CHAPTER – II

REVIEW OF THE RELATED LITERATURE

2.0  INTRODUCTION

Man, the thinking being, can take advantage of the knowledge preserved and accumulated through the centuries since the origin of the universe. Human knowledge has three phases: preservation, transmission and advancement. Research takes advantage of the knowledge accumulated in the past as a result of constant human endeavour. It can never be undertaken in isolation of the work that has already been done on the problems which are directly or indirectly related to a study proposed by a researcher. Practically, all human knowledge is really conserved in books and libraries to help the scholars probe further into the fathoms of knowledge. A careful review of the research journals, books, dissertations, theses and other sources of information does step up in the planning process of any research study. A literature review is usually a synthesized critique of the status of knowledge on a carefully defined educational topic.

Research is a careful investigation in search of new facts in any branch of knowledge involving the application of a scientific method in the study of the problem. It offers a systematic attempt to obtain answers to meaningful questions. A review of literature helps the investigator in selecting and defining the problem, formulation of hypotheses and interpreting the data. Thus, the importance of related literature cannot be denied in any research. The related literature not only guides with regard to the quantum of work already done and available in the field but also enables the researcher to identify the gaps in the concerned area of research. The survey of related literature is a crucial aspect of planning a study. It promises an indepth understanding of the problem undertaken for investigation. Review of literature serves as a link between the research proposed and the corps of knowledge already available in a particular field. Review of related literature is thus an essential prerequisite for planning and execution of research work. It entails search for reference material and familiarity with relevant literature to discover what is already known, what others have attempted, which methods have been promising or disappointing and which problems remain to be solved (Best and Kahn, 1989).
An attempt has been made here to examine the related literature vis-a-vis the problem in hand, namely, “A Comparative Study of the Effectiveness of Student-Teams Achievement Divisions (STAD) and Jigsaw Methods of Cooperative Learning”. The review of related literature and research studies has been divided into different sections along the main variables under study, that is:

2.1 Effectiveness of Cooperative Learning on Learning Outcomes.

2.2 Effectiveness of Cooperative Learning on the Development of Self-concept.

2.3 Effectiveness of Cooperative Learning in Mathematics.

2.4 Effectiveness of Cooperative Learning in Other School Subjects.

2.1 EFFECTIVENESS OF COOPERATIVE LEARNING ON LEARNING OUTCOMES

This section can be discussed under two sub-headings, that is, Studies done abroad and Studies made in India.

2.1.1 Studies done Abroad

Anderson, Johnson, Johnson and Johnson (1976) conducted research on 30 fifth graders to know the effect of structuring classroom learning cooperatively and individually on students ability to appreciate the effective perspective of others’ altruism, attitudes towards classroom life and achievement. The students were matched on previous achievement in language arts. The even-numbered students were assigned to individualized condition while the other, odd-numbered students were placed in the cooperative condition. No competition between groups or between persons was structured into the evaluation. The results indicated the cooperative learning as compared to individualized learning resulted in greater ability to take the affective perspective of others for more altruism, more positive attitude towards classroom life and higher achievement.

Skon (1979) compared the effect of cooperative, competitive and individualistic learning situations on students’ achievement and reasoning processes on the following tasks: categorization and retrieval, metaphor interpretation and story
problems on 86 first grade students. The findings revealed that on the categorization and retrieval and the metaphor interpretation tasks subjects in the cooperative condition had higher achievement scores than did subjects in the competitive and individualist conditions. High, medium and low ability subjects in the cooperative condition used higher quality reasoning processes than did high, medium and low ability subjects in the competitive and individualistic conditions on three of those tasks. On the free recall measure of the categorization and retrieval task, cooperation and individualism did not affect the relative performances of high, medium and low ability students in the competitive and individualistic conditions on three of the tasks.

Sharan, Ackerman and Hertz-Lazarowitz (1979) compared the academic achievement of 198 pupils of two through six grades taught in the small cooperative groups against that of 109 pupils of two through six grades taught in the traditional whole-class approach. The findings revealed that those children of second, fourth and six grades who studied in cooperative small groups received significantly higher scores on high level question than did pupils from traditional classroom. Third and fifth grade pupils revealed a trend in favour of small group classrooms but the trend did not reach statistical significance. On low level questions, pupils in the second grade small group classrooms significantly excelled their counterparts, whereas in third through six grades, no significant difference was found between cooperative small groups learning and whole class instruction.

Webb (1982) reviewed focuses on the role of the students experience in small group interaction in learning. The study examined three aspects of small group learning: (1) the relationship between interaction and achievement; (2) cognitive process and social-emotional mechanisms bridging interaction and achievement; and (3) characteristics of the individual, group, and reward structure that predict interaction in small groups. The study found that an individual’s role in group interaction is an important influence on learning, and that interaction can best be predicted form multiple characteristics of the individual, group and setting.

Johnson, Johnson, Tiffany and Zaidman (1984) conducted a study to see the impact of intergroup cooperation and intergroup competition on the cross-Ethnic
relationship. Intergroup cooperations and intergroup competitions were compared to determine if they promoted systematic differences in interaction between majority and minority students. Fifty-one fourth grade students were assigned to conditions on a stratified sampling basis controlling for minority status and sex. Study was conducted for 55 minutes a day for 10 instructional days. The results revealed that intergroup cooperation promoted more inclusion of minority students and more cross-ethnic relationships.

Webb (1984) investigated the effects of small group gender composition on interaction and achievement in classroom settings and found that in groups in which gender and ability were balanced (i.e. high-medium-low ability groups being similar interaction patterns and nearly identical achievement results. However, in groups in which gender was imbalanced (majority male or majority female but with similar ability means), the female’s experiences were detrimental to their achievement. In majority male groups, the females tended to be ignored as males focused their attention on other males and in the majority female groups, the females focused much of their attention on the males to whom they gave more help than they gave to other females.

Hall, lee Ellis (1988) worked on a meta-analysis of the effects of cooperative learning on achievement and presented a vote analysis of the effects of cooperative goal structures on academic achievement, based on some forty-four studies with 86 conclusions included in the vote analysis besides thirty-seven studies with 135 effects sizes included in the meta-analysis. The vote analysis indicated no statistically significant difference between cooperative and traditional goal structures. The meta-analysis indicated that the effect of cooperative learning on achievement differed in regard of study, grade level and subject.

Bak, Byung-Gee (1993) worked on meta-analytic integration of the relationship between co-operative learning and achievement. The purpose of this study was to re-evaluate the effect of cooperative learning (CL) on students ‘achievement using Hedges’ meta-analytic approach, to extract the essential components of CL, and to identify the moderators of CL. Major findings from 73 independent studies could be summarized as follows:-
First, CL methods are effective for students’ achievement i.e. the scores of the average individual in the cooperative learning group exceed that of over 60% of individuals in the control groups.

Second, analysis of essential components of CL showed that if would be desirable to implement cooperative learning using a moderate degree of individual accountability, a high degree of individualistic learning indicated that it is possible to improve pupils’ abilities to read news stories in an actual newspaper by instructing them in writing news stories in an actual newspaper by instructing them in writing news stories for a class newspaper. The findings led this researcher to the major conclusions that this treatment may cause pupils to have (a) positive changes in their newspaper habits; (b) favorable perceptions about the effectiveness of instruction in writing news stories upon their ability to read news stories; and (c) improved ability to read news stories in an actual newspaper.

Stevens and Slavin (1995) conducted a 2-year study on the cooperative elementary school model which used cooperation as an overarching philosophy to change school and classroom organization and instruction processes. The components of the model include: using cooperative learning across a variety of content areas, full scale mainstreaming of academically handicapped students, teachers using peer coaching, teachers planning cooperatively, and parent involvement in the school. The results of this study support the hypothesis that cooperative learning can be the primary mode of instruction and when integrated with effective instruction in reading, language arts, and mathematics and with changes in school organization, peer coaching, mainstreaming and other elements can be effective in producing higher student achievement. After the first year of implementation students in cooperative elementary schools had significantly higher achievement in reading vocabulary. After the second year, students had significantly higher achievement in reading vocabulary, reading comprehension, language expression and math computation than did their peers in traditional schools. After 2 years, academically handicapped students in cooperative elementary schools had significantly higher achievement in reading vocabulary, reading comprehension language expression, math computation and math application in comparison with similar students in comparison schools. There also
were better social relations in cooperative elementary schools, and handicapped students were more accepted socially by their non-handicapped peers than were similar students in traditional schools with pull-out remedial programs. The results also suggest that gifted students in heterogeneous cooperative learning classes had significantly higher achievement than their peers in enrichment programs without cooperative learning.

Qin, Johnson and Johnson (1995) compared the impacts of cooperative and competitive efforts on problem solving. The study examined 46 studies, published between 1929 and 1993 to resolve the controversy over whether cooperative learning promotes higher or lower-quality individual problem solving than does competition. The findings from these studies were classified in four categories according to the type of problem solving measured:

- Linguistic (solved through written and oral language);
- Nonlinguistic (solved through symbols, math, motor activities action);
- Well defined (having clear definition, operations, and solutions); and
- Defined (lacking clear definitions, operations and solutions).

The 63 relevant findings that resulted were subjected to a meta-analysis for purposes of integration. It was reported that members of cooperative teams outperformed individuals competing with each other on all 4 types of problem solving (effect sizes = 0.37, 0.72, 0.52, 0.60 respectively). The results revealed the superiority of cooperation however it was greater on nonlinguistic than on linguistic problems.

McManus and Gettinger (1996) examined the teachers’ use and evaluation of cooperative group learning along with students’ reactions to working in groups and their verbal interactive behaviours during group activities and found positive academic, social and attitude outcomes in the classrooms. Majority of student interactions were directly related to teaching and learning. Behaviours such as listening to another student or watching a student demonstrate how to complete a task occurred most frequently during group activities.

Jordan and Metais (1997) identified the lack of social skills on the part of some school students is one contributory factor in student misbehaviour. The study
suggested that cooperative learning contributes to the fostering of social skills in students of all ages. A ten-week programme of cooperative learning was implemented in a class of 10-12 year-olds, to develop their social skills alongside their academic skills. It was found that as a result of programme social interactions became noticeably more varied and students agreed to work in assigned groups, even when they did not like some members of the group. Interpersonal relationships between students and teacher improved considerably for the isolated students.

