

CHAPTER- II

REVIEW OF RELATED LTERATURE

2.1 Introduction

This Chapter presents a review of studies on cooperative learning . The first section of the chapter indicates the sources consulted for literature search. The second section presents a review of literature on cooperative learning. The last section gives a conclusion regarding the overall review in this chapter.

2.2 Sources Consulted for Review Of Literature

Review of literature gives on opportunity to the investigator to know what researches in the related area have been conducted and what were their results. This saves him or her from unnecessary duplication of work. After searching research studies the investigator can derive whether the same study needs to be replicated or some new variables need to be included or dropped. Investigator used the following as the sources for information :

- #.Journals
- #.Books
- #.Document (Different educational documents)
- #. Encyclopedia
- #.Educational surveys.
- #.Dissertation abstracts

A lot of work on cooperative learning approach has been done in the western countries , but very few studies have been undertaken in India. The cooperative learning approach has been used in different subject areas such as social studies, mathematics, service computer etc. The chapter on review of literature includes studies on cooperative learning in different areas because studies on mathematics were very few.

2.3 Studies related to cooperative learning in mathematics

Weeb and Cullain (1983) in their study investigated the relationships among students and group characteristics, group interaction and achievement in small groups in junior high school mathematics classrooms, and the stability of these relationships over time. The sample consisted of 105 students in seventh, eight and nine grades who participated in two studies. For this study a special classroom setting was used in which students worked in small groups with instructions from teacher when needed. All students first learned a unit on consumer mathematics. Three months later half the students learned a unit on area and perimeter, and the other half learned a one week unit on probability. At the end of the study each student was given achievement test, personality scale and observation instrument which measures achievement in the subject, and interaction among the students. The result shows that the interaction in the groups was potent predictor of achievement in all studies, asking questions and receiving no answer. The best predictor of interaction in the group was group composition. The frequency of asking questions and receiving no answer was higher in uniform ability groups. Than the mixed ability groups. Group interaction tended to be stable over time, both in average frequency and in individual students relative levels of participation (P.411-423)

Good, mason,slavings and cramer (1990) conducted a study on small mathematics instructions in elementary schools observation of (N=206) of entire mathematics periods were made in the classrooms of 33 teachers (Primary, fourth, fifth and sixth grade in 21 schools) by seven trained cadets over 2 to 3 months period, Students were placed into mathematics classes predominately through homogenous, cross class assignment and heterogeneous self contained assignment. However a few heterogeneous, mixed grade classes were also included. To develop instruments to be used to collect teaching process data, observations and video tapes of elementary school small group mathematics lessons were initially made. Narratives were written to describe classroom activities and these narratives and the video tapes were viewed to develop definitions and a tentative coding system. Coders categorised the observations of small group teaching into six format type the whole class was grouped like this, two groups, three heterogeneous work groups, mixed size groups and individualized grouping. Lessons that made use of heterogeneous work groups were gener-

ally rated more favourably on the high inference variables by observers, and teachers using these formats. It was found that work-group lessons were characterized by more student interaction and cooperation. The study suggested that the teachers can use small group mathematics instruction especially small heterogeneous work groups to make mathematics more meaningful. Small group can allow students to be more active learners and enable teachers to introduce more thinking and more challenging content into the curriculum (P.755-782)

Duren and Cherrington (1992) conducted a study to examine the relative effects of cooperative versus independent practice following the initial instructional period of introducing mathematical problem solving strategies to junior high students. The study was conducted in an urban middle school in northern California where 126 prealgebra students in the seven and eight grades were selected to participate. The students in the four pre algebra classes were randomly assigned to two groups (a) Those that solved problems in cooperative learning groups using the groups of four model and (b) those that practical solving problems independently. Both treatment groups were given identical introductory lessons. On each problem solving strategy, before practice on the strategies within the experimental classes students were divided randomly into groups for four, cooperative learning skills such as positive interdependence role in a group giving helpful feedback, rules and procedures were all reviewed before the problem solving lessons began. The Study was conducted over a four week period and covered four problem solving strategies. The problem solving post-test was administered to all the students three months after the four weeks, of the instruction and practice of strategies. At the end each problem was graded using a holistic approach giving practical audit for each significant step.

