CHAPTER-II

REVIEW OF THE LITERATURE

For any worthwhile study in any field of knowledge the research worker needs an adequate familiarity with the problem selected & its many resources because only then an effective search for specialized knowledge is possible.

With a view to seek some guidelines from the previous researches which could be helpful in formulating the investigation, the results of some of the related studies are discussed below.

The search for reference material was very time-consuming but very fruitful phase of the research Programme. Survey of related literature, besides forming one of the early chapters in research report for orienting the readers, proved very helpful in providing ideas, theories, explanations or hypothesis valuable in formulating the problem to the investigator. Survey of related studies also contributed to the general scholarship of the investigator. Keeping the objective of the present study in view, the investigator surveyed the related literature & the same is being presented in this chapter.
2.1 RELATED STUDY IN THE AREA OF COMPUTER ASSISTED INSTRUCTION (CAI)

Goodman (1964) in his study based on the comparison of the performance of a group of airline agents instructed in their jobs by CAI, to a group taught through conventional method found that CAI group did five percent better on criterion measures and needed only half the training time.

Grubb and Selfriedge (1964) in their study showed that there was much more improvement when taught by lecture discussion method. The first half of the beginning statistics course was taught to an experimental group by CAI and the control group by lecture-discussion method. A mean of 5.8 hours were spent on the CAI group on instruction and review, compared to 54.3 hours spent on the control group in class, home work and review. Mean scores on the mid term test were 94.3 percent for the CAI group and 54.04 percent for the control group.

Blauge (1968) suggested that a computer-based system should be used to research into, and hopefully to improve the quality of learning through a greater individualization of instruction.

Sleeman and Hartley (1968) emphasized that modern electronic Computer can make a powerful base for classroom instruction.

Hansen, Dick and Lippert (1968) on three groups of college physics students compared the groups which received the bulk of instructions by CAI, partly by CAI in class and classroom only. The result showed that the group which received the bulk of instructions by CAI scored significantly
higher on mid term and final test, while other groups showed no significant differences.

Atkinson et al (1969) on the use of CAI at the level of first grade students showed that nine out of ten comparisons on standardized post test significantly favoured the experimental group.

Adams, (1969); Homeyer (1970) reported that CAI students performed significantly better than others in tests of reading and written German while there was no significant difference in listening, and speaking German.

Schurdak (1965) Bitzer and Boudreaux (1969); Homeyer, (1970); Cartwright and Robin (1972) found that there is a significant saving in time using CAI as compared to conventional teaching methods.

Kulik, Kulik and Cohen (1979) A meta-analysis of fifty four studies of computer based instruction versus Traditional Teaching in post secondary classroom revealed higher student examination scores in favour of CAI approaches and proved statistically significant.

Kulik, Drown and Robert (1983) reported a small effect size favouring the use of computer materials over traditional methods.

Willet, Yamnashita and Anderson (1983), in their study found again on achievement scores measured as a result of the use of CAI.

Olstad and Haurey (1984) in their unpublished study reported significant learning gains for computerized learning in college biology. Also another study by them claimed positive feedback by students using computer based instructions. Study on the effect of CAI upon reading achievement with selected fourth grade children concluded that from the educational point of
view, the experimental group to whom treatment variable CAI was given, made a significant aim in reading achievement.

**Brag and Virginia (1985)** reported that matching the software to the objectives being taught in the traditional reading curriculum appears to be an effective educational practice.

**Carnes (1985)**, a study by him based on micro computer tutorial physics Programme with advance organizers using groups of various sizes, indicated that students working in groups of three or four on Computer tutorials have significantly better rate of learning than students working alone, though no significant difference in achievement or retention was observed.

**Janicene (1985)** in his study reported that either teachers or programmed microcomputers may be effective for spelling instructions.

**Lalitha and Shailija (1986)** in their study on Computer-Assisted instruction in relation to Traditional teaching concluded that CAI in relation to Traditional Teaching was more effective with respect to imparting knowledge, but not so much as regards to developing understanding.

**Gao, Y.Q. (1992)** in his study ‘Factors affecting use of computer assisted instruction (CAI) by selected Chinese university educators’ indicated the most educators had positive attitudes toward CAI and more than half of them used CAI in their teaching. The study also found statistically significant differences between use of CAI and other traditional method.

**Chi (1993)** in his study ‘Computer Knowledge, interests, attitudes, and uses among faculty in teachers universities in China’ found Chinese teachers’
interests in attitudes toward computers are much like those of American teachers. The majority of teachers show very positive computer attitudes, and there is potential to increase computer use among them.

Aworuwa (1994) in his study ‘A qualitative study of faculty’s perceptions of computer use for teaching and the impact on teaching and learning’ showed that Professors use computers for different teaching purposes including enhancing their own efficiency and effectiveness in the classroom, providing computer experience for their students and extending their office hours. Computer use among the professors studied was idiosyncratic, influenced by personal and institutional factors.

Stephans (1995) in his study reported that the group of students getting CAI scored higher on unit tests throughout the semester and this difference in scores became significant as the semester progressed.

Cortez (1996) in his study reported that CAI students did significantly better than traditional classroom instruction (TCI) in academic achievement and females did significantly better than males on achievement in mathematics language, reading and spellings.