Antil, Jenkins, Wayne and Vadsy (1998) examined the prevalence, conceptualization and form of cooperative learning used by elementary teachers. Survey was conducted and data indicated that 93% of teachers (n=85) from six elementary schools in two districts used cooperative learning methods. Interviews conducted with a sub-set of those teachers (n=21) all indicated having daily cooperative lessons in several subjects. It was found that majority of teachers subscribed to cooperative learning to achieve both academic and social learning goals, structured tasks for positive interdependence, and taught students skills for working in small groups. It was further highlighted that primarily, few teachers were employing recognized forms of this practice, because they did not tie individual accountability to group goals.

Prinz (1998) studied the conditions in college students of various ability levels. They learn best when they are assigned randomly to one of three cooperative learning conditions homogenous (where all students in a small group were of same ability level), heterogeneous (where high, medium and low ability students were placed into small groups placed in small groups). Findings revealed (i) No significant difference in performance outcomes for students in the three grouping conditions (narrow range, heterogeneous and homogeneous). (ii) No significant difference for attitude towards learning and students perception that the presence of other in the group enhanced their learning (iii) A significant interaction effect was noted for student’s preference for learning alone with low and high ability students in the narrow-range grouping conditions less interested in working individually; and (iv) students in the narrow-range grouping condition who did not believe in the group process to be helpful.
Wilson (1998) investigated the ability of general education middle school students to prompt and reinforce the functional academic skill acquisition of peers with moderate to severe disabilities in the context of content area cooperative learning instructional settings and found that the general education students learned to provide the identified opportunities, prompt sequences and reinforcement to their peer with disabilities after a brief training session and ongoing in classroom feedback. Analysis of the grades achieved by the tutors indicated that the tutoring responsibilities had little or no negative impact on their attainment of classroom skills.

Williamson (1999) studied whether the presence of embedded meta-cognitive cues facilitates learner interactions and improves attitudes towards cooperative learning during the cooperative computer based lesson and studied the effects of ability grouping and group interactions on the sample of 120 sixth-grade students assigned by ability to one of three group compositions homogeneous high-ability, low-ability or heterogeneous Verbal interactions were audio taped while social and management interactions were recorded MANOVA and univariate ANOVA related that learners in the cued treatment had significantly different achievement post-test scores, exhibited more on task behavior, and socialized less than learners in the non-cued treatment. Significant differences for ability groups were found only on the achievement post-test and for management interactions. Homogeneously grouped low-ability tended to have lower achievement post-test scores. In addition homogeneously grouped low ability learners and the heterogeneously high ability group. There was no significant difference in attitude towards cooperative computer based instruction for either treatment or group composition.

Gillies (1999) conducted a 1-year investigation on whether children, who had been trained in the previous year to cooperate, were able to use the skills they had been taught in reconstituted groups without additional training on 64 fourth graders, who had participated in training in cooperative group behaviours in the previous year, were assigned to the trained condition, 84 fourth graders, who had not received any training, were assigned to the untrained condition. Results indicated that the children in the trained groups were consistently more cooperative and helpful than their peers
in the untrained groups, although they had not received refresher training in cooperative group behaviours.

Stepka (1999) examined the difference in academic achievement among students under two teaching strategies: Jigsaw cooperative learning method and the lecture method at a rural community college and found that overall, the Jigsaw cooperative and section scored higher than the lecture section when compared academically.

Klein and Schnackenberg (2000) investigated the effect of informal cooperative learning and the affiliation motive on achievement, attitude and students interactions. Study involved 122 undergraduate education majors classified as high or low need for affiliation used either an informal cooperative learning strategy or an individual strategy while receiving instructional television lesson (ITL). Results indicated that participants who used the individual strategy acquired significantly more continuing motivation for working alone than those who used the informal cooperative strategy. Results also revealed that high affiliation participants expressed significantly more continuing motivation than low affiliation participants for working with another person. Low affiliation participants expressed significantly more continuing motivation than high affiliation participants for working alone. Furthermore, results indicated that high affiliation dyads exhibited significantly more on-task group behaviours (taking turns, sharing materials, group discussion of content) and significantly more off-task behaviours than low affiliation dyads.

Veenman, Kenter & Post (2000) examined the use of and evaluated cooperative learning methods by 60 Dutch primary teachers (grades 1-8) and investigated the reactions of 363 pupils to cooperative grouping and the quality of the group cooperation. In the study, teachers reported that cooperative learning occurred in their classrooms about 4 times a week. Questionnaires completed by teachers indicating that social skills, on task behavior, and pupil self esteem improved as a result of having pupil work in groups. Further pupils reported a positive attitude towards cooperative group learning and rated their work in groups as effective. Half of the teachers reported problems with the monitoring of the cooperative groups.
Results showed that the time-on-task levels of the pupils working in groups to be high, but effective learning and cooperation was not promoted. The teachers devoted little time to the teaching of group work skills.

Jensen, Johnson and Johnson (2002) examined the effects of positive interdependence vs no interdependence on students’ academic achievement. The study included 151 US College students (aged < 18 – 30 years) who took weekly electronic quizzes on which they could interact with group-mates in a chat room. In the positive interdependence condition, one member was chosen at random, and his or her score was given to all members of the group whereas in the no interdependence condition, each group member received his or her own score on each quiz. The finding of the study conveyed that students in the positive interdependence condition engaged in significantly more interaction and more promotive interaction while taking the electronic quizzes and achieved higher scores on the subsequent examinations taken individually.

Gillies (2002) investigate the effect of training in small-group and interpersonal behaviours on children’s behaviour and interactions as they worked in small groups 2 years later. 52 fifth-graders, who had been trained 2 years previously in cooperative group behaviour were assigned to the trained condition and 36 fifth graders, who had not previously been trained were assigned to the untrained condition the results showed a residual training effect, with the children in the trained groups being more cooperative and helpful than their untrained peers.

Onwuegbuzie, Collins and Elbedour (2003) investigated the role of group composition ranging on in size from 2 to 7 cooperative learning groups. The sample consisted of 275 graduate students of introductory level education research course. The analysis revealed (1) Positive relationship between degree of group heterogeneity at the mid-term level and scores on the research proposed; (2) Relationship was found between group size and performance on the article critique however, no relationship emerged involving scores on the research proposal scores.

Peterson and Miller (2004) compared the experiences of college students during cooperative learning and large group instruction to discuss how they could
apply important psychological principles to teaching-learning projects, under graduate education psychology students were assigned to small groups. During cooperative learning and large group instruction perceptions of their experiences with experience sampling method were measured. It was found that overall quality to experience was greater during cooperative learning benefits occurred specially for thinking on task, student engagement, and perceptions to task importance, and optimal levels of challenge and skill. Study revealed that students were more self-conscious and reported more difficulty concentrating during cooperative learning.

Rondinaro (2004) studied the relationship between interpersonal multiple intelligence and the usage of cooperative learning teaching methods on the sample of 103 teachers and revealed the following:

i. No significant relationship between interpersonal multiple intelligence and the usage of cooperative learning teaching methods.

ii. Elementary school teachers had a significantly more positive attitude towards cooperative learning than high school teachers, and

iii. The longer one teaches, the more negative he/she is regarding cooperative learning than the lesser he/she uses this teaching method.

Hancock (2004) investigated the effects of graduate students peer orientation on achievement and motivation to learn cooperative learning strategies while enrolled in a 1-semester educational research methods. The study comprised to 52 graduate at a large, state supported university in the with high and low peer orientation, enrolled in an educational research methods course. The average age of the participants was 34.12 years (SD = 8.6) seventy on percent of the participants were women. During 15 weekly lessons (2hr and 50 min each), subjects were exposed to cooperative learning instructions that involved face to face promotive interaction, positive interdependence, individual accountability enforces by group members, collaborative skills, and group processing. The results of the study revealed that difference in the achievement of students with high and low peer orientation were not statistically significant. However, students with high peer orientation were significantly more motivated to learn than were students with low peer orientation.
Olivera and Straus (2004) investigated the effects of group collaboration on member learning in a laboratory experiment. Hypothesis tested were based on theoretical ideas from research on cooperative learning that groups provide opportunities for transfer of learning to individuals and that arise during groups interaction. In experiment, eighty-six students solved puzzles either individually, in groups, or individually while observing a group. Findings based on the analysis of subsequent individual performance on a transfer task showed that participating in or observing a group caused transfer of learning, whereas working alone did not. Furthermore, results suggested that transfer of learning occurred mainly due to cognitive, but not social, factors.

Williams, Devon (2004) suggested that colleges and universities can improve intergroup relations on campus by implementing a cooperative learning technique known as the jigsaw classroom. Study involved an argue as that use of the jigsaw classroom would facilitate a re-categorization process by which members of racial-ethnic groups other than one’s own (them) would begin to be seen as being members of a more inclusive, “We”. The study included an examination of on-campus racial discrimination a discussion was made on some social psychological work and ultimately found that jigsaw classroom has the potential to reduce this type of discrimination.

Blair and Millea (2004) studied the impact of cooperative education on student Academic performance specifically; the study examined the effect of cooperative education on grade point average, length of time in school, and starting salary. Statistical analysis revealed that cooperative education programs have significant effects on all three measures. These measurements were useful not only to students deciding whether to participate in cooperative education programs, but also to universally administrators seeking to assess program effectiveness.

Veenman, Denessen, and Vanden (2005) conducted a study to examine the effects of a teacher training program on the elaborations and affective-motivational resources (i.e. intentions and attitudes towards help seeking help giving and achievement goals) of students working on a cooperative task. Study sample included
teachers from seven primary schools and 24 dyads of sixth-grade students. The findings of the study showed moderately positive effects on use of elaborations among the treatment dyads. Dyads with experience in cooperative learning achieved more than dyads without such experience. Mastery and performance oriented goals were negatively related to use of high-level elaborations was positively related to student achievement.

Ghina Hassan (2005) investigated the question of whether Jigsaw is more effective than whole class instruction in improving learners' reading achievement and motivation. The participants were 44 grade five students in a private school in Lebanon. The students were randomly assigned to control and experimental conditions and a post-test only control group design was employed. The experimental group was instructed according to the dynamics of the Jigsaw II method whereas the control group was taught according to whole class instruction. The treatment lasted for eight weeks. Two post-tests GMRT and MRP were administrated at the conclusion of the study. The GMRT assesses two dimensions of reading comprehension: a) vocabulary acquisition and b) reading comprehension. The MRP assesses two dimensions of reading motivation a) reading self-concept and b) reading value. A multivariate analysis of variance (MANOVA) was conducted to compare the results of both groups. The treatment with two levels (control and experimental) was the factor, and reading comprehension, vocabulary acquisition, reading self-concept, reading value and reading motivation were the dependent variables. Results indicated that Jigsaw had a significant effect on students' self-concepts as reader, the value they place on reading and their reading motivation. However, no significant differences were found in favor of Jigsaw II on the variables of vocabulary acquisition and reading comprehension.