The results of the test indicated that the students who worked cooperatively were able to remember and apply the problem solving strategies better than those students for the independent practice classes. 50% of the cooperative group students showed evidence on their tests of attempting one of the learned strategies whether successfully or not. 45% of the independent practice students showed evidence of attempting one of the learned strategies, whether successfully or not. Results also shows that the students were more willing to tackle a problem longer in the cooperative groups. From teacher

observation and notes, students in the cooperative group classes were more open to alternative strategies and received much more corrective feedback from peers. From the final test papers given three months after instruction and practice, students in cooperative group classes attempted to use a learned strategy 7% more of ten students in the independent practice classes. From this study it seems that the use of cooperative groups to practice problem solving strategies after the strategy has been introduced a variable approach in helping these students, place the strategy in long-term memory. This method makes the focus away from the teacher as the answer person and problem solver places it on the groups of students themselves (P. 631-652).

Knubfer (1993) conducted a study to investigate the effects of students of ability grouping on geometry learning transfer after a semester of instruction with logo environment. Students were grouped in pairs at the computers for completion of logo projects and then tested for the knowledge of geometry skills. The analysis tested for differences in geometry post test scores resulting between heterogeneous and homogeneous grouping patterns among low average students and high ability students. Subject included two full self-contained classes of six grades students of mixed ability including 53 students in all. Students were grouped according to their current ability level based on previous mathematics achievement as reflected on reports during three semesters. Once their ability groups were identified the students were randomly placed in homogeneous and heterogeneous pairs for computer work. Three students worked along the setting for the study was computer lab at the students elementary school. The students worked on keyboard and word processing skills during the first semester so that they were able to execute logo commands and text entry with comfort when the study was begun. The logo instruction took place during the first three months of the second semester overall geometry post test revealed a significant difference in the main effect ($f=21.62 < 0.01$) based ability no significant differences in heterogeneous grouping pattern were found.

The lowest mean score was accomplished by the low ability students who were grouped homogeneously. The mean post-test percentage score on the overall geometry test shows high ability students scored higher in the homogeneous group, while average and low ability students scored higher in the heterogeneous group, (P. 17).

Webb and Forivern (1994) conducted a study on promoting helping behaviour in cooperative small groups in middle school mathematics. The study compared the effects on achievement and verbal interaction of two instructional programs designed for each students to work effectively in small group. Cooperative learning with instruction and practice in basic aommunication skills and academic helping skills (experimental condition) and cooperative learning with instruction and practice in basic communication skills only (comparison condition) sixth grade general mathematics classes(n=166) were randomly assigned to instruction condition. After preparation for group work students worked in peer directed small group on a 4week unit on operation with fractions. Result showed thath latin and African and American students gave and received more elaborated help and showed higher achievement in the experimental condition than in the comparison condition. Differences between instructional cinditions were greater for one teacher than for the other. Reasons for these differences were discussed no significant differences between conditions in verbal interaction or achievement appeared for white students. The study showed that an instructional programme focussed on improving students ability to help others in cooperative small groups can have significant positive effects on their behaviours and learning outcomes. The strong results for Latin and African Americal students suggests that this kind and outcomes of traditionally under achieving groups in middle school mathematics(P. 132).

Austin and Darnel(1995) conducted research on effect of cooperative learning infinite mathematics on students achievement and attitude to examine theeffect of implementing cooperative learning methods throughout a entire semester in college level finite mathematics course. The study of compared student overall mathematics course overall mathematics achievement overall retention of material learned conceptual understanding procedural knowledge, problem solving skill and attitude towards mathematics between two section of a finite mathematics course. The experimental section utilized cooperative learning methods, the control section utilized a traditional lecture format. The study was quasi experimental in nature , making use of intact groups.

Results indicated that the cooperative learning procedures lead to improved academic growth as measured by both the curriculum based mathematics probes and the mathematics section of the standardized group. No statistically significant differences were noted between experimental and control groups on the sociometric nomination measure, but an improvement was seen for both work and play measures on the rating scales. Social validity data suggested that teach-



ers, students and parents found the cooperative learning procedure to be effective and acceptable. Overall findings suggest that cooperative learning is an effective method for increasing mathematics and cooperative behaviour of young children in integrated kindergarden classes(P.34).

Mears and John (1995) conducted a study to compare the effects of two instructional methods on the achievement and attitude in fourteen sections of basic college Ngebra. The study was on the effects of cooperative learning strategies on mathematics achievements and attitude in college algebra classes. The study also examined how gender moderated the effectiveness of these two instructional methods. The study was an experimental design in that students were randomly assigned to treatment, within each of seven different time periods. For other instructions taught their sections using the traditional lecture and discussion method. A pretest and post-test was administered to measure both achievement and attitude towards mahtematics anecdotal data were gathered through classroom observations meeting with students and teachers and from students evaluations. Significant difference were found in the net change between the pretest and post-test achievemant scores for students enrolled in the experimental classes. No significant differences were found in the attitude scores of students. The conclusion was that the cooperative learning technique seemed to be more effective when used in the classes which meet for longer periods of time. In addition, faulty expressed belief that more extensive training is needed for them to be comfortable with and for effective users of cooperative learning further research is recommended(P.19).