Batchelder (1997) conducted a study on the efficacy of using Computer-Assisted Instruction (CAI) with male members participating in the prison education Programme at the South Mississippi Correctional Institutions (SMCI) through an experimental study and reported that there was no statistically significant difference between the scores of male members in the experimental and the control group.
Chibbaro (1997) found no significant difference between the two strategies of instruction (Computer-Assisted Instruction and traditional classroom Instruction) at the cognitive level.

According to Lebediker (1997) “there were distinct differences in computer usage, training and attitude variables by faculty discipline, gender and age”.

Anandan (1998) in his study on Effectiveness of Computer-Assisted Instruction in Economics showed that CAI had produced significant positive effect on the achievement in Indian Economics when compared with traditional method; Significantly favorable achievement was noticed in components of knowledge and comprehension but not in application, there was significant difference favoring CAI, even after allowing for the differences in intelligence and socio-economic status of the students.

Kuchler (1998) in his study on CAI found that there was no significant difference in mean CAI-effectiveness between published studies and dissertations and no significant trend in CAI effectiveness over conventional teaching.

Lee (1998) found that there were significant relationships between age, gender, and education level, and position/rank, years in the current position, college field and their perceived skill levels using software application programs.

McCarthy (1998) observed that there was a significant relationship between he attitude towards computers and the level of involvement with computers.

Brophy (1999), found CAI as an effective tool for the science classroom.

Burke (1999) in his study based on CAI using interactive software versus
traditional instruction showed that there was no statistically significant
difference between the methods of learning in a college macro-economics
course.

**Carter (1999)** in his study showed that CAI is an effective tool for
instruction in vocational education. The results suggested that the CAI
Training Programme in vocational education was superior to the Traditional
Programme.

**Chan (1999)** in his study showed that there was a positive relation between
self-efficacy and achievement in CAI.

**Joshi, S.K. (1999)** studied that the effectiveness of CAI on achievement in
computer fundamentals and applications of polytechnic students and
concluded that achievements of the students when taught through CAI was
not significantly different from those taught through lecture method.

A number of studies, as described above, have been conducted on
comparison of CAI to conventional teaching in areas other than
mathematics, however, it was observed that there have also been several
studies on the effect of CAI on acquisition of concepts in mathematics and
mathematics achievement, description of which follows.

**Pamela (1983)** in her study on CAI for remedial teaching in mathematics at
secondary level found that CAI produced a significantly higher achievement
as compared to conventional classroom instruction.

**Marty (1983)** in a study based on computer games found a significant
change in class means on mathematical achievement favoring the use of
computer games.
Grady (1986) in his study based on Computer-based instruction showed that for specially selected topics for which quality software was available it had a significant impact on students’ achievement in mathematics when it was used as an effective support for teachers.

Lawson, 1988, Singh, Ahluwalia and Verma, 1991; Utomporm, 1991, Chen (1994) in several studies on Computer-based instruction, computer-aided instructions and Computer-Assisted Instruction showed significant differences on achievement in mathematics between the students who use computer as compared to the students who were taught through conventional methods. The students who used the computer scored significantly higher on the post-test than those who did not use the computer.

Uompson (1991) concluded that CAI can provide a beneficial method of studying mathematics at the university level.

Cracolice, Mark S. (1994) conducted a study on 504 students, enrolled in college general chemistry course to investigate effect of computer assisted instruction and semi-programmed instruction as a replacement for traditional/recitation/discussion in general chemistry. He also investigated student performance and problem solving and student attitude. It was found that for simple problems, all methods of teaching recitation/discussion section were equally effective, but for more difficult problems the semi-programmed instruction was most effective. It was also found that the student had more positive attitude when using the semi programmed instruction than when attending traditional recitation/discussion section.

increased performance in reading and mathematics when compared to TMI (Teacher Managed Instruction) or the control situation. Age and sex has no effects on achievement.

Wilkins (1995), Wilson (1995) in their studies related to the use of graphing calculations/TI-81 graphic calculates as a learning tool on college students showed that the use of graphing calculators in mathematics instruction is helpful and further found that use of the calculator allows the exploration and discovery of mathematical concepts and the learning of advanced concepts earlier in the curriculum. The results showed that students in the experimental group (who were allowed to use graphing calculators) scored statistically and significantly higher than students in the control group in the area of solving word problems which involved factoring.

Chadwick (1997) in his meta Analysis of CAI studies found that CAI is more effective than conventional instruction for secondary mathematics.

Rinaldi (1997) in his study based on the effects of Computer-Assisted Instruction (CAI) and teacher directed instruction on achievement in mathematics showed that there were no statistically significant differences in academic achievement of eighth grade mathematics students who receive CAI and who receive direct instruction from teacher.

Tsuruta, Joyce Yoshiye (2000) in his study investigated the effects of CAI in Mathematics on the academic achievement of Middle school students and showed that students taught through CAI gained significantly in grades.
Singh, R.P. (2001) in his study revealed that CAI proved significantly better over total Television Teaching and Traditional Teaching on achievement in Mathematics.

Narang, V.P. (2004) in his study revealed that students taught through computer software teaching strategy attain more mathematical concepts than the students taught through traditional teaching strategy.

