the students in the experimental group.
Fridman, Dasso and Basson (2003) investigated the effects of computer assisted instruction on learner performance in Accounting. The findings of this study suggested that in the first instance the use of the two pedagogies showed no statistical difference in the performance of the learners. In the second instance a significant finding showed that if computer assisted instruction was used in conjunction with the traditional ‘chalk and talk’ method of instruction, it had many positive effects of the Accounting milieu. The research provided evidence that computer assisted instruction increased the learner’s problem solving skills, motivation and interest in Accounting.

Tabassum (2004) conducted a study on effect of computer assisted instruction on the secondary school students’ achievement in science. The hypothesis were (i) there is no significant difference between the mean scores of students taught science with computer assisted instruction as supplementing strategy on the academic achievement in science and without computer assisted instruction (ii) no significant difference between treatment effect for the students of high and low intelligence (iii) no significant difference between treatment effect for male and female students. The findings of the study were that all null hypotheses were rejected. It means there exists significant difference between control and experimental group.

Basturk (2005) studied the effectiveness of computer assisted instruction in teaching introductory statistics. The focus of this study is to demonstrate and discuss the educational advantages of computer assisted instruction. Findings suggest that participants’ learning capacity of the introductory statistics could be improved successfully when computer assisted instruction used as a supplement to regular lecture in teaching introductory statistics course.

Beth, Gerald and Alfred (2006) determined the effects of computer assisted instruction versus a text mode of programmed instruction and the cognitive style of locus of control, on pre-service elementary teachers’ achievement of the integrated science process skills. The results suggested that printed programmed instruction and tutorial computer assisted instruction were equally effective modes of instruction for teaching pre-service elementary teachers the integrated science process skills.

Kochhar (2007) studied the effectiveness of computer assisted instruction and concept mapping in acquisition of biological concepts in relation to style of learning & thinking and found computer assisted instruction and concept mapping as superior instructional strategy than traditional lecture method.
Ozmen (2008) investigated the effect of computer assisted instruction on conceptual understanding of chemical bonding and attitude towards Chemistry. A statistically significant difference was found between groups in favour of experimental group. It was concluded that students from experimental group were more successful than the control group students in remediation of alternative conceptions. The results of this study suggested that teaching-learning of topics in chemistry related to chemical bonding can be improved by the use of computer assisted teaching materials.

Kanmani and Radha (2009) studied on effectiveness of computer assisted instruction package in basic electronics teaching and found that there is a significant difference between the control and the experimental group students in the attainment of application level objectives in the gain scores and there is a significant association between the habits of journal reading and gain score of control group students.

Barot (2010) conducted a study on development and implementation of computer assisted instruction in Sanskrit for IX students. The hypothesis were (i) there will be no significant difference in the mean gain scores of experimental and control group of the students on written pre-test and post-test (ii) There will be no significant difference in the mean gain scores of experimental and control group of the students on oral pre-test and post-test. The findings were largely significant difference has been found between mean achievement scores of control and experimental group. So the computer assisted instruction was found effective for teaching Sanskrit.

Mustafa, Aslihan and Turgay (2011) conducted a study on the effect of computer assisted instruction with simulation in Science and Physics activities on the success of student: Electric current. At the end of the study it was detected that of the two groups whose successes were the same at the beginning, experiment group students on whom computer assisted instruction method was applied came out more successful than control group on whom traditional method was applied. They found that computer assisted instruction technique increase the academic successes of students in the subject of “Electric current”.

Beechler and Williams (2012) conducted a study on computer assisted instruction and elementary ESL (English as a second language) students in sight word recognition. They concluded that computer-aided instruction is beneficial for young English as second language students. Computer assisted instruction has many academic applications, especially with
English as a second language students. While the idea of computer assisted instruction is not new, the ability to utilize instruction on computers has never been better.

From the above studies on computer assisted instructions, we can conclude that computer assisted instruction develops interest among students for learning and make learning easier and effective. Students showed improvement in the achievement.

1.5.2 RELATED STUDIES ON PROBLEM SOLVING ABILITY

Dutt (1989) made a study on the effect of problem solving strategies on problem solving ability in science of high school students in relation to anxiety level, cognitive style and intelligence and found that (i) strategies of problem-solving significantly affected the problem-solving ability of students. The focusing strategy was found to be superior to the scanning strategy. (ii) high intelligent students, irrespective of the strategies of training, scored higher on problem solving ability test than low-intelligent students. (iii) cognitive style and intelligence were found to contribute significantly to the total variance in problem-solving ability, anxiety did not make any significant contribution.