Hijzen, Bockaerts and Vedder (2006) examined relationships between the quality of cooperative learning (CL) and student’s goal preferences and perceptions of contextual factors in the classroom. Sample consisted of 1920 students studying in secondary vocational schools. The study focused on four different types of goals; social support, belongingness, mastery and superiority goals. It was found that social support goals had the strongest relation with the quality of CL and further it was
found that the quality of CL was best predicted by a combination of social support goals, evaluations of the extent that students were taught cooperation skills, perception of the teachers monitoring behaviour, and the availability of academic and emotional peer support. It was concluded that female students preferences for mastery and social goals were stronger than those of male students, whereas male students had a stronger preference for superiority goals.

Lai, C.Y. and Wu, Cheng-Chih (2006) reported about the study of implementation of handheld wireless environment to support Jigsaw cooperative learning activities in a college setting. A quasi-experimental research design was conducted to investigate the effects of using handhelds, as well as issues associated with the use of handheld technology. In the experiment study sample consisted with two intact classes of fourth-semester students from a five-year junior nursing college. Findings revealed that handheld tools enhanced both student’s attitude and performance in learning, and promoted better interactions between students and instructions. Furthermore reported that handheld technology does prove to the not sophisticated enough to support cooperative learning goals without the support from a technology specialist.

Summing up (Global Scenario)

In brief, cooperative learning resulted greater ability for altruism, (Anderson, Johnson, Johnson and Johnson, 1976), higher achievement (McManus and Gettinger, 1996; Skon, 1979; Bak, Byung-Gee, 1993; Blair and Millea, 2004), increase in self-confidence (Nederhood, 1986), higher self-esteem (Ali, 1999) increase in intrinsic motivation and beliefs about success (Lin, 1997, Good, Reys, Grows and Mulryan, 1989), higher Self-appraisal of their performance and higher perceived efficacy (Chang, 1998). Second, fourth and sixth graders received high scores when learned in cooperative small groups (Sharan, Ackerman and Hertz-Lazarowitz, 1979). CL integrated with school/classroom climate fosters higher achievement (Stevens and Slavin, 1995).

Individual’s role in group interaction influenced achievement in learning (Webb, 1982), intergroup cooperation promoted inclusion of minority students and
cross-ethnic relationship (Johnson, Johnson, Tiffany and Zaidman, 1984). In small group gender interaction, female experienced detrimental to achievement (Webb, 1984). Positive interdependence enhances interaction chatting and achievement (Jensen, Johnson and Johnson, 2002). Students in cooperative learning groups showed increase in number of friends, liking of others (Slavin, 1980 and Nederhood, 1986), increase in interactive behaviours and skills: listening and watching (Nowak, 1996; McManus and Gettinger, 1996) and increase in group effectiveness and interpersonal interactions (Earley, 1997). Peer orientation significantly more motivates to learn (Hancock, 2004). More students in cooperative condition perceived themselves as giving help to and received help from peers (Cooper, Johnson, Johnson and Wilderson, 1980; Gillies, 2002). Fourth and fifth graders trained in CL maintain more cooperative behavior than their untrained peers (Gillies, 1999, 2002). Group size has relationship with performance in CL (Onwuegbuzie, Collins and Elbedour, 2003).

News making skills like reading and writing news stories improved in cooperative learning (Bak, Byung-Gee, 1993). Elementary teachers relish small group CL skills (Antil, Jenkins, Wayne and Vadsy, 1998). Social skills, on task behavior and pupil self-esteem improved as a result of having pupil work in groups (Veenman, Kenter & Post, 2000). CL inculcates social skills (Jordan and Metais, 1997), problem-solving skills (Din, Johnson and Johnson, 1995) and helps peer learning (Wilson, 1998).

Students with high peer orientation in CL motivated more to learn than students with low peer orientation (Hancock, 2004). CL groups cause transfer of learning (Olivera and Straus, 2004).

Jigsaw classroom reduces racial discrimination at university and colleges (Williams, Devon, 2004) and impacts grade V students’ reading skills better than in whole classroom situations (Ghina Hassan, 2005). Quality of cooperative learning in secondary vocational schools impacts social support goals among girls and superiority goals of boys (Hijzen, Bockaerts and Vedder, 2006). Jigsaw CL activities

College students in various ability groups learn best by CL (Prinz, 1998). Under-graduate affiliation needed variation in CL (Klein and Schnackenberg, 2000). In rural community college Jigsaw CL method scored higher than traditional method (Stepka, 1999).

Primary teachers reported problems with the monitoring of cooperative groups (Veenman, Kenter & Post, 2000). College students in CL experienced more self-consciousness and difficulty (Peterson and Miller, 2004).

2.1.2 Studies made in India

Tripathy (2004) investigated cooperative learning as a method of promoting learning through student cooperation rather than competition and considered it as a method of effectively using student groups in a classroom. The primary elements involved in this strategy of teaching science were positive interdependence, individual accountability, face-to-face interaction with peers, use of pro-social skills and group processing of a given academic task by the learners, the role of teacher being that of an academic consultant. Teaching-learning of difference between metals and non-metals by modified cooperative learning method was suggested after a try-out in real classroom situation. In a cooperative learning system, students were divided into groups and they worked together to master an assigned lesson. Groups were heterogeneous, with one high level child, one or more children identified as with special educational needs and others of various abilities. Each group member was assigned a role for that lesson. The findings of the study revealed that students who were working in groups were more likely to stay on task and remain motivated because of peer support and encouragement. Working together is good as it does a lot to increase self-esteem and reduce normal peers rejection, which is so important for peer support and encouragement. Cooperative group learning induces cooperative attitude in the learners, which in the long run, has the potential of carry over into other areas of the competitive world.
Pushpanjali and Satyaprakasha (2010) investigated that cooperative learning is a broad phrase for an effective approach to education and it was a classroom learning environment in which students could learn in mixed ability heterogeneous groups on academic tasks. An attempt was made to find out the effectiveness of cooperative learning strategy on achievement motivation and anxiety of class VIII students of Bangalore city. The findings of the study were:

a) Cooperative learning strategy was more superior to conventional method in significantly promoting achievement motivation.

b) Cooperative learning strategy was effective in significantly reducing the anxiety.

Summing up Indian Scenario

In brief, students working in groups stay more on task and remain motivated because of peer support and encouragement (Tripathy, 2004). Cooperative learning environment promotes achievement motivation and reduces anxiety among eighth graders (Pushpanjali and Satyaprakasha, 2010).

2.1.3 Overview (Cooperative Learning)

This review of the literature available on cooperative learning reveals that the range of researches conducted on its various aspects and their effects are quite considerable. Although there is no complete unanimity of opinion, a vast majority of researchers agree that cooperative learning can provide answers to many of the questions faced by educators, parents, students and provide evidence of the effectiveness of cooperative learning in raising the achievement level of the learners. The claims of the advocates of cooperative learning that students can achieve higher if they receive education through cooperative learning procedure seem to stand vindicated by a large number of the researchers. Improvement in cognitive outcomes shows its consequences in the form of improved self-esteem of the students. The evidences, both objective and subjective, of their achievement change their view of themselves and the people and things around them. The development of success builds in pupil’s sense self-confidence, a desire to learn more and work systematically in order to achieve higher. The development of positive self-esteem in turn leads to
higher motivation, deeper interest that the overall effects of cooperative learning on student self-esteem, peer-support for achievement, liking of class and/or classmates and intergroup relations are positive. It suggests that the use of cooperative learning methods can go a long way in improving relationships between mainstream students of different racial or ethnic groups and between mainstream students and their normal progress classmates. It also emerges from this brief survey that the number and range of studies conducted to examine the effectiveness of cooperative learning methods in Indian situation are limited, leaving much scope for further research. Cooperative learning promotes achievement motivation, longer stay on task and reduces anxiety which ultimately will be very useful in the Indian classroom.

2.2 EFFECTIVENESS OF COOPERATIVE LEARNING ON THE DEVELOPMENT OF SELF-CONCEPT

2.2.1 Studies Done Abroad

Bonaparte, E.P.C. (1989) investigated the effects of cooperative versus competitive classroom organization for mastery learning on the mathematical achievement and self-esteem of 240 urban second-grade pupils attending schools in the middle Atlantic Region of the United States. Analysis of covariance with a nested design was utilized to ascertain the effect of classroom organization on mathematical achievement and self-esteem at the .05 level. Three factors were used in this nested design: method, classes/teachers nested under methods and ability. A Pearson Product-Moment Correlation was employed to determine if there was relationship between achievement in mathematics and self-esteem. It was reported that the cooperative-mastery learning/STAD form of classroom organization was superior to the competitive-mastery learning form of classroom organization. A significant interaction effect was also found. It further revealed a significant correlation between achievement in mathematics and self-esteem.

Glassman, Phyllis (1989) conducted a study of cooperative learning in mathematics, writing and reading in the intermediate grades with a focus upon achievement, attitude and self-esteem by gender, race and ability group. A quasi-experimental design with random assignment of teachers to experimental and control
groups was employed. The sample included 441 students in two sub-urban intermediate schools on Long Island. Related to achievement, a statistically significant difference was revealed favouring the treatment group in writing specially ideas in writing. Additionally, statistically significant differences were found favouring the cooperative learning group with respect to attitudes toward reading and perceived abilities in reading. Girls in the treatment group evidenced gains in mathematics and boys in the experimental group revealed enhanced social self-concept.

Scott, Thomas, J. (1989) investigated the effects of cooperative learning team vs traditional classroom/resource room instruction on handicapped students’ self-esteem and academic achievement. The purpose of this study was to see if Cooperative Learning Teams (CLT) provides an effective mainstreaming mode. More specifically, this study examined the effect of the CLT model vs the traditional “pull out” resource model on the self-esteem and academic achievement of handicapped students in grades three and four. Twenty-one learning disabled students in the CLT treatment remained in the regular education classroom setting for the entire day with their non-handicapped peers. For approximately 60% of each day students were instructed to work cooperatively in small groups to complete assignments. The control group consisted of 22 LD students who were the mainstreamed part of the day but also pulled-out of the regular classroom to supplement special education instruction in resource rooms. Students were tested at the beginning and end of the school year in reading, mathematics and self-esteem. In addition, 48 classroom observations were conducted. The observations indicated that the treatments were implemented properly. Analysis of covariance was performed on 23 depended measures. Significant difference (p<0.05) in favour of the CLT were found on four of the level self-esteem scales. Reading and mathematics achievement were equivalent. The study concluded that the CLT model is a viable alternative to the “pull-out” model and a less restrictive placement for LD students.