So in conclusion, several recent studies namely: Olstad and Haureay (1984); Kronk, Andrews and Peter (1985); Grady (1986); Lalitha and Shalija (1986); Tawson (1988); Singh, Ahluwalia and Verma (1991); Utomporn (1991); Chen (1994); Cortez (1996); Chadwick (1997); Anandan (1998); Brophy (1999); Carter (1999); Chan (1999) and Campbell (2000) showed CAI to be significantly better as compared to Traditional Teaching strategy, whereas Batchelder (1997); Chibolro (1997); Rinaldi (1997); kutchler (1998) and Burke (1999) found CAI equivalent or vary slightly to the Traditional Teaching.

2.2 REVIEW OF STUDIES IN THE AREA OF VIDEO ASSISTED INSTRUCTION (VAI)

Cassirer, 1962; Witlich & Schuller, 1962; Carpenter 1965 (In Knirk and Childs, 1968); Kumar & Chandiram, 1967) in their study revealed that it is feasible to use television for the purpose of instruction.

Carpenter (1965) In Knirk & Childs (1968) emphasized that T.V. and films in combination with printed material can be used for programmed instruction.
Kumar (1967) undertook T.V. lessons which had successfully opened a number of avenues for the students for new creative activities by encouraging model thinking, experimenting with home made apparatus and becoming keen observers. House examinations revealed that the approach improved performance by television lessons and that enthusiasm for science increased.

The Satellite Instructional Television Experiments (SITE), an innovation of international importance, was a year long communication project which commenced on August 01, 1975 and ended on July 31, 1976. The India/United States of America (USA) project envisaged the use of a communication satellite for direct broadcast of instructional television programmes to rural community receivers. The programmes telecast were mainly on agriculture, adult education, family planning, national integration, teacher training, and improvement of occupational skills, health and hygiene. Under SITE, educational television programmes were transmitted to two thousand and four hundred villages in six states of India namely Andhra Pradesh, Bihar, Karnataka, Madhy Pradesh, Orissa and Rajasthan.

Mohanty (1976) in his study on ETV (SITE) programmes, found that there were deviations of ETV programmes from scheduled dates as a result of which there was difficulty in organizing pre and post telecast discussion in the classroom. Language difficulty, inadequate pauses and quick speed were felt barriers in understanding some programmes.

Rahman (1977), a pioneer study on ETV programmes, conducted by Ministry of Education, Government of India, in collaboration with the Educational Technology Cell, Orissa and Doordarshan Kendra, Cuttak,
established the success of educational television programmes taken up for investigations and more importantly, the acceptance of television as an educational force in our rural primary schools.

**Ames, T.R.H. (1981)** found that video-taped instructional modules as a useful training instrument for the personnel working with moderately, severely & profoundly retarded persons.

**Levelt (1981); Kanade (1982); Seth (1983)** revealed that there is a significant impact of ETV programmes in the process of information gain.

**Varadi (1983);** in his study on motion pictures in teaching geography in high school concluded that illustration by films, if used properly, can favorably influence the efficiency of teaching. Therefore, at a certain point of the subject matter, the teacher should use one of the most useful teaching aids-the motion pictures.

Central Institute of Educational Technology (CIET) (1984) conducted a study in Sambalpur district of Orissa to know about the functioning of ETV programmes, which led to the conclusion that the achievement of TV school students were higher than that of non TV school students to the extent of 3:2 only; In another independent study to assess the needs of the primary school children for ETV support, it was reported that teachers and parents stressed the necessity of the telecast of syllabus based programme for children and TV could be profitably used by lending support to the learning of environmental studies, arithmetic, and languages in primary school. It was also felt that it would be more effective if the syllabus based programmes and the general programmes were telecast in the ratio of 3:1.
Mohanty & Behera (1984) in their study on TV Teacher Education described that the teacher education programmes were not effective due to technical discrepancies.

The Countrywide Classroom (CWRR) project was sponsored by University Grants Commission (UGC) and the telecast of its ETV Programme was started on 15th August, 1984. The aim of these programmes was to improve the quality of higher education. The objectives of all these programmes were to upgrade, update and enrich knowledge, understanding and skill, to generate interest, to widen the intellectual horizon and to stimulate curiosity of students not only at the undergraduate stage but also at the postgraduate level.

Mohanty & Naik (1986) in their evaluative study on ETV programmes telecasted under Indian National Satellite (INSAT) project found that uniformity was maintained on the weightage only between social studies and science, but, uniformity was lacking in ETV programmes relate to mathematics, mythology, folk culture, art etc. Majority of the ETV programmes were thorough featured which proved to be quiet, clear and lively.

Mohanty and Maharana (1986) in their study on ETV programmes for the children in the age group of 9 to 11 years, under INSAT, found majority opinion confirming that no earlier information about ETV programmes was available to teachers in schools. In most of the ETV programmes, visuals were found to be clear and lively, the voice was distinct and speed was normal but their reception particularly verbal synchronization was lacking.
Joshi (1987) in his study of UGC (CWCR) programmes found that special efforts to reach rural audiences were lacking.

Sodhi and Dutt (1987) carried out an experimental study on the effectiveness of ETV programmes in terms of academic achievement and attitude of the students in relation to Socio-Economic Status (SES) and intelligence and saw the ETV programmes found to be more effective with a majority of students in terms of achievement than traditional teaching.