Gill (1990) researched on the effect of training strategies on creative problem solving skills and cerebral dominance in relation to intelligence, personality and cognitive style and found that irrespective of training, introverts and students with high intelligent quotient scored higher on originality in solving math’s problems.

Kumari (1991) studied the problem solving strategies of 10-12 years of age children and examined their relationship with certain cognitive capabilities. The finding revealed that overall problem solving ability and the success on different types of problems was significantly and positively related to each cognitive ability, separately as well as globally.

Charan (1992) did his research on a comparative study of scientific creativity, problem solving and risk taking in tribal and urban students and found that urban students were significantly better than the tribal in fluency, flexibility and originality. Girls were superior to boys in problem solving ability.

Patwardhan (1994) found that women coming from rural and urban areas fell apart on concept formation, reasoning, decision making and problem solving, but were not different in creative thinking.
Poris (1997) conducted a study on effects of computer based cooperative learning on the problem solving skills of grade sixth students. The specific research questions were: (i) are students’ abilities to solve problem significantly improved by individual participation in a computerized problem solving game? (ii) are students’ abilities to solve problem significantly improved by individual participation in a computerized problem solving game as a part of a cooperative learning pair? The first hypothesis investigated in this study was that sixth-grade students who work to solve a computerized puzzle game will demonstrate a significantly greater improvement in problem solving skills than who receive traditional teacher presented mathematics instruction. The second hypothesis investigated was that sixth-grade students who work to solve a computerized puzzle game in a cooperative learning setting consisting of pairs of students will demonstrate a significantly greater improvement in problem solving skills than either those students who work on the computerized puzzle game individually or those students who receive traditional teacher presented mathematics instruction.

Chang (1998) conducted a study on hope, problem-solving ability and coping in a college student population: some implications for theory and practice. The main finding of the study was that high-hope students were found to have greater problem-solving abilities than low-hope students. High-hope students were also found to employ less disengagement strategies than low-hope students for coping with stressful academic situations. No difference was found in the strategies used by high- and low-hope students for coping with stressful interpersonal situations.

Foster (2000) conducted a study on the development of students ‘problem-solving skill from instruction emphasizing qualitative problem-solving. The results of the study were skewed slightly by the students in the more traditionally taught course who had average grades higher than their peers. This was not a problem in the course where an explicit problem-solving strategy was taught. In general, the students in the course who were taught an explicit problem-solving strategy tended to develop their skills faster, but did not score any higher than the students in the more traditionally taught course by the end of the year. However, the students in the explicit problem-solving course consistently performed better on the multiple choice concept tests given during the year.

Skinner (2001) conducted a study on problem solving and computer assisted instruction in Science education. Results indicated that the form of computer assisted
instruction used in this study did not significantly improve students' problem-solving performance. Logical reasoning ability was measured by an abbreviated version of the Group Assessment of Logical Thinking (GALT). Logical reasoning ability was found to be correlated to problem-solving performance in that, students with high logical reasoning ability tended to do better on the problem-solving tests and vice versa. However, no significant difference was observed in problem-solving improvement, in the laboratory-based instruction group versus the computer assisted instruction group, for students varying in level of logical reasoning ability.

Salami and Aremu (2002) conducted a study on relationship between problem-solving ability and study behavior among school going adolescents in South-Western Nigeria. The purpose of this study is to investigate the relationship between problem-solving ability and study behavior among school-going adolescents. A problem solving inventory was employed in the data collection from the respondents. The results obtained indicated that problem solving ability was significantly predictive of study behavior. Implications for counselors to use problem-solving activities in improving students’ study behaviours were discussed.

Altun (2003) conducted a study on the perceived problem solving ability and values of student nurses and midwives. The results of the study have shown that education in professional ethics should provide the development of professional values especially of truth and human dignity. Concerning value-related issues, education should help students to reach the desired levels of problem solving skills by allowing them to acquire abilities such as self awareness and being inquisitive.