Fan, Minte (1990) examined the effects of cooperative learning and tutoring on academic achievement and self-concept of Native American Students. The purposes of this study were: (a) to investigate the effects of cooperative learning with
tutoring in Native American students’ academic achievement and self-concept. (b) to
determine the Native American students’ level of self-concept and (c) to investigate
the relationship between self-concept and academic achievement in Native American
students. One hundred thirty-five Native American sophomores and juniors
participated in this study from June to July, 1990. Cooperative learning was provided
for the intact group in regular classroom instruction during the five-week intensive
treatment period.

In addition, they received tutor student ratio of one-to-six. Students’
academic performance was determined by a mathematics teacher-made test while
their self-concept was measured by the Culture Free-Esteem Inventory. All subjects
were pre and post tested, and the data was analyzed on the basis of gender, grade
level and types of schools attending, using test and analysis of covariance. In
addition, Pearson-correlation coefficient was employed to determine the relationship
between GPA and self-concept scores.

Statistical significance was found in mathematics at p<0.001 using t-test for
the entire sample as well as for genders, grade levels, and public and non-public
school students. It indicated that cooperative learning and tutoring had a strong
positive effect upon academic achievement. Analysis of covariance further revealed
that all subjects performed at nearly the same level. In the mathematics post-test
student’s performance on the self-concept test was stable throughout the five week
treatment period. Overall, they rated themselves as intermediate (51-55 percentiles) in
self-concept. Further, male and females were not significantly different in both self-
concepts pre and post-test scores. Finally, no strong relationship between GPA and
self-concept was detected.

Coleen (1991) studied the effect of cooperative learning on selected student
variables (Cooperative Integrated Reading and Composition on academic
achievement in reading comprehension, vocabulary and spelling and on student self-
esteem). Two regular classroom teachers and one Resource room teacher were given
two-day training in Cooperative Integrated Reading and Composition (CIRC) and
each other Cooperative Learning Method and philosophy. The experimental teachers
were asked to implement CIRC for duration of twenty-four weeks. Two control teachers used the same basal reader spelling instruction. Results did not support those found in the two field experiments on CIRC conducted by researchers from John Hopkins University. The implementation of CIRC did not predict any significant difference on reading comprehension, vocabulary and spelling standardized test scores for third grade students. However, it did provide a basis for improved self-esteem in the experimental classes.

Adams (1995) investigated the effectiveness of specific cooperative learning method, Student Teams Achievement Divisions (STAD), on achievement and self-estees levels of mildly handicapped and 64 normal progressing learners of sixth grade. Findings revealed that the treatment group had significantly higher levels of academic achievement in reading comprehension; they had significantly higher levels in vocabulary, but not in reading comprehension; they had significantly higher levels of general self-esteem, but did not differ in school and academic self-esteem.

Joseph Zisk (1998) investigated the effects of cooperative learning on academic self-concept and achievement of secondary Chemistry students. The results of this study indicated that both types of self-concept (performance based and reference based) increased at significant levels (levels p<0.05 and p<0.01 respectively) for students who were exposed to cooperative learning as compared to students in a traditional classroom. In addition to the differences in academic self-concept, students' test scores were also examined. Tests, routinely used by the teacher to measure academic achievement of subject area, were given to both the comparison and experimental groups. A statistical analysis of these test scores showed a significant (p<0.001) increase for the cooperative learning group. This significant increase in test scores reinforces the notion that cooperative learning teaching strategies improve academic achievement. By comparing a cooperative learning teaching strategy with a traditional teaching strategy, this study demonstrated that a cooperative learning teaching strategy promotes a greater sense of academic self-concept while improving academic achievement.
Chang (1998) investigated the acquisition and development of self-efficacy through cooperative learning on the sample of the one hundred twenty-three sixth grade students from two traditional classes and two cooperative classes. They found that there was no relationship between the self-efficacy measure and the requisite skill (i.e., mathematics aptitude), the cooperative learning method yielded higher perceived efficacy, students in cooperative method exerted more effort in solving word problems and showed higher self-appraisal of their performance.

Ginsburg-Block, Rohrbeck, and Fantuzzo (2006) used meta-analysis to examine social, self-concept, and behavioral effects of peer-assisted learning (PAL) interventions with elementary school students. An electronic search of PsycINFO and ERIC databases resulted in 36 relevant PAL studies. Overall, effect sizes were small to moderate across the 3 outcome variable domains. Both social and self-concept outcomes were positively correlated with academic outcomes. Specific PAL components—student autonomy, individualized evaluation, structured student roles, interdependent group rewards, and same-gender grouping—were related to effect sizes. PAL interventions were more effective for low-income versus higher income, urban versus suburban–rural, minority versus nonminority, and Grades 1–3 students versus Grades 4 – 6 students. Results suggest that PAL interventions that focus on academics can also improve social and self-concept outcomes.

Martin Hanze and Roland Berger (2007), investigated to compare cooperative learning and direct instruction on motivational effects, and student characteristics in 12th grade physics classes. One hundred thirty-seven students in 12th grade physics classes participated in a quasi-experimental study comparing the jigsaw classroom method of cooperative instruction with traditional direct instruction. While no differences were found between the two conditions for physics achievement gains, the results revealed differences in students’ experience of the three basic needs (autonomy, competence, and social relatedness as posited by self-determination theory of learning), in self-reported cognitive activation, and in degree of intrinsic motivation. Path analyses showed that the basic needs partially mediated the effects of method of instruction on cognitive activation and intrinsic motivation. Increases in feelings of competence with cooperative learning were associated with better
performance in physics. When controlling for competence, however, direct instruction had a facilitating effect on physics performance. Four aspects of students’ personal learning characteristics (previous knowledge, academic self-concept in physics, academic goal orientation, and uncertainty orientation) were assessed. Method of instruction was found to interact with self-concept: students with low academic self-concept profited more from cooperative instruction than from direct instruction because they experienced a feeling of greater competence.

Bertucci, Conte, Johnson and Johnson (2010) compared the effect of cooperative learning in pairs and groups of 4 and in individualistic learning on achievement, social support, and self-esteem. Sixty-two Italian 7th-grade students with no previous experience with cooperative learning were assigned to conditions on a stratified random basis controlling for ability, gender, and self-esteem. Students participated in 1 instructional unit for 90 min for 6 instructional days during a period of about 6 weeks. The results indicate that cooperative learning in pairs and 4s promoted higher achievement and greater academic support from peers than did individualistic learning. Students working in pairs developed a higher level of social self-esteem than did students learning in the other conditions.

Oloyede (2010) examined the effect of enhanced mastery learning strategy on achievement and self-concept in senior secondary school chemistry. It was identified that the widespread poor performance and the negative attitudes towards chemistry of secondary school pupils had been largely ascribed to teaching problems. 127 senior secondary schools year II (SSS II) students’ from three secondary schools in a Bauchi state of Nigeria participated in the study. They were taught for six weeks with conventional teaching, mastery learning strategy combined with cooperative learning strategy and were administered the chemistry self-concept scale and chemistry achievement test before and after teaching. The results arrived at during this study showed that there was significant difference in mastery achievement among the groups. It was found that enhanced mastery-learning strategy with cooperative learning strategy helped in improving chemistry achievement and self-concept by the students.
Summing up (International Studies)

In brief, CL strengthens interaction between achievement of grade II in mathematics and self-esteem (Bonaparte, 1989), enhances 3Rs and social self-concept (Glassman, 1989).


Peer-Assisted Learning (PAL) interventions focused on academics also improve social perception and self-concept (Ginsburg-Block, Rohrbeck, and Fantuzzo, 2006). XII Grader Physics students with low academic self-concept profited more from CL (Martin Hanze and Roland Berger, 2007).

Seventh Graders working in pairs under CL developed their social self-esteem (Bertucci, Conte, Johnson and Johnson, 2010). XII Grade Chemistry students taught through mastery-learning strategy with cooperative learning improved their achievement and self-concept (Oloyede, 2010).

2.2.2. Studies made in India

Sumitra (1994) studied the effect of cooperative learning on student achievement, self-concept and liking of classmates. In this study pre-test, post-test control group design has been employed. Eighty students of 10th class studying in Model School, Rohtak were assigned to experimental and control groups randomly. The student’s achievement, self-concept and liking of classmates were the dependent variables. Teaching of seven units of social science syllabus for a period of five months through Cooperative learning Method (STAD) was the experimental
treatment and treatment and traditional method was followed for teaching the control group. The Socio-Economic-Status (SES) and intelligence were adjusted by applying analysis of co-variance. For testing the significance of difference between the means of students’ achievement, self-concept and liking of classmates, ‘t’ test was used.

The findings of the study were as follows:

i. The results arrived at during this study showed that the post-test achievement mean scores of the experimental and control groups, controlling for intelligence and socio-economic status differ significantly in favour of the experimental group. This implies that the students who were taught social science through cooperative learning showed significant improvement in their achievement in social science than the students who received instruction through traditional method. This suggests that cooperative learning contributes towards raising the achievement of students.

ii. The group of students taught social science through cooperative learning showed significantly higher gain in achievement than the group of students taught social science through the traditional method.

iii. At the post-test stage, students of the experimental group achieved significantly higher means score on the test of self-concept that the group of students taught through the traditional method.

iv. The mean gain score of the students of the experimental group being significantly higher on the test of self-concept than that of the control group, it implies that cooperative learning, by helping in improving student achievement, is effective in improving their self concept as well.

v. At the end of the experimental treatment, the group of students taught social science through cooperative learning scored significantly higher on the test of ‘Liking of Classmates” than the group of students taught through traditional methods.

vi. The mean gain score of the experimental group after the experiment being significantly higher than that of the control group on the test of “Liking of Classmates” leads to the conclusion that students taught through cooperative
learning develop more liking for their classmates than the students who learn through traditional method of teaching.