2.4 Studies Related To Cooperative Learning in Other Fields

Noreen philip and lewis(1986) in their study reports the results of learning computer progamming(BASIC) in small groups. The purpose of the study was:

#To determine which planning and debugging strategies relate to learning BASIC.

#To determine which group posses relate to learning basic. Thirty students participated in this study ranging from 1 to 14 years in age. Approximately 30% of the students were minority (black or mexican-American) and 50% were female. Six aptitude and cognitive style measure were adminis-

tered at the beginning of the workshop. These were tests of mathematical computation and reasoning which consist of a short form of the Raven's progressive matrices (Raven's 1958) to measure non-verbal reasoning ability.

At the end a 26 item achievement test was conducted. The results showing positive relationship between group interaction and programming achievement suggest that at least some kinds of interaction with another student are beneficial for learning computer programming (P.243-231).

Roger, David and Mary (1986) conducted a study to compare the efficacy of computer assisted cooperative, competitive and individualistic instruction on achievement, student-student interaction and attitudes.

In a cooperative learning situation when one student achieves his or her goal, all others with whom he or she is cooperatively linked achieve their goals, (Deutsch, 1962, D.W. Johnson & R.T. Johnson, 1975). In a competitive learning situation when one student achieves his or her goal, all others with whom he or she is competitively linked failed to achieve their goals. In last, one student's goal achievement are independent.

In cooperative situations communications among students tends to be frequent, open, accurate and effective whereas in competitive inaccurate and ineffective (Deutsch, 1962, 1967, D.W. Johnson, 1971, 1973) subjects were 75 eighth grade students ages (11-13) from a mid western, suburban middle school district. Subjects were randomly arranged to three conditions i.e, six handicap and ability level. 24 students were assigned to the cooperative condition, 10 students were arranged competitive condition and 24 students were assigned to individualistic condition.

The Independent Variables were

#cooperative Vs competitive Vs individualistic learning.

#male Vs female students.

The Dependent Variables was achievement. The results of this study indicated that when computer assisted cooperative, competitive and individualistic learning were compared, computer assisted cooperative learning promoted.

#higher quantity and quality of daily achievement,

#accuracy of recognition of factual information studied and ability to apply facts in test questions requiring higher level reasoning and problem solving.

#more success in complex problem solving task involving mapping and navigation.

#greater success in operating a computer program(P.382-392)

Klein, Erchul and Pridemore(1994) in their study investigated the effect of individual vs cooperative learning and type of reward on performance and continuing motivation. Subjects used either an individual or cooperative learning strategy while receiving information, examples, practice and feed back form an instructional television lesson. A 2x3 factorial design was used in this study with instructional method(individual versus cooperative) and type or reward(task performance none) and the independent variables. The dependent variables were performance and continuing motivation subjects were(N=126) undergraduate education majors(30 males,30Females in the first semester of a teacher training programme at a large south western university in U.S.A, Materials used in this study were an instructional television lesson, a post test, and a continuing motivation survey performance was measured using a 15 item constructed response post test. The maximum scores on the post tests was 20 points. Subjects were assigned randomly. Treatment condition was implemented in a seperate room after the completion of all the activities they were given post test. Statistics used was Mean, Standard Deviation and Analysis of Variance.ANNOVA revealed that type of instructional method had a significant effect on performance, subjects who worked cooperatively (M=10.6,SD=3.6). Type of reward did not have a significant effect on performance. Furthermore a significant interaction between instructional method and type of reward was not found. Continuing motivation was measured using the seven item scale. Multiple analysis of vaiance(MANOVA) suggested that type of instructional method had a significant effect on continuing. Subjects who worked expressed more overall continuing motivation(M=21.5) than those who worked cooperatively(M=19.8). Type of reward did not affect continuing motivation and a significant interaction between instructional method and type of reward was not found for instructional television programmes that require individual work. However students who worked cooperatively expressed more continuing motivation than those who worked alone for activities that require working with other students(P.24-32).