Fuchs, Fuchs, Prentice, Hamlett, Finelli and Courey (2004) conducted a study on enhancing mathematical problem solving among third-grade students with schema-based instruction. The purposes of this study were to assess the effects of schema-based instruction in promoting mathematical problem solving and to investigate schema induction as a mechanism in the development of mathematical problem solving. Students receiving schema-based instruction, with and without sorting practice, improved more than the contrast group on problem-solving measures. Concurrently, the schema-based instruction groups' schema development exceeded that of the contrast group, and schema development explained a substantial portion of unique variance in students' post treatment problem-solving.
performance. Results also suggested the need for additional research testing the contribution of practice in sorting word problems.

Chance, Matthew and Randall (2005) conducted a study on a direct comparison of conceptual learning and problem solving ability in traditional and studio style classrooms. Quantitative problem-solving ability was measured with standard questions on the final exam. Our data compare three different quarters over the course of two years. In all three quarters, the normalized learning gain in conceptual understanding was significantly larger for students in the studio sections. At the same time, students in the studio sections performed the same or slightly worse on quantitative final exam.

Susai (2006) in her study problem solving: an assessment of student attitude, expectations and beliefs. Some of the conclusions were that problem solving plays a significant role in education process, those who are less competent in problem solving may be doing more memorizing more than learning.

Sharma (2007) in her study of problem solving ability and scientific attitude as determinant of academic achievement of higher secondary students concluded that on the basis of value of co-efficient of co-relation, it can be inferred that all these three variables are significantly correlated.

Fang, Lin, Yang, Lee, Tsai and Tsai (2008) undertook a study to increase the critical thinking and problem solving abilities by web-based learning. The purpose of this study is to understand the experimental effects of web-based critical thinking instruction program for promoting students' abilities. It found that students' critical thinking and problem-solving abilities has been promoted after performing web-based critical thinking instruction. The results can be given reference for teachers to innovative instruction and performance in web-based instruction.

Pimta, Tayruakham and Nuangchalerm (2009) conducted a study on factors influencing Mathematic problem-solving ability of sixth grade students. The factors influencing mathematic problem-solving ability were represented as following: (i) direct factors influencing mathematic problem-solving ability were described that direct and indirect factors influencing mathematic problem-solving ability were attitude towards mathematics, self-esteem and teachers’ teaching behavior. Indirect factors influencing
mathematic problem-solving ability were motivation and self-efficacy (ii) factor models influencing mathematic problem-solving ability of sixth grade students was associated with visual data (iii) The developed model could describe variance of skill in mathematic problem-solving at 63.00 %.

Kuo, Maker, Su and Hu (2010) conducted a study on identifying young gifted children and cultivating problem solving abilities and multiple intelligences. The results of this enrichment program found significant correlations among the measurement scores; the scores of teacher assessment of problem solving abilities also showed that most students performed well on all five kinds of problem solving types. From children's archives, participating children presented scientific thinking characteristics, such as rich knowledge with fascinating imagination and the ability to seek many approaches to solving problems. They were delighted to challenge others and pleased to be challenged. The twice exceptional children also performed well in the program, especially those children with autism whose progress in social skills and group adaptability were remarkable. In sum, the researchers in this program had a belief that children, whether gifted or not, did not get the satisfaction of making progress until they had opportunities to find and develop their potentials.

Mohd and Mahmood (2011) conducted a study on the effects of attitude towards problem solving in mathematics achievements. The research findings reveal that the level of patience, confidence and willingness towards problem solving are medium. The findings also show that there is significant contribution between overall attitude in problem solving and mathematics achievement. On the other hand, the finding shows that there is no significant relationship between gender towards problem solving and mathematics achievements.

Jeotee (2012) conducted a study on reasoning skills, problem solving ability and academic ability: implications for study programme and career choice in the context of higher education in Thailand. The most important finding is reasoning skills, and problem solving ability have some influences on each other approximately thirty percent; however, academic ability did not show much influence on the reasoning skills, and problem solving ability. This shows that academic achievement in university students in Thailand is not a good predictor of high levels of reasoning and problem solving ability. The other findings confirm the differences in those skills between students from different programmes and strengthen the case for using admission tests in Thailand for university admission.
1.5.3 RELATED STUDIES ON LEARNING STYLES

Soliman and Torrance (1986) undertook research on Japanese, American and Kuwaiti college students’ learning and thinking styles and observed that Japanese students preferred an intuitive approach, and the American students favoured an integrated approach to problem solving.