Ali (1999) studied the effect of cooperative mastery learning strategy on learning languages (English, Hindi and Assamese) and self-esteem on a sample of 200 tribal and non-tribal fifth graders. The study reported that:

i. Cooperative mastery learning strategy yielded higher achievement gain scores that conventional group learning in English, Hindi and Assamese languages.
ii. Cooperative mastery learning yielded almost similar achievement gain scores in English, Hindi and Assamese languages for Tribal and Non-Tribal fifth graders.
iii. Cooperative mastery learning strategy yielded higher self-esteem gain scores of fifth grade students than through conventional group learning.
iv. No interaction was found among the instructional mode (cooperative mastery learning and conventional group learning), habitations (Tribal/Non-Tribal) and family background (educated/ uneducated) with regard to achievement gain scores in English, Hindi and Assamese languages.
v. No-interaction was found among instruction treatment (cooperative mastery learning and conventional group learning), Habitations (Tribal and Non-Tribal) and Family Background (Educated/Uneducated) for gain scores in self-esteem of fifth grades.

Minakshi (1998) studied the effect of Team Games Tournaments of Hindi Grammar on students’ achievement, intergroup relatives and self-concept under cooperative learning. In this study pre-test, post-test control group design was employed. Seventy students of IX standard studying in Saini Senior Secondary School, Rohtak were assigned to experimental and control group randomly. The student’s achievement, inter-group relation and self-concept were the dependent variables. Teaching of six units of Hindi grammar syllabus for a period of six months though cooperative learning method (TGT) was the experimental treatment and traditional method was followed for teaching the control group. The Socio-Economic Status (SES) and intelligence were adjusted by applying analysis of co-variance. For testing the significance of difference between the means of students achievement, self concept and intergroup relations, ‘t’ test was used. The results implied that the
students, who were taught Hindi Grammar through Team-Games-Tournaments under cooperative learning, showed significant improvement in their achievement in Hindi Grammar than the students who received instructions through traditional method. This suggests that Team-Games Tournaments under cooperative learning contribute towards raising the achievement and self-concept of students in Hindi Grammar.

Krishanaraj and Kalaiyarasan (2004) studied whether the STAD approach of with reward’ was more effective that the traditional approach in developing self-esteem of learners, besides investigating whether the group investigation approach ‘without reward’ scores over the traditional approach resulted in enhancing the self esteem of learners. For experiment-I, which was subjected to STAD with reward, a total of 48 learners studying in IX standard ‘G’ section was chosen from Alagappa Model Higher Secondary School, Karaikudi. The learners were grouped into 8 teams with 6 members in each team based on the VIII standard annual examinations scores of the learners in science subject. For experimental group-II, which was subjected to Group investigation method without reward, 48 learners studying in IX standard ‘H” section, were chosen from the same school. They were also jumped into same member of teams and the criteria followed as in the earlier case. For application of cooperative learning approaches, 6 topic of Biology were selected. The treatment lasted for 60 days. The control group consisted of 48 learners studying in IX standard ‘A’ section of the same school. The group was exposed to traditional method of instruction and no novel treatment was given. The investigation revealed that

1. The STAD with reward approach and the traditional method differed in enhancing the self-esteem of learners. It was noted that STAD with reward approach proved to be more effective than the traditional approach in enhancing the self-esteem of learners.

2. A comparison between the traditional approached and group investigation approach revealed a true difference in the mean scores. The Group investigation approach was found to be more effective than the traditional approach.
3. A comparison between the two cooperative learning approaches revealed the more effective nature of STAD approach than the group investigation approach in enhancing self-esteem of learners.

4. It was concluded that the STAD approach proved to be more effective in enhancing the self-esteem of learners than the group investigation approach and the traditional approach.

**Summing up (Indian inputs)**


**2.2.3 Overview (Self-Concept)**

Review of research studies reveals that in cooperative learning settings student have shown increase in self-concept, self-esteem, self-efficacy and self-appraisal in different subjects at different levels as in the similar manner of academic achievement. This is supported by various studies as mentioned above. Different cooperative learning strategies not only improves in academic achievement in wide variety of subjects but also improves the ‘self’. Studies in hand suggest that cooperative learning strategies can be used to develop and enhance self-concept in different domains. The development of self-concept in turn leads to higher motivation to learn more and to establish relationships. It suggests that cooperative learning can go as an effective way to bring handicapped and learning disabled students mainstreaming.

**2.3 EFFECTIVENESS OF COOPERATIVE LEARNING IN MATHEMATICS**

**2.3.1 Studies done Abroad**

Webb (1982) investigated the relationship among students group characteristics, group interaction and achievement in cooperative small groups (mixed
on ability or uniform-ability) on 77 students of grades 7 and 8 in mathematics. The findings revealed that three interactions were related to achievement receiving no explanation in response to a question or error (receiving no response or receiving only the correct answer) was negatively related to achievement, giving explanations and receiving explanations were positively related to achievement. Achievement and interaction in the group were related to group composition, sex, ability and personality, medium-ability groups. Boys showed higher achievement than girls. There was a curvilinear relationship between ability and achievement in mixed groups. Highs performed best, and mediums and lows showed similar achievement. High-ability students gave more explanations than low-ability students. Introvert students outperformed extrovert students, but extrovert students received more explanations.

Webb (1982b) investigated interaction and achievement in cooperative small groups mixed ability of uniform ability of 96 students in Grades 7, 8, and 9 of average and general ability in mathematics. The group interaction variables were student gives help, student receives help, students asks a question (receives a response or receives no response), students works alone, student interacts with another student (task-related, non-specific) and student is off-task. Results indicated that students who worked in mixed-ability groups tended to score higher on achievement test than students who worked in uniform-ability groups but the difference was not significant for group composition. The interaction variable that related most strongly to achievement was asking a question and receiving no response. The frequency of asking a question and receiving no response was higher among uniform ability groups than among mixed-ability groups. This interaction variable was negatively related to achievement. Students who received no answers to their questions obtained lower achievement test scores than students who did not experience this problem, whereas when asking a question and receiving a response was taken into account, it did not predict achievement. The correlation between extroversion-introversion scale and the number of times students asked question and received no response confirmed that extrovert students tended to be ignored less often than were the introverts.
Scanlan (1988) examined the patterns of student talk in one fifth grade mathematics class. Cooperative learning groups provided an alternative means for structuring classroom activities and give students further opportunities to use language to learn. Although research has reported compelling evidence that use of cooperative groups promotes academic achievement, positive attitudes towards school, higher levels of collaboration, positive relationships among students and increases self-esteem, little is known about how students actually talk with one another in these settings. Results indicated that student talk in cooperative groups was significantly different from the typical patterns of classroom discourse. Students used talk in the following ways: 60% was related to the mathematics they had been assigned to do; 30% was used to regulate their group processed, and 7% was for social/personal purpose. Only 2% of the students talk was unloadable Group assignment, that is, who is working with whom and the kind of tasks assigned influenced the ways in which the students used oral language.

Davis (1988) investigated the effect of using group process skills of think aloud and oral summaries in a series of cooperating learning lessons on attitudes and achievement of 104 seventh grade mathematics students of average ability in treatment and control groups using cooperative learning. Results indicated that there was no significant difference in students’ attitude between the two conditions. The observational data revealed difference in students’ interaction pattern between the treatment and control groups. Students using the specified group process skills were more verbal, interacted more with other group members, demonstrated more concern for other group members, and had more process-oriented explanations for word problems being solved during group work than the other students functioning without the specified teachers directed group process-skills.

Williams (1988) investigated the effect of cooperative learning strategies on student achievement in Algebra I, and on student’s attitudes towards self and others, and student’s attitudes on Algebra. The sample consisted of 165 Algebra students in two senior high schools and one junior high school. The experimental classes were taught by combining STAD and TGT strategies. Results showed a significant
difference between experimental students and control students in the average gain scores on the Algebra I test but no significant changes in attitudes.

Mulryan (1989) investigated the behavior and perceptions of high and low-achieving fifth and sixth-grade girls and boys. Students’ behaviour was observed in cooperative small-group mathematics, whole-class mathematics and reading-group setting. Comparisons were made across settings. Interviews with students and teachers were also conducted. The findings revealed that students manifested more time-on-task in the cooperative small-group setting than in the whole-class mathematics and reading group settings. High achievers manifested more time-on-task and also more quality involvement than did low achievers to student behavior in cooperative small groups. High achievers were more active participants than low achievers were in the groups. The interviews responses of low achievers indicated that these students had less complex and less differentiated understanding of the nature of cooperative small-group work.

Good, Reys, Grows and Mulryan (1989) studied the cooperative small group process and found that the students working in cooperative small groups in mathematics tended to be more active learner and more highly motivated than students working in whole-class settings. However, many students tended to work independently and individually instead of cooperatively and needed particular kinds of tasks if cooperation was to take place. There was a tendency for some students to dominate group interaction or to manifest passive withdrawing behavior in this setting.

Berg (1992) studies the effectiveness of structured cooperative learning technique in 11th grade mathematics class. The newly-devised paired-learning script was used as the primary instructional technique for 8 weeks, during which peer interaction and achievement were monitored. Results of analysis of short and long-term effectiveness of paired learning indicated that co-operative learners achieved more than Comparable student s taught using conventional methods in three of four comparisons; in one comparison there was no statistically significant difference, the programme was at least as effective as a mere conventional one as measured by
chapter test scores, and there was evidence of long-term effects. Qualitative and quantitative analysis of tapes, field notes, student questionnaires and student characteristic measures (prior mathematics achievement, study skills, mathematics anxiety and learning preference) reflected an overwhelmingly positive reaction to the paired learning experience.

Coston (1994) studied the effect of cooperative learning, graphics calculator enhanced instruction, and a combination of these approaches on student understanding of the function concept, mathematics achievement of algebraic skills and mathematics attitude of college Algebra students. Results indicated that cooperative learning significantly affected students understanding of functions and related topics, while the treatment that combined cooperative learning and calculator enhancement significantly affected students attitudes towards mathematics.

Berg, Kathleen Faith (1994) has undertaken to assess the feasibility and effectiveness of instruction that used a structured cooperative learning technique in an upper level high school mathematics class. Additionally, the study was designed to explore the nature of students’ verbal interaction within this cooperative structure, how that interaction changed over time and its relationship to achievement. The newly-devised paired-learning script was used as the primary instructional technique for 8 weeks, during which peer interaction and achievement were monitored before the implementation of scripted analysis of the short and long-term effectiveness of paired learning indicated that cooperative learners achieved more than comparable students taught using conventional methods in three of four comparisons; in one comparison there was no statistically significant difference. The programme was at least as effective as a mere conventional one, as measured by chapter test scores, though there was an evidence of long-term effects.