Stevahn, real and Johnson(1996) studied the impact of a cooperative or individualistic context on the effectiveness of conflict resolution training. In this study the participants were 111 students in two seventh and two eighth grade classes in a rural k-8 Public school in Ontario, Canada. The total students population in the school was 567. and the 111 seventh and eighth grade students in this study constituted the entire middle level age population in the school. Students were from middle class backgrounds. Students were randomly assigned to one of four conditions. In the first condition(n=30), 13 boys(7 seventh and 6 eighth graders) and 17 girls(8 seventh graders and 9 eighth graders), received the peace makers conflict resolution training. In the second condition(n=27), 12 boys(1 seventh grader and 11 eighth graders) and 15 girls(11 seventh graders and 4 eighth graders) received the peacemakers training integrated into the identical English literature unit structures individualistically. In the fourth condition(n=27), 12 boys(10 seventh graders and 2 eighth graders) and 15 unit individualistically without the conflict resolution component.

As far as variables are concerned two independent variables were included in this study (a) the presence versus absence of the integration of conflict resolution(peacemaker) training into and academic English Literature unit and (b) cooperative versus individualistic learning. The dependent variables were as follows:(a) learning of the negotiations procedure. The measure was given to all participating students the week before the study began, at the end of the study, and 8 weeks after the study post test was also given. (b) Application of the negotiations procedure. The measure was given to all participating students the week before the study began, at the end of the study, and 14 weeks after the study. This was paper and pencil measure.(c)The degree to which students engaged in distributive or integrative negotiations, was measured by using pencils, pens and markers to randomly assigned negotiating pairs (d)Attitude towards conflict was measured by the conflict and association measure, a paper and a pencil measure. (e) Academic achievement was measured by a retention achievement test 8 weeks after the study ended.(f)Retention of academic learning was measured by a retention achievement test 8 weeks after the study ended. The study consisted of five measures, premeasures, training postmeasures, and retention measures. A 2x2 analysis of variance was conducted to determine the difference among conditions. When there was significant interaction effect, t-tests were conducted to interpret the results.

The results of the study were as follows. Before training there was no significant differences among these conditions. (a) cooperative, untrained (b) cooperative trained (c) Individualistic trained (d) individualistic untrained. After training students in the cooperative conditions recalled more of the negotiation steps than did the students in the individualistic conditions, $F(1,106)=99.49, p<.001$, and the students who had received the conflict training knew more than untrained students, $F(1,106)=11.73, P<.0009$ on the retention test students in the cooperative conditions recalled more of the negotiation steps than in individualistic conditions, $F(1,106)=41.55, P<.001$ and the students who received the conflict training knew more steps than untrained students. The interaction was also significant, indicating that the difference between the trained and untrained students was significant in the cooperative conditions but not in the individualistic conditions. In third variable, on the pretest there was no significant difference among conditions. On the posttests, the trained students generated a higher mean than untrained students. For fourth dependent variable before the training, there was no significant difference found but after the treatment, students in the cooperative conditions did pattern than individualistic condition. As far as achievement is considered students in the cooperative conditions achieved higher on the posttest than individualistic conditions, $F(1,106)=13.63, P<.0004$, and students in the conflict conditions learned more than students in the no conflict training conditions, $F(1,106)=5.49, P<.02$ indicating that the difference between trained and untrained students in the cooperative conditions was more significant (P.801-823).

Douglas, Lynn, Patricia, Simmons (1997) conducted a study to explore the effectiveness of peer assisted learning strategies by comparing the reading progress of three learner types-low achieving students with and without disabilities and average achieving pupils. As far as sample is concerned (a) systematically a relatively large number of participants ($N=120$) from 40 classrooms in 12 schools representing 3 districts were selected, (b) conducting the treatment for 15 weeks; (c) collecting fidelity of treatment data at several points during treatment implementation; (d) using teachers written instructional plans to understand the larger context of their reading instructions how peer assisted learning strategies may have influence it, and (e) requiring trained examiners to measure participants individually and repeatedly, rather than use students performance on the districts high stakes, teacher administered, large-group tests. Twelve schools, stratified on student achievement and family income, were assigned randomly to experimental and control groups. 12 teachers implemented the peer tutoring program for 15 weeks, 20 did not implement it. In each of the 40 classrooms, data were collected systematically on three learner types.

Peer assisted learning strategies was conducted during regularly scheduled reading instruction, 35min per day, 3 times per week, for 15 weeks. Pre and post treatment reading achievement data were collected achievement systematically on three measures of the comprehensive reading assessment battery.

To test the effects on achievement over time, we conducted a one between subjects (treatment), two within subjects (student type; pre vs post treatment) ANNOVA was applied on each 3CRAB scores ANNOVA produces three main effects, three 2 way interactions and one 3 way interactions.

Findings indicate that low achieving students with and without disabilities and average achievieng pupils in Peer assisted learning strategies classroom made significantly greater progress than their counterparts in no Peer assisted learning strategies classroom across the three reading measures(P.174-286)