Verma and Kumari (1988) conducted a study on learning style preferences of senior secondary students in relation to their sex. The results of the study indicated that male students differed significantly with female students, with regard to their preferences for individualistic vs. on-individualistic learning styles. Female students tended to have relatively more preference of field independent learning style. Female students showed relatively more liking for environment oriented learning style in comparison to male student.

Felder and Silverman (1988) while working in the area of individual student’s learning style of engineering students felt that the individual’s learning style plays an important role in acquisition, retention, and retrieval of information. The use of multimedia after taking care of individual student’s learning style probably seems to be one of the alternatives in the present scenario.

Verma and Tiku (1990) studied the effect of socio-economic status and general intelligence on learning styles of high school students and found that there is no significant difference was found between high and low intelligent students on independent, dependent, participant, collaborative and competitive learning styles. The interaction effect of socio-economic status and intelligence was not significant on any of the learning styles of the high school students.

McKee (1997) while carrying out a review literature on multimedia effectiveness in the learning environment examined some of the research and academic literature related to the use of computer-assisted instruction, hypertext, hypermedia and multimedia in the learning environment. Contemporary views of media psychology and learning styles were also discussed, as well as the impact of multimedia on teachers, students and learning. According to him, each learner has a different learning style and responds to different stimuli. Assessing the learning styles of individual students should be an important consideration when designing instructional media.
Reynolds and Beeman (1999) conducted a study on teaching effectiveness using sensory learning styles. Findings revealed that auditory is the least preferred sensory mode for information processing identified in this study, but there was wide use of auditory teaching strategies in nursing education which include lecture, note taking, transparencies with written materials and huge reading assignments. Computer mediated learning capitalized on visual and kinesthetic interaction. Verbal interaction between students and faculty typically occurred via email and chat rooms. Visual and kinesthetic learner would readily adapt to computer mediated and on line learning activities.

Rourke and Lysynchuk (2000) studied the effect of learning styles on success in web-based learning environments. The first group studied in a web-based learning environment, and the other group studied in a learning environment composed of printed materials. Then, both groups took an exam. The exam results showed that diverger students received high scores in both learning environments and assimilator students received low scores in both environments. These results indicate that web-based learning environments affect the success of learners having different learning styles.

Sugahara and Boland (2001) conducted a study on the impact of cultural factors on students’ learning style preferences on implementation of the International Education Standards (IES). Recently, the International Federation of Accountants has issued the International Education Standards in order to implement successful convergence of accounting education. The findings of the study indicated that cultural differences across the two nations studied had a significant impact on accounting students’ learning style preferences. It was also found from the analyses that differences in students’ learning styles are significantly associated with their degree of individualism and uncertainty avoidance. The study recommends that accounting instructors should be very sensitive to cultural differences and adjust their teaching methods in order to achieve the best mix of acceptable learning outcomes.

Shih and Gamon (2002) conducted a study on relationships among learning strategies, patterns, styles and achievement in web-based courses. This study analyzed the relationships among student achievement, learning strategies, learning patterns, learning styles, and student characteristics. The students used most of the learning strategies to find important ideas from lectures and to memorize key words of important concepts. They seemed to be more
interested in checking their grades than in communicating with the class and instructors via e-mail, discussion forum, or chat room. Learning strategy was the only significant factor that explained about one-fourth of student achievement measured by class grade.

Mayer and Massa (2003) studied three facets of visual and verbal learners: cognitive ability, cognitive style and learning preference. The authors examined the hypothesis that some people are verbal learners and some people are visual learners. Results have implications for how to conceptualize and measure individual differences in the visualizer-verbalizer dimension and cognitive style in general.

Kvan and Jia (2004) explored learning style of architectural students in China and correlated their learning style with design studio performance. A statistically significant correlation was found between learning styles and academic performance, with convergers achieving significantly lower marks in one studio while assimilators succeeded in the other. These results suggested that architectural studio programmes can disadvantage students with particular learning styles.

Garland and Martin (2005) while studying the learning styles of 168 students in traditional face-to-face and online courses through multimedia found that there was a difference in the learning styles of the online student using multimedia and the student in the face-to-face course. They were of the view that by examining the leaning style of the online student using multimedia and the learner engagement by a student’s learning style, an instructor can include the necessary components in the multimedia design that facilitate student learning. They recommended that when designing multimedia, the learning style of all students must be considered.