Hopp (1994) examined the influence of task on time spent in cooperative episodes and on cognitive and meta-cognitive behaviours of 32 eight grades as they worked cooperatively in groups of four on two routine and two non-routine mathematics tasks over a three-week period. Data was collected by audio and videotaping all students interaction as they completed the tasks. Findings suggested that
time spent in cooperative episodes and in meta-cognitive and cognitive behaviours were found between routine and non-routine tasks and also within the two task types. Results offered strong support that for a task to be truly desirable as a group task, it needs to be non-routine for everyone in the group. Also, group members must need each other in order to complete it. Difference among groups may have occurred because of the ability composition of the group, the gender of the student, or the routineness or non-routineness of the task for individuals in each group. Tasks which required multiple abilities resulted in more and longer cooperative episodes.

Morgan (1994) studied the effects of cooperative learning with process-oriented individual accountability, cooperative learning without individual accountability and traditional instruction on per-instructional achievement, post-instructional achievement, retention and attitudes towards school and mathematics on the third grade and cooperative learning with individual accountability in post-test results, students of low ability experienced greater success in the cooperative learning with process-oriented individual accountability than the students of low ability in the traditional group, cooperative learning without individual accountability did not reveal a significant difference when compared to the traditional group, cooperative learning with individual accountability had a significant effect on the achievement results, whereas, cooperative learning without individual accountability had a significant effect on attitudes towards Mathematics.

Nichols (1994) explored the effectiveness of a cooperative group learning structure (STAD) on achievement, goal orientation, self-efficacy, intrinsic and extrinsic valuing of the learning task and the use of cognitive strategies of 81 students in high school geometry classes STAD was used in 2 treatment situations (1) as instruction for the first few weeks of school (2) as instruction for the second nine weeks of the school. Results indicated that both treatment groups experienced significantly higher achievement scores and increase in learning goal orientation, self-efficacy, intrinsic valuing and reported uses of deep processing cognitive strategies than did the control group. A decline in these effects was noticed when cooperative group instruction was replaced by traditional lecture instruction.
Karnasih (1995) investigated the effect of small-cooperative group learning on 160 tenth grade students’ achievement and affective behaviours in mathematics and developing a descriptive model of grouping patterns based on students interactions and interviews providing information concerning their feelings and reactions to the method and the group membership in small group cooperative learning. To develop the grouping patterns, small heterogeneous and homogeneous groups were formed by recording students’ mathematical ability, gender and field-dependency. The findings revealed that small group cooperative learning opportunities in mathematics classrooms showed significant impact on students’ achievement and mathematics anxiety. Most students preferred small group learning, but some high achieving field-independent males did not prefer small group learning, but some high achieving field-independent males did not prefer small group cooperative learning when the group members did not fit there well most students felt that they had more opportunity for learning mathematics through small groups. With respect to grouping could be interactive but the most interactive groups were those in which there were no social and cognitive difference in problems of group members.

Nowak (1996) explored the effects of a cooperative learning programme on academic performance, cooperative interactions during lessons, and pro-social behaviours during play activities kindergarten classrooms. Scores on curriculum based mathematics probes and direct observations of cooperative interactions during the intervention served as primary dependent measures. Pro-social behaviours were assessed by direct observation in a free play outside the classroom. Results indicated that the cooperative learning procedures lead to improved academic growth as measured both by the curriculum-based mathematics probes and the mathematics section of the standardized group readiness test. Levels of cooperative behaviours increased during the instructional period when cooperative learning was in effect. Pro-social skill learned and practiced during the intervention generalized to the free play settings in and outside of the classroom environments. An increase in interactive play behaviours was observed for all participants during these time periods. For cooperative behaviours, the generality of effects with respect to maintenance over
time was not supported. Social validity data suggested that teachers, students and parents found the cooperative learning procedure to be effective and acceptable.

Watson (1996) investigated the use of cooperative learning and small-group instruction on sixty four remedial college students in beginning Algebra and found increase in achievement, attitude and attribution, remedial students in cooperative learning group stay in school longer, take to succeed in more courses than traditional remediation group.

Nichols (1996) examined the effects of a form of cooperative group instruction (STAD) on student motivation and achievement in a high school geometry class. The sample of the study comprised of eighty 10\textsuperscript{th} – 12\textsuperscript{th} grade students who were randomly assigned to either a control group receiving cooperative learning instruction. It assessed barometry achievement using scores from IOWA Test of Basic skills and teacher-made exams. An 83-item questionnaire was used as a pre-test and post-post test assessment of efficacy, intrinsic valuing, goal orientation and cognitive processing. Findings revealed that students in the cooperative treatment groups exhibited significantly greater gains than the control group in geometry achievement, efficacy, intrinsic valuing of geometry, learning goal orientation and reported uses of deep processing strategies.

Lin (1997) studied effects of classroom goal structure (competitive, cooperative and individualistic) on beliefs about success/failure in mathematics environments on two hundred and forty fifth-grade Chinese children found significant difference in goal structure effects on mastery goal orientation, mathematics achievement, individualistic goal structures had higher master goal orientations than children in the competitive goal structure and scored higher in mathematics achievement and intrinsic motivation.

Whicker, Bol and Nunnery (1997) investigated the effects of cooperative learning on student achievement and attitudes in a secondary mathematics classroom. Two pre calculus courses were compared in a quoi-experimental design, where students in 1 class studies the material in cooperative learning groups and other students studied material independently in 2\textsuperscript{nd} class. The results were obtained from a
repeated measures by multivariate analysis of variance (with pretest scores as the covariate) showed a significant Group X Time interaction. It was found that students in the cooperative learning group had increasingly higher test scores than students in the comparison group and significantly outscored the comparison group on the last, third chapter test. Results revealed primarily favourable responses toward the cooperative learning procedure. Most students indicated that they liked working in groups and appreciated getting help from other students, especially for learning difficult learning concepts. Furthermore, same students disliked having groups preassigned and permanent and then suggested alternating group membership.

Suyanto (1998) investigated the impact of the Student Teams-Achievement Division (STAD) cooperative learning model on students’ mathematics achievement and their perceptions of classroom environments in rural primary schools. The sample consisted of 664 third, fourth and fifth-grade students and their teachers who were trained in the use of STAD. The findings indicated that the STAD classes in third and fifth-graders performed significantly higher on tests of mathematics knowledge than the traditionally instructed classes. No significant differences in mathematics achievement were found between the fourth-grade students in the STAD group and those who were in the control group. Students in STAD group had significantly higher attitudes towards classroom environment.

Lucas (1999) studied the effect of the use of cooperative learning on the academic performance and self-efficacy of students enrolled in college Algebra at a large mid-western university with gender as a co-factor, 307 students were taught with formal cooperative learning and 427 students were taught using the traditional lecture format when grades were used as the measure of academic achievement. Students in the cooperative learning sections performed significantly better than those in the traditional sections. There was no significant difference in students’ self-efficacy scores between the cooperative and traditional sections and the effects of using cooperative learning did not significantly differ when gender was considered.
Alkhatib, Haitham and Jumaa (2002) investigated the effect of cooperative learning on 8th grade student’s performance in algebra. The sample of the study comprised of 54 boys and 57 girls studying in 4 middle-school mathematics classes of grade 8 in United Arab Emirates. Analysis of data showed no statistically significant increase in the algebra performance for students in the cooperative learning groups compared with the traditional groups. Furthermore boys in the cooperative setting improved significantly on the performance test compared with boys in the traditional setting.

Stevens, Olivarez, Lan and Tallent-Runnels (2004) evaluated self-efficacy and motivation orientation across Hispanic and Caucasian students to predict variables related to mathematics achievement, including mathematics performance and student’s plans to take additional mathematics courses. The study analyzed path models for 358 students in Grades 9 and 10 who attended a West Texas high school and the sample split by ethnicity. The data supported the finding that self-efficacy predicts motivational orientation and mathematics performance. The findings revealed that relationship between prior mathematics achievement and self-efficacy was stronger for Hispanic students. Furthermore indicated that similar motivational systems existed to predict mathematics achievement across ethnicity: however, Caucasian students did not place as much emphasis on prior mastery experiences as did/do Hispanic students, while other factors were active in influencing their self-efficacy.

Bosfield (2004) investigated mathematical computation (i.e addition, subtraction, multiplication, division, algebraic algorithm, decimals and fractions) skills between students instructed through the traditional learning method compared to the students instructed through the cooperative learning method on 53 subjects, 29 boys and 24 girls, from two fifth grade classrooms. Subjects were randomly assigned to the traditional mathematics learning and the cooperative mathematics learning conditions. Subjects were given the Math 65 Test Masters assessment as the pretest and post-test, which was used to assess the learning skills. Analysis of results revealed the students in the cooperative classroom had significantly higher growth skills in mathematical computation than students in the traditional classroom.
Siegel, Cristine (2005) used qualitative research methods to explore on 8th grade mathematics teacher’s personal definition of cooperative learning and the enactment of cooperative learning in the classroom according. Data collection involved interviews and classroom observations. The researcher used coded schemes and descriptive statistics for data reduction and analysis. Results revealed that while the teacher implemented a research-based model of cooperative-learning instruction, he adopted the model for use in his classroom. Results also identified the teacher’s prior experience and teaching context as factors that influenced his implementations of cooperative-learning instruction.

Veronica Galvan Carlan, Renee Rubin, and Bobbette M. Morgan (2005) conducted a study on cooperative learning, mathematical problem solving of 5th grade Latino students. The results of this study indicated four changes in student behaviour: (1) students became more engaged in problem solving; (2) students moved from a competitive to a cooperative stance; (3) students discovered there were several correct ways of finding a solution; and (4) students code-switched between Spanish and English to ensure everyone in the group understood. Two changes in teacher behaviour related to cooperative learning were: (1) the regular classroom teacher moved desks from rows to groups; and (2) the teacher became more aware of the students’ mathematical abilities.

Thangarajathi and Viola’s (2007) study aimed at (a) finding the effectiveness of cooperative learning approach over conventional method in learning mathematics at high school level; (b) comparing the achievement of the High, Average and Low achievers when though through conventional method; (c) comparing the achievement of the High, Average and Low achievers when taught through Cooperative Learning methods; and (d) comparing the achievement of conventional method group and cooperative learning method group with respect to sex, locality of the house, tuition undergone and type of tuition. The study concluded, indicating: (a) a significant difference between the post-test scores of students in cooperative learning method group and conventional method group; (b) a significant difference between the post-test scores of high, average and low achievers in the conventional method group; (c) no significant difference between the post-test scores of High, Average and Low
achievers in the cooperative learning method group; and (d) a significant difference between the pre-test and post-test scores of conventional method group and cooperative learning method group students in terms of sex, locality of the house, tuition undergone, type of tuition.