Surikanthi and Meenakshi (1989) revealed that sixty nine percent of parents of children who viewed ETV programmes felt that most of the programmes brought about appreciable improvement in general knowledge of their children and sixty-one percent felt that the quiz Programme was very useful for the children. A Majority of the parents were satisfied with ETV programmes.

Anandan (1990) in his study on ‘How to make ETV programmes more interesting’ reported that- Students were found lacking in interest due to the fact that the CWCR programmes under study were not syllabi based. Audio-visual media were not used adequately in most of the programmes and the programme telecast time was not suitable for students. In some programmes, the language recorded and played was at high speed and also difficult to understand. The background music in some ETV programmes was good and in some other programmes, it was bad-that is the quality was not uniformly maintained.

Kumar (1990) in his study on analysis and appraisal of different aspects of CWCR- ETV programmes reported that The sample indicated an appreciable increase of indigenous programmes (during the period January,
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1990 to April, 1990. The language was not suitable to the primary target of viewers i.e. undergraduates. About thirty percent teaching material was in lecture format, which was in no way better than classroom teaching.

Mohanty & Saboo (1990) in their study showed that formats like dramatization, quiz and group discussion were not given due emphasis and interviews with experts, documentary films and lecture with demonstration were found more attractive.

Shastri (1990) in his study entitled ‘Where are the TV sets?’ was conducted through surveys during 1987-88 to find out how many colleges had procured TV sets and whether viewing arrangements were made or not.

The findings were as follows:

(1) In all ten colleges of the five universities of Gujarat, TV were installed and out of them, fifty percent of the colleges made proper-viewing arrangements.

(2) The reasons for not making viewing arrangements in the remaining fifty percent of colleges were clash of college time with transmission, no place of installation of TV sets and disturbances in reception etc;

(3) The information about the CWCR programmes were received by 41.18 percent of colleges through TV, 35.29 percent through newspapers and 23.53 percent through UGC programmes schedule.

Staltares (1991) in his study showed that the use of mathematics video tape in first year algebra has a highly positive response.
Venkataiah (1996) studied various reports on educational Television (ETV) programmes which showed that educational television is a potential medium for instruction, along with few limitations.

Bhattacharya (1996) in his study on the effectiveness of ETV programmes as against conventional teaching of certain engineering subjects showed no significant differences in either achievement of students’ learning, or in their attitude towards the two methods of teaching-learning used.

Singh, R.P. (2001) in his study revealed that Total TV Teaching and Traditional Teaching did not differ significantly on achievement in mathematics.

D. Idayavani, S. Shanti (2003) revealed in their studies that teaching video tape was not only effective and impressive but also motivating because it helped in building concepts by increasing the curiosity of the learner. It can be used effectively for imparting more information and facts to the students, according to their abilities. Scientists/educationists have employed it for more complicated teaching tasks viz. Computer-managed Instruction (CMI), Computer-Assisted Learning (CAL), Computer-Assisted Instruction (CAI), etc. Modern technology can go a long way in easing the pressures of classroom instruction.

In conclusion, it can be said that several studies on Video Assisted Instruction feasible to use video for the purpose of instruction (Cassirer, 1962; Wittich and Schuller, 1962; Carpenter, 1965 (In; Knirk and Childs, 1968); Kumar and Chandirm, (1967); Sodhi and Dutt, 1987; Behera, 1991; Goel and Jaiswal, 1991; etc) though it has a few limitations.
2.3 STUDIES RELATED TO SELF LEARNING MODULES (SLM)

Todd, P.G. (1972) in his study observed that the modularized instruction is better than the instructor’s traditional method at the college level.

Sahajahan, M.M. (1980) found the modular way of learning more effective for teaching science in case of some modules, while in case of other modules it was found as effective as the conventional method at high school level. Majority of students possessed a favorable attitude towards modular instruction.

DE Antelo, M. N.O. (1981) in his study reported that the individualized learning modules (ILM) improved the understanding, competencies and professional development of the supervisors.

Kaur, R (1981) conducted a study with the objective of prepare self instructional audio cassettes for developing the skills of probing, questioning, explaining and illustrating with example among students-teachers and found that experimental group made continuous progress component-wise and as a whole in all the four skills of student-teacher. The self instructional audio cassettes were effective for developing different teaching skills. Immediate, pinpointed and self feedback through audio cassettes was an effective way of improving the performance of student-teachers in the use of different teaching skills.

Mukhopadhyay, M. (1981) compared the effectiveness of microteaching & modular approaches in developing selected teaching competencies and found that there was no significant difference in the performance of the
groups trained through microteaching and modular approaches. Both the treatments were equally effective.

Mavi (1981) developed programmed learning units in physical Geography & saw that learning through programmes was easy, interesting & stimulating.

Nanavati, U.R. (1981) developed a multi media package on population education and found that learning package was more effective than the traditional method in teaching the pupils of IX.

Hopper, W.A.F. (1982) compared the three structured modular approaches of teaching, viz., self-learning, peer group learning and peer group learning with teacher intervention for teaching biology in standard XI and found that self-learning approach was more effective than the other two modular approaches.