Malathi and Malini (2006) conducted a study to find out the relationship of learning style with achievement of students of classes XI and XII. The sample consisted of 160 students. The study found that the learning style of higher secondary students was good. There was no significant difference in the learning style of higher secondary students in terms of their class and types of school. There was significant difference in the learning style between boys and girls studying in higher secondary schools and the correlation is higher between learning style and the achievement which indicates that higher the achievement scores the better the learning style among higher secondary students.
Kim, Seo, Kim and Lee (2007) gave suggestions for effective teaching methods through analysis of the learning and thinking styles of gifted information technology students. According to the results, gifted information technology students not only need to provide an environment where these students can take the initiative and actively participate in learning, but also provide competitive elements. Teachers also need to support participatory learning and reinforce collaborative learning by creating an environment where gifted students can interact through group activities.

Sun, Lin and Yu (2008) conducted a study on learning effect among different learning styles in a web-based lab of science for elementary school students. The results of this experimental teaching method demonstrated that: (a) students in the experimental group using the online virtual lab achieved better grades than those in the control group under traditional class instruction. (b) in the experimental group, achievement of students having different learning styles were not significantly different from each other, leading us to conclude that the web-based virtual learning environment is suitable for various learning styles’. Students with the “accommodator” learning style made the most significant achievements in this study, the scores obtained by the experimental group being remarkably better than those in the control group.

Rathod (2009) conducted a study on evolving information communication technology enabled strategies for teaching science catering to the learning styles of students. The objectives were to identify the learning styles of students and design information communication technology enabled strategies for teaching science on the basis of these learning styles. The resultant attitudinal change was also studied. Statistical treatment showed that there is significant positive difference in achievement scores of experimental group and control group as also in the attitude towards the science subject.

Li, Chen, Yang and Liu (2010) an exploratory study of the relationship between age and learning styles among students in different nursing programs in Taiwan. The purpose of this study was to identify the relationship between learning styles and age among nursing students in a two-year, a five-year Associate Degree of Nursing program, and a two-year Bachelor of Science in Nursing (BSN) program in Taiwan. The Chinese version of the Myers–Briggs Type Indicator form M was used to measure individual preferences in four dichotomous dimensions of Jungian theory: extraversion/introversion, sensing/intuition,
thinking/feeling and judging/perceiving. The analysis of the data revealed that the most common learning styles were introversion, sensing, thinking, and judging and introversion, sensing, feeling and judging. The findings indicated that the sensing and judging comprised 43.0% of the participating nursing students. Sensing and judging are highly preferred in the field of nursing. However, the ages of nursing students were not significantly related to their learning styles. The findings suggested that the participating nursing students were homogeneous.

Udeani and Adeyemo (2011) conducted a study on the relationship among teachers’ problem solving abilities, student’s learning styles and students’ achievement in Biology. Outcomes of the findings from the study include: (i) the relationship between teachers’ problem solving abilities and students academic achievement in Biology is positive and significant. (ii) the relationship between students’ learning styles and their academic achievement in Biology is positive and significant. (iii) the effect of teachers’ problem solving abilities, students, learning styles on students’ academic performance in Biology are positive and significant. Based on these, it was concluded that teachers’ problem solving abilities and students’ learning styles have significant effects on the student’s achievement in Biology.

Sadeghi (2012) conducted a study on learning styles, personality types and reading comprehension performance. The study showed that there is a relationship between personality types of the learners, the way they establish their learning styles and their success in language learning. On the other hand, both theoretical and empirical studies showed the relationship and the effect of personality on reading comprehension.

1.5.4 REVIEW OF RESEARCHES

The variable of computer assisted instruction has been studied by many researchers which appear to have direct or indirect bearing on the present investigation. It is crucial to review existing literature and studies carried out in the field of computer assisted instruction. The findings were supported by the studies of Kulik, Kulik and Cohen (1980), Hasselbring (1984), Mevarech and Rich (1985), Makros and Tinker (1987), Ganguli (1990), Singh, Ahluwalia and Verma (1991), George (1992), Agarwal (1995), Reeves (1998), Kadhiravan (1999), Meera (2000), Jenks and Springer (2001), Boling, Martin and Martin (2002), Fridman, Dasso and Basson (2003), Tabassum (2004), Basturk (2005), Beth, Gerald and
Alfred (2006), Kochhar (2007), Ozmen (2008), Kanmani and Radha (2009), Barot (2010), Mustafa, Ashlan and Turgay (2011) showed that there exists significant difference on the achievement of the students taught through computer assisted instruction and conventional method of teaching. The findings were contradicted by the studies of Fox (1986), Christmann (1997), Beechler and Williams (2012) showed that there exists no significant difference on the achievement of the students taught through computer assisted instruction and conventional method of teaching.