Ding, Li, Piccolo and Kulm (2007) examined the extent to which teacher interventions focused on students’ mathematical thinking in naturalistic cooperative learning mathematics classroom setting. The study observed six video tapes about the same teaching content using similar curriculum form two states. Two instruments were created for coding the equality of teacher intervention length, choice and frequency and intervention. The findings showed the difference of teacher interventions to improve students’ cognitive performance. The study suggested detailed techniques to address student’s thinking, such as indentify, diversify and deepen their thinking. The study concluded that during teacher training, it was not enough for teacher educators to provide mathematics teachers for strategies for classroom managements and group function. Educators also needed to cultivate teacher beliefs of using cooperative learning to improve student’s mathematical thinking and to provide teachers with techniques to effectively address student thinking.

Summing up (Global Scenario)

In brief, Grade VII-IX mixed ability group showed better achievement in mathematics than the uniform ability group (Webb, 1982, 1982b). Fifth graders cooperative groups promote achievement in mathematics, positive attitude and self-esteem (Scanlan, 1988). CL strategies promote mathematics (Algebra) achievement of high schools (Williams, 1988). Fifth and sixth Grade high achievers in mathematics devote more time-on-task in CL, more quality involvement and active participation than in whole class (Mulryan, 1989). CL makes more active and more motivated learners in mathematics (Good, Reys, Grows and Mulryan, 1989). Fifth graders CL mastery goal orientation yielded higher maths achievement and intrinsic motivation (Lin, 1997) and yielded higher growth maths computation skills (Bosfield, 2004).
Paired-learning yielded better achievement in II grade (Berg, 1992) and in high school mathematics (Berg, Kathleen Faith, 1994). CL in KG classrooms improved academic growth, cooperative behaviour as well as interactive play behaviour (Nowak, 1996).

Graphics and calculator enriched CL improved attitude towards mathematics at college (Coston, 1994). Multiple ability tasks result in long lasting cooperative episodes among eighth graders (Hopp, 1994). CL with individual accountability enhances mathematics achievement in third graders and without it enhances attitude (Morgan, 1994). Rural primary schools STAD CL yield higher attitude towards classroom climate while third and fifth graders made better maths achievement, grade IV did not show any difference (Suyanto, 1998). CL by remedial college students increases their achievement and attitude towards mathematics (Watson, 1996). CL in secondary mathematics yielded higher achievement and attitude but preferred rotating group membership than the permanent and pre-assigned one (Whicker, Bol and Nunnery, 1997).

STAD enhances achievement, goal orientation, self-efficacy and intrinsic valuing in high school geometry (Nichols, 1994). Collegiates show no significant difference on gender and self-efficacy parameters in Algebra (Lucas, 1999). Eighth graders show no significant difference on gender basis in mathematics achievement (Alkhateeb, Haitham and Jumaa, 2002). Grade IX and X self-efficacy predicts motivation orientation and maths performance across ethnicity (Stevens, Olivarez, Lan and Tallent-Runnels, 2004)

CL causes change of behaviour in V graders and their teachers towards problem solving and mathematics abilities (Veronica Galvan Carlan, Renee Rubin, and Bobbette M. Morgan, 2005). Eigth grade teachers’ prior experience and teaching context impacts cooperative learning (Siegel Cristine, 2005). High school CL mathematics shows significant difference along sex, locality, tution parameters (Thangarajathi and Viola, 2007). CL teacher training methods, technologies, techniques and strategies interventions promote cognitive, thinking and classroom
management performance of mathematics teachers and students (Ding, Li, Piccolo and Kulm, 2007).

2.3.2 Studies made in India

Ponnusamy and Sudarsan (2001) studied the effects of cooperative learning method on student’s achievement in mathematics at upper primary level and further studied the effect of variables such as sex and standard on the achievement of students under cooperative learning method. A total of 120 students constituted the sample chosen from three schools in Coimbatore district of Tamil Nadu state. Findings of the study revealed that (1) Cooperative learning contributed a lot to improve the academic performance of students in VII and VIII standards in learning mathematics; (2) The standard had no effect on the performance of experimental group students and so the effectiveness of cooperative learning could be generalized; and (3) Gender had no effect on the performance of experimental group students and so the effectiveness of cooperative learning could be generalized.

Mehra and Thakur (2008) conducted a study to compare the effect of cooperative learning and conventional group learning on achievement and retention in Mathematics. The research study was carried out on 12 Class VII students of two government schools of Chandigarh. There were 56 students in experimental group and control group each. The average age of students was 12 years. The obtained data was analyzed with the help of 3-way analysis of variance. The major findings of the study were (i) students when exposed to cooperative learning yielded better mean gain on achievement scores and retention scores as compared to those taught through conventional group learning, (ii) Field-independent and field dependent students yielded comparable mean gain on achievements scores and retention scores on item related to knowledge than those related to comprehension level but yielded comparable mean gains items related to comprehension levels and application level and at knowledge and application levels; and (iv) Field-independent and field-dependent students yielded better mean gains on achievement and retention scores through cooperative learning than conventional group learning.
Kaul, Pallavi (2010) investigated the effect of learning together techniques of cooperative learning method on student’s achievement in mathematics at elementary level. This study was an experimental research in which pretest post-test design with control group was applied. The study was conducted in May 2008 with pupils studying in 7th class in N.S. Public School, Gamma II – Greater Noida, Uttar Pradesh. Most children were girls. It was observed that learning together technique of cooperative learning method is more effective that traditional in mathematics teaching of elementary school 7th class. It was equally notice that the level “which is concerned with improvement of achievement in math” of the students in the experimental group in which learning. Together technique of cooperative learning method is applied’ was higher than the level of students in the control group “in which traditional teaching method permanently connect with each other and their teachers for learning and teaching, where as in the control group, there is less connection feeling.

Harish (2011) studied the impact of integrated Critical thinking skills an achievement in Mathematics of secondary school students. The sample consisted of 140 students who were studying in ninth grade. The study revealed that the package of integrated critical thinking skills has helped the standard IX students to enhance their academic achievement in mathematics as evident from the posttest of achievement. The study also revealed that the boys and girls do not differ in their achievement in mathematics but they differ in the critical thinking skills. Gender has influenced integrated critical thinking skills as boys have shown better performance than girls in the integrated critical thinking skills. However, group and gender have their significant interaction effect on achievement on mathematics.

Surinder Kaur and Aruna Sharma (2011) investigated the effect of Abacus techniques on Achievement in mathematics Elementary stage. The sample comprised of 120 students, 60 students were boys and 60 students were girls. Findings of the study revealed that the group of students who studying in fifth grade taught through Abacus technique has positive significant effect in improving their achievement in mathematics than taught without abacus. The achievement scores of boys and girls of different schools of experimental group showed that gender has no significant effect on the achievement in mathematics of student. Further, the achievement scores of
students of experimental group with high level of intelligence had significant difference with average and low levels. Also the interaction of gender and intelligence on the achievement in mathematics was insignificant. It concluded that there was no significant effect of gender, intelligence and their interaction on achievement in mathematics.

Summing up (Indian studies)

In brief, seventh and eighth graders show not significant on sex and standard of achievement parameters (Ponnusamy and Sudarsan, 2001).

Grade IX gender impacts integrated critical thinking skills mathematics achievement in favour of boys (Harish, 2011). Fifth grade gender, intelligence and their interaction have no impact on mathematics achievement (Surinder Kaur and Aruna Sharma, 2011).

Grade VII CL yielded better on achievement and retention and comparable gains in comprehension, knowledge and application in mathematics (Mehra and Thakur, 2008). Learning together techniques of CL improve achievement of seventh graders in mathematics (Kaul Pallavi, 2010)

2.3.3 Overview (Cooperative Learning in Mathematics)

Review of the literature accessible on the effectiveness of cooperative learning strategies reveals that outcomes derived through the wide range of researches held on its variety of aspects are quite considerable in teaching learning process, especially in the field of mathematics. Classroom itself is the large group of mixed abilities and to draw better achievement in mathematics, it suggests small mixed ability grouping. Cooperative groups promote not only achievement in mathematics but also promote positive attitude, self-esteem, motivation, goal orientation, self-efficacy, intrinsic valuing and computation skills. Cooperative learning also enhances academic growth, cooperative behaviour as well as interactive play behavior in lower classes which suggests that cooperative learning strategies can be used frequently at pre-primary stage. Studies in hand reveal that cooperative learning is not only useful at pre-primary, primary but equally having good applications for high schools. More
devotion time-on-task, more quality involvement and active participation in cooperative learning enhance achievement in mathematics.

Graphics and calculator enriched cooperative learning improves attitude towards mathematics and multiple ability tasks result in long lasting cooperative episodes among students. Cooperative learning without individual accountability enhances attitude so careful handling of the technique is required. Teachers’ prior experience, teaching context, training methods, technologies, techniques and strategies interventions promote cognitive, thinking and classroom management performance of mathematics teachers and students. It suggests that cooperative learning with its all features, elements and prospects can be more applicable if it is enriched by new technological advancements.

2.4 THE EFFECTIVENESS OF COOPERATIVE LEARNING IN OTHER SCHOOL SUBJECTS

2.4.1 Studies done Abroad

Johnson and others (1976) found that pupils in cooperative small group learning setting respond more pro-socially on altruistic versus individualistic choice tasks than do pupils in individual learning situations. In another study, based on the social studies curriculum, it was found the students who had studied cooperatively made more cooperative and helpful decisions in a subsequent simulation game than did students who had studied competitively (Ryan and Wheeler 1977). In this study, fifth and sixth grade students played the simulation “Seal Hunt” a component of MAN: A COURSE OF STUDY. The cooperative subjects manifested significantly more cooperative behaviour, such as institution and implementing group strategies and rendering assistance to one another.

Slavin (1978) investigated the independent effects of level of reward (recognition based on the performance of a four-to-five member cooperative learning team vs. comparison with entire class) on students achievement and attitudes on 205 seventh grade in English (grammar and punctuation) classes. Results indicated reward level effects in favour of team reward and comparison group effects in favour of the comparison with equals on percentage of time on task, positive interpersonal
perceptions. In case of attitudes, rewards effect favouring team rewards were supported for perceived probability of success, motivation, dependence of outcome on performance, liking of others, peer support for academic performance and number of friends named. No academic achievement effects were found for either factor.