Passi, B.K. and Pal, H.R. (1982) in their study found that the experimental group using self-instructional module obtained significantly higher mean scores on the criterion test than the control group. Students’ reactions towards SIM was also positive.

Sharma, JP (1982) compared the effectiveness of three modules for civics teaching with the traditional teaching method in terms of achievement of student teachers on criterion test, and found that the mean achievement scores of the Experimental group of student-teachers were significantly higher than that of control group.

Khan, A.R. (1983) reported significant learning occurred on the part of trainee due to the use of self-instructional training package and suggested
that self instructional package could be an effective strategy for training non-formal education facilitators.

**Khanna, K. (1983)** prepared modular reading material especially for girl dropouts living in Delhi slums and found that modular reading material was significant in improving the reading competency and cumulative performance.

**Krishanan, S.S. (1983)** developed a ‘Multi-media package for teaching a course on Audio-Visual Education’ for the instructor training Programme & studied the effectiveness of the multimedia package in terms of achievement of trainees & change in attitude of the instructor trainees towards the multi-media package. The Instructional strategy was prepared in modular form & it was found that the mean gain in the total scores of knowledge, comprehension and higher mental abilities for all the modules were found significant at 0.01 level.

**Kathuria, R.P. (1984)** experimented four approaches – teacher led, self instructional, peer-group and mass media approach of teaching population education to class IX & X on knowledge, attitudes & belief of the students. He observed that peer-group discussion approach and mass-media approach were equally successful and were found to be better than the self-instructional approach and teacher-led approach. With regard to urban and rural settings, it was found that self-learning and peer approaches were more suitable for rural settings and the mass media approach for urban settings.

**Prabhune, R.P. (1984)** found that self-instructional teaching device was significantly effective in developing learners’ scientific attitude and problem solving skills.
Rabindradas, B. (1984) reported that the self-instructional materials on health education for high school students succeeded in enhancing the learning capacities of the student and were found superior to the other modes of learning.

Menon, M.B. (1984) evolved multi-media strategy in educational technology and found it satisfactory.

Jayalakshmi, T.K. (1985) found that instructional modules had potentialities for learning educational psychology in an effective manner. The modules as a whole had provided good motivation for the study of subject at B.Ed. Level.

Mitra, J. (1989) prepared self-learning instructional material in the forms of modules and found it effective not only for the formal system but also for drop out children at this stage (elementary) in Biology.

Kim, I.L. and Sun, Y. (1989) studied the validation of self instructional food service inventory control system module and concluded that self instructional method appears to be an effective innovation as students’ responses to the attitude inventory showed that students in the self-instructional group had overall favourable attitude towards the module.

Yadav, M.S. (1989) developed twelve self-contained and self-instructional modules in research methodology for post-graduate and research students and found reaction of the users towards the modules positive.

Bhattacharya, S. (1990) prepared a module in Botany and General Biology for secondary and higher secondary levels and found it effective for developing the investigative competencies of teachers.
Panda, P.K. (1990) showed a positive effect of a package of certain curricular strategies on selected cognitive and non-cognitive characteristics of rural primary school students of Orissa which involved use of teaching skills, extra reference material and parental involvement.

Bhatnagar, A; Gupta N; Mohan, S. and Gulati, S. (1991) prepared a multimedia package of career guidance for training of teachers, counselors and parents and found it effective.

Pant, D. (1992) developed self-guidance modules for secondary and senior secondary school students. The modules were found to be effective in developing in the students the skills of learning, career development and self-esteem enhancement.

Pecoraro, A.G. (1992) developed a module on interpersonal skills for home economics teachers and evaluated it in two teaching modes and found the module was effective in both the modes for the cognitive and affective development of teachers.

Kaur, M (1992) developed three learning packages for the illiterate adults of Punjab & found it effective.

Singh (1993) investigated the relationship between group empowerment and self-directed learning in selected small groups and observed the enhancement of competencies of the self-directed learners, which helped the groups become better empowered.

Pant, P.K., (1994) in his study ‘Effect of guided Instruction through Self-Learning Module on the Achievement of Students in Book-keeping and
Accountancy revealed that students’ achievement increased significantly by making use of the guided instruction through self-learning modules.

**Narula, T.K. (1997)** studies the effectiveness of “Self-learning modules in applied physics on achievement in relation to gender and personality of polytechnic students of Haryana”,

**Kapoor, K.C. (1999)** found that modular approach and personalized system of instruction of teaching were quite effective and superior to conventional method of teaching in the teaching-learning process of English Grammar. However, there is no significant difference in the achievement scores of MA and PSI groups of students. Both the new approaches are equally effective and positive in nature.

**Kohli, V (1999)** studied the effectiveness of SLM on achievement in geography in relation to mastery learning strategy & non mastery learning strategy, intelligence and study habits on 200 students of X class in Chandigarh and found that students taught through SLM and mastery teaching strategy attained more than the students taught through non-mastery teaching strategy.

**Dubey, A. and Khuntia, S. (2000)** reported that the module on vocational Guidance of B.Ed. Students was found to be effective in terms of students reaction towards it and study habits of students have no effect on their achievement on criterion test and Habits.