The variable of problem solving ability has been studied by many researchers which appear to have direct or indirect bearing on the present investigation. The findings were supported by the studies of Dutt (1989), Gill (1990) found that high intelligent and introvert students, irrespective of the strategies of training, scored higher on problem solving ability test and originality in solving math’s problems than low-intelligent students. Kumari (1991) revealed that overall problem solving ability and the success on different types of problems was significantly and positively related to each cognitive ability. Charan (1992) found that girls were superior to boys in problem solving ability. Patwardhan (1994) found that women coming from rural and urban areas fell apart on concept formation, reasoning, decision making and problem solving, but were not different in creative thinking. Poris (1997) and Foster (2000) investigated that sixth-grade students who work to solve a computerized puzzle game and taught an explicit problem-solving strategy demonstrated a significantly greater improvement in problem solving skills than who receive traditional teacher presented mathematics instruction. Chang (1998) found that no difference was found in the strategies used by high and low hope students for coping with stressful interpersonal situations. Skinner (2001) found that no significant difference was observed in problem-solving improvement, in the laboratory-based instruction group versus the computer assisted instruction group for students varying in level of logical reasoning ability. Salami and Aremu (2002) indicated that problem solving ability was significantly predictive of study behavior. Altun (2003) concluded that education should help students to reach the desired levels of problem solving skills by allowing them to acquire abilities such as self awareness and being inquisitive. Fuchs, Fuchs, Prentice, Hamlett, Finelli and Courey (2004) found that students receiving schema-based instruction improved more than the contrast group on problem-solving measures. Chance, Matthew and Randall (2005) found that students in the studio sections performed the same or slightly worse on conceptual learning and problem solving ability.
Susai (2006) concluded that problem solving plays a significant role in education process, those who are less competent in problem solving may be doing more memorizing more than learning. Sharma (2007) concluded that problem solving ability, scientific attitude as determinant of academic achievement are significantly correlated. Fang, Lin, Yang, Lee, Tsai and Tsai (2008) found that students' critical thinking and problem-solving abilities has been promoted after performing web-based critical thinking instruction. Pimta, Tayruakham and Nuangchalerm (2009) found that direct factors influencing mathematic problem-solving ability were attitude towards mathematics, self-esteem and teachers' teaching behavior and indirect factors influencing mathematic problem-solving ability were motivation and self-efficacy. Kuo, Maker, Su and Hu (2010) found that most students performed well on all five kinds of problem solving types. Mohd and Mahmood (2011) found that there is no significant relationship between gender towards problem solving and mathematics achievements. Jeotee (2012) concluded that academic achievement in university students in Thailand is not a good predictor of high levels of reasoning and problem solving ability.

The variable of learning styles has been studied by many researchers which appear to have direct or indirect bearing on the present investigation. The findings were supported by the studies of Soliman and Torrance (1986) observed that Japanese students preferred an intuitive approach and the American students favoured an integrated approach to problem solving. Verma and Kumari (1988) found that female students showed relatively more liking for environment oriented learning style in comparison to male student. Felder and Silverman (1988) felt that the individual's learning style plays an important role in acquisition, retention and retrieval of information. Verma and Tiku (1990) found that there is no significant difference was found between high and low intelligent students on independent, dependent, participant, collaborative and competitive learning styles. McKee (1997) each learner has a different learning style and responds to different stimuli. Reynolds and Beeman (1999) revealed that auditory is the least preferred sensory mode for information processing identified in this study. Rourke and Lysynchuk (2000) results indicated that web-based learning environments affect the success of learners having different learning styles. Sugahara and Boland (2001) found that indicated that cultural differences across the two nations studied had a significant impact on accounting students’ learning style preferences. Shih and Gamon (2002) found that learning strategy was the only significant factor that explained about one-fourth of student achievement measured by class grade. Mayer and
Massa (2003) examined the hypothesis that some people are verbal learners and some people are visual learners. Kvan and Jia (2004) found that significant correlation was found between learning styles and academic performance with convergers achieving significantly lower marks in one studio while assimilators succeeded in the other. Garland and Martin (2005) found that there was a difference in the learning styles of the online student using multimedia and the student in the face-to-face course. Malathi and Malini (2006) found that significant difference in the learning style between boys and girls and higher the achievement scores the better the learning style among higher secondary students. Kim, Seo, Kim and Lee (2007) gifted information technology students provide an environment where these students can take the initiative and actively participate in learning. Sun, Lin and Yu (2008) found that achievement of students having different learning styles were not significantly different from each other. Rathod (2009) identified learning styles and showed that there is significant positive difference in achievement scores of experimental group and control group. Li, Chen, Yang and Liu (2010) revealed that the most common learning style were introversion, sensing, thinking and judging and introversion, sensing, feeling and judging. Udeani and Adeyemo(2011) found that the relationship between students’ learning styles and their academic achievement in Biology is positive and significant. Sadeghi (2012) found that there is a relationship between personality types of the learners, the way they establish their learning styles and their success in language learning.