**Sulaiman (2001)** studied ‘The effect of varied instructional text design strategies on the achievement of different educational objectives’, and
reported that there was significant difference in student achievement when SLM was used.

**Ahuja, P. (2002)** in her study, “Effect of SLM on achievement in environmental education in relation to altruism and emotional intelligence”, showed that students taught through SLM strategies gained more environmental education concepts than those taught through traditional teaching strategy.

**Saini, A. (2004)** in her study revealed that students using learning module with teacher intervention achieved and retained more concepts than students exposed to Self Learning Modular strategy and Conventional method. Cognitive style of students also accounted for difference in the achievement and retention of the students.

### 2.4 RELATED STUDIES ON COGNITIVE STYLE (CS)

**Coop, R.H. (1968)** determined the effect of cognitive style and teaching method on different aspects of subject matter and achievement; and reported no significant interaction between cognitive style and teaching method in regard to any of the dependent measure.

**Deguin, H.C.P. (1972)** tested the effects and inter-action of matching the cognitive style categories with the instructional modes of reading and listening on the basis of post-test achievement scores, it was concluded that on the basis of instructions used in this study valid and predictive diagnosis of cognitive style was not established.
Witkin, H.A. et al. (1977) found that cognitive style was not significantly related to overall school achievement; rather it was related to achievement in specialized areas.

Annis, L.F. (1979) studied the effect of cognitive style and learning passage organization on study technique effectiveness. Field-independent and Field-dependent college students were made to read only in book notes on a logically organized or scrambled 80 sentence article. It was found that Field independent students scored better than the Field-dependent students on completion items of high structural importance.

Bachman, M.E. (1979) studied the relationship between cognitive style and concept attainment strategy. He concluded that verbal ability relevance and task complexity are important mediators in the relationship between field-independent and concept attainment efficiency and success. The measure of concept attainment strategy was found to be unrelated to field-independent differences.

Shrock, S.A. (1979) studied the role of cognitive style in problem solving performance and conducted that field-independence contributed significantly to problem solving variance.

Letteri, C.A. (1980) indicates that the cognitive profile is a basic determinant of an individual; so level of academic achievement can accurately identify specific learning deficits significantly contributing to low academic achievement.

Van Duyne, S.C. (1980) explored the relationships among field-independence and field-dependence, achievement, withdrawal from the
conventional and school-related attitudes under mastery method of instruction. The study revealed that field independence-dependence attitude toward the subject matter and attitude toward a mastery method of instruction were all related to achievement.

**Chatterjee, R.G. and Paul, B. (1982) and Shade, B.J. (1984)** found significant relationship between cognitive style and academic achievement. Results indicated that field-independent students were found to be high achiever when compared to the field-dependent ones.

**Graffin, M.C. (1982)** conducted a study entitled ‘An investigation of the relationship between students’ cognitive style on the field-dependence-independence dimension and their writing process, and reported that field-independence subjects obtained higher holistic scores than did field-dependence subjects.

**Lamka, E. (1983)** studied the relationship between field dependent-independent and language arts achievement in high school students. Field-independent subjects were superior to field-dependent subjects in inferential and total comprehension analysis of word parts, total vocabulary and scanning.

**Cogley, C.E. (1984)** studied field-dependence and field-independence as a predict of inferencing and problem solving abilities in community college students and found cognitive style as a minimal predictor of both. Results of ANOVA indicated significant difference (P<0.05) between highly field-dependence and field-independence regarding problem solving but non-significant (P>0.05) regarding Inferencing ability among some students.
Mrosla, H.P. (1984) investigated that low achieving Mathematics students were more field-dependent than high achieving Mathematics students and in the high school for dropouts and that there would be a significant interaction on the achievement variable with respect to field-dependence to both schools.

Peterson, P.R. (1984) indicated that field-independent students perform better in Mathematics than field-dependent students while latter are better at learning material.

Randolph, C.F. (1984) investigated the relationship among cognitive style, achievement in Science, selected personality variables and the sex of students and found significant correlations among field-independence and Science achievement.

Walker, A.J. (1984) reported in his study that field-independence students performed at higher levels of initial learning, retention, and time on task behaviour irrespective of methodology. He suggested a significant main effect for cognitive style for the initial learning variables. For the retention variable, there was also a highly significant main effect for cognitive style but no main effect for methodology.

Atang, C.I. (1985) reported that individuals’ field-dependence/independence was not a significant factor in their performance in the pre-test and post-test.

Dugger, C.R. (1985) compared the effects of two contrasting instructional approaches representing the field-dependence/independence cognitive dimension on the mathematical problem-solving performance and found statistical differences in the mathematical problem solving post-test and gain
scores of the two treatment groups, receiving field-dependence and field-independence instruction, over the control group. The conclusions supported the assumption that the field-dependence-independence cognitive dimension applied to teaching improved the students’ performance in the mathematical problem solving.

Fritz, K.M. (1985) reported that neither locus of control nor field-independence/dependence was related to academic achievement in sample of gifted students.

Rossler Jacoby, V.J. (1985) investigated the role of field-independence using an analogy based problem solving method and found that field-independence subjects scored significantly higher on the problem solving task and that the field-independence subjects using an analogy scores significantly higher on the problem task than field-independence subjects who did not use an analogy. Results from the study indicated that the cognitive style of subjects might influence successful use of analogy-based problem solving strategies in the solution of new paradigm problems.