1.6 NEED AND SIGNIFICANCE OF THE STUDY

Investigator’s interest in this topic aroused because of the fact that the subject like Accountancy is not enjoying the position which it deserves. It is also not very much popular among the students. It has also been observed that the subject is considered as one of the social sciences and not as an independent discipline. But one cannot deny important values connected with this subject. There is general dissatisfaction with the result of commerce institutions. The students fail to grasp the spirit of the subject, the basic concepts and fundamental principles which are essential for clarity and understanding of the subject. With the result, the student takes it as a difficult, uninteresting, dull and dry subject. Student enter into high secondary comes with poor background of accounting, business concepts. Practice and repetition are considered key factors for student success in both accounting courses. The focus of accounting course is on the development of tools and methodologies, which students are expected to use in solving a variety of problems.
Collins, Deck & McCrickard (2008), “Many students find this very challenging because the ability to apply methodologies requires a deeper level of understanding than simply the ability to repeat lecture and text material. This often requires different study habits than those students may have previously used. To maximize their learning, students are encouraged to read text material before coming to class and to actively work on the concepts and principles covered in class by completing problems and testing themselves on the main topics being discussed in class”.

Collins, Deck & McCrickard (2008), “The need for students to be actively engaged in the learning process can create a pedagogical dilemma. Instructors recognize that completing chapter readings and homework assignments significantly increases the student’s ability to retain what is being taught, recognize alternative situations to which the concepts can be applied, and see the connection between topics throughout the course. Yet many students may not understand the amount of effort required to learn the subject matter at this cognitive level and may not have the time management skills needed to achieve the disciplined study required by more rigorous courses. To address this dilemma and to insure that students are actively engaged in the learning process, instructors have typically given written homework assignments and/or frequent quizzes. Such methods are not necessarily optimal, for either instructors or students, because developing, distributing, and grading assignments and quizzes is often very time intensive, particularly for large classes. This implies an information lag between the learning process and an instructor’s knowledge of what students are learning”.

So to overcome problems and to accomplish objectives, there is a need of an efficient and flexible device that can store a massive amount of organized information and use a selected portion to meet the needs of individual learner. The computer is such a device, which can cater to needs of individual learner by storing vast amount of information.

As the modern society is becoming more and more dependent on Information and Communication Technology (ICT), there is a need to make computers an essential classroom tool for the retrieval, analysis, presentation, communication and transmission of information in ways that help in applying scientific knowledge, developing scientific attitude, facilitate learning of different fields, and allow students to become more active participant in teaching
learning process. Collins, Deck & McCrickard (2008), “One option for motivating students and reducing this information lag is to incorporate computer assisted instruction as a pedagogical tool. For the instructor, an appropriate computer assisted instruction tool can reduce the time needed to develop, distribute, and grade assignments and quizzes; with the added benefit of providing more immediate feedback – to both instructors and students of the learning process. This can enable the instructor to reinforce those topics not well understood by students before moving on to the next learning objective. For students, the active learning and immediate feedback is promoted by computer assisted instruction”.

In computer assisted instruction, the students participate in the computer system on a direct basis, and the instructional materials are stored in computer system. In the classroom, computer assisted instruction offer more flexibility in presentation, and better management of instructional techniques. Various modes of computer assisted instruction i.e. tutorial, dialogue, simulation, drill and problem solving engage students in meaningful interactive dialogue, employ graphics, sound and simulations in learning facts and problem solving ability promote concept learning and clarity.

Thus the study was being done as the investigator feels that schools should develop a vision of how technology can improve teaching-learning process and make the pupils more informative. The investigator tried to develop computer assisted instructions package for teaching of Commerce at secondary level. Investigator also taken into account the effects of these methods on the students of different problem solving abilities and learning styles. As technology with its potential for presenting information in a wide variety of formats makes teaching tailored to wide variety of learning styles. By integrating technology, learners can be taken through different learning styles so that they can be benefited by learning through preferred styles and at the same time learn to adjust and function in styles that make them more balanced learners.

1.7 STATEMENT OF THE PROBLEM

The title of present research problem is stated as follows:-

EFFECT OF COMPUTER, ASSISTED INSTRUCTION ON ACHIEVEMENT IN ACCOUNTANCY IN RELATION TO PROBLEM SOLVING ABILITY AND LEARNING STYLES
1.8 OPERATIONAL DEFINITION OF THE VARIABLES

- **Computer Assisted Instruction:** It is in many respects similar to programmed instruction. The learner answers questions and calls up the next learning sequence by using computer terminal. Computer assisted instruction moves at the students’ pace and usually does not move ahead until they have mastered the content or skill.

- **Conventional Method of Instruction:** The conventional/traditional educational system focuses entirely on intellectual and ignores experiential learning, teaches students how to succeed on tests or succeed in examination and not much more, has an authoritarian nature, and leads students to only extrinsically value education and not intrinsically value learning.

- **Achievement:** Achievement means performance in a subject or in a test. The achievement test is an investigator made test. It involves the set of questions from different lessons chosen for study. This helps to measure high and low achievement of students under study.

- **Problem Solving Ability:** The problem solving is a process of overcoming difficulties that appear to interfere with the attainment of a goal. It is an ability to choose among various responses in order to accomplish a task successfully.

- **Learning Styles:** Learning styles could be used to predict what kind of instructional strategies or methods would be most effective for a given individual and learning task. In the present study four types of learning styles were taken into consideration viz. Convergent, Divergent, Assimilating and Accommodating.

1.9 DELIMITATIONS

The present study was delimited with respect to the following:

(i) The present study was confined to 10+2 students of senior secondary schools of Amritsar city affiliated to Central Board of Secondary Education, New Delhi only.

(ii) 20 lessons based on computer assisted instruction and conventional method of instruction was developed in Accountancy.

(iii) The topics covered from the two units of Accountancy were: (i) Company’s accounts—Accounting for share capital (ii) Accounting for debentures.

(iv) The experimental treatment was confined to about 40 working days of academic session.
The study was confined to two classifying variables i.e. problem solving ability and learning styles.

1.10 OBJECTIVES
The present study was designed to attain the following objectives:

1. To develop computer assisted instructional package for selected units of Accountancy.
2. To develop and standardized criterion referenced test for selected units of Accountancy.
3. To develop and standardized achievement test for selected units of Accountancy.
4. To compare the achievement of groups in Accountancy taught through computer assisted instructions and conventional method of instructions.
5. To compare the achievement of high and low group of students on problem solving ability.
6. To compare the achievement of different groups of students on different learning styles.
7. To examine the interaction effect of instructional strategies and problem solving ability on achievement.
8. To study the interaction effect of instructional strategies and different learning styles on achievement.
9. To find out the interaction effect of problem solving ability and learning styles on achievement.
10. To examine the interaction effect of instructional strategies, problem solving ability and different learning styles on achievement.

1.11 HYPOTHESES
The study was designed to attain the following hypotheses:

H10: The performance on Accountancy of computer assisted instruction group is significantly higher than that of conventional group.

H20: The performance of high problem solving ability group is significantly higher than that of low problem solving ability group of students in Accountancy.
H3O: The performance of different learning style groups is significantly different from one another in Accountancy.

H4O: There exists no significant interaction effect of instructional strategies and problem solving ability on achievement.

H5O: There exists no significant interaction effect of instructional strategies and different learning styles on achievement.

H6O: There exists no significant interaction effect of problem solving ability and different learning styles on achievement.

H7O: There exists no significant interaction effect among instructional strategies, problem solving ability and different learning styles on achievement.

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