Nelson, P.A. (1986) studied the effects of field-independence-dependence cognitive style on achievement in telecourse and found no significant difference between the attitude of field-dependence and field-independence students enrolled in a telecourse. Students with a field-independence learning style scored higher grades than students with a field-dependence style. There was no association between field-independence/dependence and course completion.

Yore, L.D. (1986) investigated the effect of lesson structure and cognitive style on the Science achievement of elementary school children. His
findings stated that High structured lesson resulted in higher achievement than the low structured. And field-independent students achieved significantly higher Science score than field-dependent students.

**Dutt, S. (1987)** has revealed that (1) Intelligence of the problem solver significantly affected the problem solving ability irrespective of strategies of training. (2) A bright child trained in any of the two strategies scored higher marks on problem ability test than a less bright student. (3) Cognitive style of learner was also found to be significantly contributing to the variance of problem solving ability scores there by showing that cognitive style affected problem solving ability irrespective of training strategies. (4) The group having field-independence cognitive style scored higher mean than field-dependence group on problem solving ability test.

**Sood, K. (1988)** revealed in her study that (1) Intelligence levels acted as redundant factors so far as learning of concept in Hindi language was concerned. (2) There were no significant differences in achievement scores of field-dependence and field-independence students. (3) Cognitive style and intelligence did not interact significantly to produce differential achievement in Hindi language concepts. (4) Field-independence students retained more than field-dependence students.

**Stoeltje, Y.R. (1988)** investigated relationship between the field-dependent and field-independent dimension of cognitive style and reading performance. The result of this study supports the idea that cognitive style is an important factor in school learning. Specifically the field-dependent and field-independent dimension of cognitive style appears to be significantly related
to reading performance in the lower elementary grades. The cognitive style could become important diagnostic tool for the classroom teacher.

Arrington, H.J. (1989) studied the relationship between cognitive style and problem solving in eighth grade students. It was revealed that problem solving was positively correlated to cognitive style and concluded that field-independent subjects were more proficient problem solvers than field-dependent.

Gill, I.K. (1989) has revealed the following results (1) High Intelligence subjects score higher on originality than low intelligence subjects on originality than field-dependent group on creative problem solving skill test. (2) Levels of intelligence, personality types, cognitive style and training strategies when paired among themselves did not show any interaction in terms of performance in creative problem solving skills in Mathematics and cerebral dominance.

Devaki, L. and Ramasamy, K. (1990) attempted to study cognitive style as related to errors in second language learning and found that the higher the degree of field-independence, lower was the tendency to make global errors, over and under generalize and ambiguity recognition. The lower the level of field-independence greater was the proneness errors.

Rogers, R.H. (1990) found that subjects who were more field-independent tended to demonstrate more sophisticated programming strategies than field-dependent subjects.

Bal, Nimret (1992) has revealed that (1) the variables of intelligence had a significant effect on acquisition and retention of higher level writing skills in
English. (2) The variables of cognitive style of field-independence-dependence has a non-significant effect on acquisition; a significant effect on retention as measured by test totals and scores on supply type items but not when measured by scores on selection type items. (3) Intelligence and cognitive style had a non-significant interactional effects on acquisition and retention of higher level writing skills in English.

Behal, V. (1992) revealed (1) High ability students acquired mathematical concepts better than average and below average ability students irrespective of model of teaching. (2) Field-independence students attained more concepts than field-dependence students irrespective of model of teaching. (3) Cognitive style and level of intelligence were found to be interacting irrespective of models of teaching on achievement and attitudes both. (4) High ability field-independence students achieved significantly higher scores on mathematical concept test than average ability field-independence and below average ability field-independence students. (5) High ability and field-independence students also scored higher marks than high ability field-dependence, average ability field-dependence as well as low ability field-dependence.

Sandhu, K.J. (1992) studied the effectiveness of advance organizer model for acquisition of language concepts in relation to cognitive style and concluded both strategies of teaching equally effective so far as achievement for the acquisition of the concepts was concerned. The group having field-independent cognitive style scored higher mean than field-dependent group on achievement test. Cognitive style acted as redundant factor towards retention of scores.
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Gautam, G. (1992) investigated the effect of inquiry training model on achievement of adolescents studying Economics in relation to their cognitive style and found that inquiry training model of teaching was more effective than traditional model of teaching in terms of achievement in Economics and the interaction between teaching models and different levels of cognitive style was found to be significant.

Ganihar, N. (1993) in her study on a sample of 200 students of class IX found that there was significant relationship between cognitive style and academic achievement in Social Studies, Language, Mathematics, Science and English.

Krank, H.M. (1993) found statistically no significant predictive power of cognitive style on treatment condition. Pre-service teachers’ cognitive style did not significantly contribute to enhance critical thinking abilities. No significant differences were found for critical thinking performance between the three treatment conditions.

Sawhney, P. (1993) reported that Mastery Strategy was superior in teaching as well as retention of algebraic concepts. Above average and average ability students secured significantly higher score and retained more algebraic concepts than the students of below average group irrespective of teaching strategy. Field-dependent and field-independent students did not differ significantly on the achievement of algebraic concepts. The retention of algebraic concepts was not affected significantly by the cognitive style of the students of class IX.

Collins, J.N. (1994) tested training materials created to develop cognitive restructuring field-independent skills needed to categorize and order reality...
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through the use of concrete operations. The experimental groups (11-12 years) underwent ordinary exposure to the training with some attempt to develop meta-cognitive language in relation to the materials. Result demonstrated that field-independent is a factor in the application of formal operation and that this is due to increased skills in identifying significant factor in any task.

Kumari, S. (1994) observed significant positive correlation between the variable of cognitive style and the criterion variable of acquisition of geographical concepts. The variable of cognitive style was not found to be good predictor of the criterion variable.

Nanda, A. and Paul, G.C. (1994) examined the effect of cognitive style and creativity on academic achievement and found that field-independent cognitive style and high creative students had better academic achievement.

Kumar, D. (1995) observed that achievement of students was better when taught through the Keller’s Mastery Learning Strategy than the students trained through Bloom Mastery Learning Strategy. Field-dependent and field-independent students did not differ significantly on the achievement of economic concepts. The interaction between Mastery Learning Strategies and different levels of cognitive style was not found to be significant in learning of concepts in Economics.

Lu Chin, H. and Suen, H.K. (1995) examined the outcomes of multiple choice tests and performance based assessments for field-independent and field-dependent students. Subjects were 102 undergraduates who completed take-home assignments and tests I class; and found substantial interaction
between cognitive style and assessment approach. Results suggest that performance-based assessment tended to favour field-independent.

Gupta, S. (1995) found that Concept Attainment Model and Inductive Thinking Model be superior than Advance Organizer Model of teaching for learning the concepts of science of class X students. The following are the findings of his study: Students with field-dependent and field-independent cognitive style differ significantly in the extent of learning of concepts in Science. field-independent cognitive style students have significantly higher mean post-achievement test scores than field-dependent cognitive style. Achievement motivation acted as a redundant factor so far as learning of concept in science is concerned. Interaction between teaching strategy and different levels of achievement motivation was not found to be significant to produce differential achievement scores. The variables namely teaching models, cognitive style and achievement motivation did not interact significantly to produce differential achievement.

Mehar, R. (1997) reported that Advance Organizer Model was found as effective as traditional method of teaching. No difference in the gain mean scores yielded by the subjects having field-dependent and field-independent cognitive style was found. Further, it was also found that gain mean with Advance Organizer Model was more with field-independent subjects than field-dependent subjects. This difference was not found in respect of two cognitive style groups taught through conventional method. The different cognitive style yielded comparable gain in retention scores also.

Ansari, A.B. (1998) found that there was significant inverse relationship of formal reasoning ability, cognitive style and achievement with number of
misconceptions concerning genetics and evolution in Biology. The field-dependent, intermediate and field-independent groups of cognitive style did not differ significantly in the number of misconceptions in Biology.

Kumar, A. and Kaur, H. (1998) concluded that inquiry training model was more effective for developing process skill in Geography than the conventional method. The experimental and control groups did not differ with respect to cognitive style and personality on the development of process skills in Geography. The teaching techniques and cognitive style did not have any interaction effect on the development of process skills in Geography.

Kaur, J. (1999) found that field-dependent and field-independent male-female students and total sample were nearly equal with respect to their academic achievement. There is positive but non-significant correlation between cognitive style and academic achievement.

Gulati, V. (2001) reported that there is significant difference in the pre-test and post-test cognitive style scores of groups of students taught accountancy by inquiry training model, mastery learning model and conventional method of teaching. Students scored higher on post-test as compared to pre-test on cognitive style.

Roya Rahmani, N. (2001) revealed that there were differences between the means scores of the field-dependent and field-independent at knowledge, application and skill and also for total sample performance in computer education. The treatment in field independent groups yielded better scores than field-dependent groups at knowledge application skill and total
performance. It was also found that interaction between treatment and cognitive style in respect of knowledge score was found to be significant.

So in conclusion, several recent studies namely, Annis (1979); Chatterji and Paul (1982); Graffin(1982); Peterson (1984); Nelson (1985); Behal (1992); Sandhu (1992); Ganihar (1993); Nanda and Paul (1994); Gupta (1995); Gulati (2001) and Roya Rahmani (2001) concluded significant relationship between cognitive style and academic achievement. The studies reported that field-independent students scored higher grade than field-dependent students in achievement test. Further studies conducted by Shrock(1979); Cogley (1984); Dugger (1985); Roessler (1985); Dutt (1987); Arrington(1989) and Gill (1989) reported that field-independent contributed significantly to problem solving variables. The field-independent subjects were more proficient problem solver than field-dependent subjects.

However, the studies conducted by Buchman (1979); Atang (1985) reported that field dependence-independence was not a significant factor in their performance the post-test. Sood (1988); Bal (1992); Sawhney (1993) revealed that there was no significant difference in achievement scores of field dependent and field-independent students. Further, Krnak (1993); Mehar (1997); Ansari (1998) and Kaur (1999) reported that field-dependent and field-independent students were nearly equal with respect to their academic achievement.

So far as studies related to cognitive style and it’s impact on achievement is concerned, the findings of some studies are quite contradictory.

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