Slavin and Madden (1979), in a secondary analysis of data collected in a national sample of high schools by the Educational Testing Service found that teacher workshops, multi-ethnic texts, minority history, heterogeneous groups and classroom discussions of race relations had very limited effects on students’ social attitudes and behaviour. On the other hand, the assignment of students of different race to work with each other and the participation of students in multi-racial sports teams had strong, consistent, positive effects on race relations.

Cooper, Johnson, Johnson and Wilderson (1980) studied the effects of cooperative, competitive and individualistic experiences on cross-ethnic, cross-sex and cross-ability interpersonal attraction on 60 seventh grades during English, geography and science classes and found that more students in the cooperative learning receive help from peers of the other ethnic group and sex than in the competitive and individualistic conditions. More normal-progress students in the cooperative conditions perceive themselves as giving help to learning-disabled peers than in the competitive or individualistic conditions. More students in the cooperative and competitive conditions than in the individualistic condition chose friends from the other ethnic group and learning disabled peers.

Slavin (1980) studied the separate effects on student achievement and time on-task of three components of the team learning technique, STAD cooperative rewards, group tasks and a focused schedule of instruction. The sample comprised of 336 fourth and fifth grade students who studied language mechanics for nine weeks. Results revealed the following (1) In case of academic achievement, reward and task interaction effects were found significant for curriculum-specific test while the reward effect was in favour of team reward, the task effect was in favour of the individual task and no effects were found for standardized effect; and (2) the experimental classes learned significantly more than in the individual reward
conditions and that the students tutored significantly more in the team reward classes than they did in the individual reward classes.

Lang (1983) investigated the use of a cooperative learning technique, Teams-Games-Tournament (TGT), on academic achievement and improve attitude towards economics among college students in different ability levels. On 60 students of microeconomics class, 30 each in experimental (TGT) and control group it was found that TGT has no statistically significant treatment effect on academic achievement nor were there any statistically significant distributional effects of TGT among students in three ability groups TGT has no statistically significant treatment effects on attitude towards economics.

Nattiv, A. (1986), studied the effects of three types of cooperative learning instructional methods vis-à-vis traditional learning structures on student achievement, using a Combination of Jigsaw-II and cooperative methods on a sample of 129 sixth grade students in four middle school classes who studied social studies for three consecutive nine week quarters. In three out of four treatment conditions, students were randomly assigned to classes. Each of the four teachers rotated through three of the four conditions, teaching the same material by different methods. Teachers received twentyfour hours of initial in-service training plus periodic on-site visits throughout the study, Results of the curriculum-specific test indicated significantly greater performance in two of the three Cooperative Learning Methods compared to the control group.

Nederhood (1986) investigated the effects of cooperative learning technique on achievement and attitude outcomes of 1145 seventh graders in five experimental teaching teams of mathematics, language, arts and social studies and found significant positive results linking a teacher’s use of students team learning with positive classroom involvement, increased number of friends, higher academic expectations and increased self-confidence. No significant differences were found for academic achievement.

Conwell et. al. (1988) interviewing 28 students who worked in cooperative learning groups in intermediate Social Science classroom in an urban system,
reported several findings. Students perceived their social science achievement positively. Nearly two-thirds rated their level of self-esteem as high. White students, particularly white females felt positive about themselves when working in groups. More than three-fourth of the students interviewed enjoyed working with everyone in their group. Students had no preferences based on race or sex for team mates. However, the overall response of black students of group work was not so positive as that of white students. White females, regardless of achievement level, felt better about themselves when working in a group, as compared to working alone in social science.

Watson, Scott B (1988) studied the effects of the Group Educational Modules (GEM) materials and cooperative learning techniques on the achievement of high school biology students. GEM materials are self-instructional packed designed for use with groups of high school biology students. Cooperative learning is a classroom learning environment in which students work in small, mixed ability groups towards a common goal and are rewarded for doing well as a group. A total of 11 teachers with 36 classes and 715 students were included in this study, all teachers involved covered the same general subject matter during the study period. An analysis of co-variance (ANCOVA) was used as the data analysis procedure. Significant difference was found in the achievement of students using GEM materials and those using traditional instructional approaches. The use of cooperative learning produced significant difference when compared to traditional classroom structures.

Kinney (1989) studied the effects of cooperative learning on the achievement of ninth-grade students in a multicultural general biology class Kinney’s cooperative learning model involved two days of specifically designed cooperative learning activities followed by individual chapter test on the third day. Day one involved the use of STAD One day, two students were given their graded test and worksheets for 10 to 15 minutes of study and then played team-Game-Tournaments (TGT) for the rest of the period. Laboratory activities took place between the three-day cycles Black students of both sexes showed significant increase in achievement over their counterparts in the control group for short-term effects (1989.5) Both black and white students in the experimental group had significant increase on chapter test scores.
Sheng (1990) investigated the effect of cooperative learning (with training and organized) and cooperative learning (without training and unorganized) on 117 sixth graders in science in three ability levels (high, middle and low). Results showed that cooperative learning (trained and organized) displayed a statistically significant difference when compared with the other two conditions (cooperative learning without training and organization and traditional teaching) in a test of process skill. No significant difference was found between scores obtained by students engaged in cooperative learning and participating in traditional teaching. Significant difference was found between ability levels. High ability students achieved higher than mixed ability students and mixed ability students achieved higher than low ability students.

Orlando, Joseph Edward (1991) conducted a study on cooperative learning, students’ achievement and attitude in community college freshman English classes. Cooperative learning method designed and developed by Robert Slavin and his colleagues at the John Hopkins University was used for twelve weeks. A quasi-experimental design and a sample of 132 community college students were included in the study. The findings indicated a statistically significant difference in achievement between students who were involved and students who were not involved in the selected cooperative STAD method. A post-analysis of student’s attitude towards cooperative learning instruction indicated a positive direction.

Peck (1991) compared differences in spelling achievement among group of student who were high, average and low achievers. The study attempted to determine any treatment effects resulting from students being cooperatively grouped for spelling instruction on 135 intermediate grade elementary children. Normal curve equivalent scores from an existing standardized achievement test were used to classify students as high, average or low achievers. STAD was implemented. The sessions provided activities designated to encourage the development of collaborate skills prior to initiating treatment. A bonus point system was used to reinforce the collaborative skills. The results indicated that intermediate children achieved equally well regardless of how they were grouped for spelling instruction. Low achieving students achieved significantly different from high and average achieving students.
Cook (1993) examined verbal student interactions as a product of varying motivational patterns in small cooperative learning groups in physics classes. Groups were classified by number of learned-helpless and mastery-oriented individuals who were identified by means of Intellectual Achievement Responsibility Scale (IAR). Each group was observed by means of videotaping and assessed by a coding system for four variables on or off task, sender of receiver of the message, positive or negative nature of communication attributions for effort or ability. Results showed significantly different relationship between scores on the positive half of IAR and the Attitude Towards Science in School Assessment (ATSSA) Scale but not between the negative half of the IAR and ATSSA. Significant differences were found for the main effects of sending and receiving, on and off-task messages. No significant relationships were found for being learned helpless and sending or receiving positive/negative comments or making attributions for effort or ability.

Stevahn, Johnson, Johnson and Real (1996) examined the effectiveness of a conflict resolution program in a rural K-8 public school in Ontario, Canada. Participants were students in two seventh and two eighth grade classes. The study involved two independent variables:

a. The presence versus the absence of the integration of conflict resolution training into an academic English Literature unit and
b. Cooperative versus individualistic learning.

There were three issues investigated. The findings revealed that before training there was no significant difference among conditions (cooperative trained, cooperative untrained, Individualistic trained and Individualistic untrained) but after training students in cooperative conditions recalled more of the negotiation steps than did the students in the individualistic conditions. It was observed that immediately after the training program, students in the cooperative/trained condition used more of the negotiation steps in their responses than did the students in the other their conditions. For the conflict strategies theory analyses of the cutting in live scenario, students in cooperative conditions used more constructive conditions and further more students in trained conditions used more construction strategies than did the students in the individualistic conditions and further more students in trained
conditions used more constructive strategies than did the students in the untrained conditions. Descriptively, data confirmed that predictions: (a) Training enhances performance, (b) cooperative learning groups enhance performance and (c) the training effect is larger for cooperative learning groups.

Dudley, Johnson and Johnson (1997) conducted a study to see the relationship using of cooperative learning to enhance the academic and social experience of freshman student athletes. The Study comprised of the sample of one hundred seven freshman student athletes who were studying in 17 different women’s and men’s intercollegiate sports session in evening during study 3 questionnaires were administered to a sample of 50 (25 women & 25 men). In the study respondents reported that (a) they worked cooperatively on academic assignments (b) the program staff provided both academic and personal support while structuring and facilitating cooperative learning groups and (c) they themselves were highly, task oriented, confident of their academic ability and involved in positive and supportive relationship with their fellow participants.

Armstrong (1997) studies the effect of Student-Teams Achievement Division (STAD) cooperative learning strategy on academic achievement and attitude towards social studies class on the sample of 47 twelfth-grade social studies students in two advanced progressive American classes and found that the application of STAD in the upper secondary social studies classroom exhibition gave no statistically significant difference in academic achievement on student attitude towards social studies class.

Webb, Nemer, Chizhik and Sugrue (1998) investigated the effects of group ability composition on group processes and outcomes in science performance assessments. The study involved students in 21 eighth-grade science classes worked on science assessments first individually, then in groups, and finally individually again. It was found that group discussion quality and on student achievement, groups with above average students procured more accurate and high quality answers and explanations about how to solve the test problems than groups without above-average students who worked with above-average students showed higher achievement than did below-average students who worked without above average students. The fact
concluded that heterogeneous groups provide a greater benefit for below-average students than they impose a detriment on high-ability students.

Earley (1999) investigated the effect of cooperative learning on the group work and social skills interaction of 64 social studies students from grade 9 to 11 during a twelve-week period. The self report group function survey was used to assess the significance of whether instruction of social skills is important in the cooperative learning setting. The student choice form was used to establish the significance of social skills being taught and to determine the effects on increasing friendship among group members. Results of the survey indicated that social skills taught through cooperative learning methodology increased group effectiveness as well as interpersonal interaction.

Sparks (1999) studied the effectiveness of a short-term remediation/cooperative learning programme on a sample of 450 first semester general chemistry course. Increase in achievement on examination 2 was found which was over topics discussed in the sessions. The session participants also increased their achievement on later examinations over material that was not discussed in the sessions.

Barett (2000) investigated the effects of two cooperative learning strategies. Performed And Coach Earn Rewards (PACER) and Jigsaw – II – PE on academic learning time in physical education (ALT-PE), the percentage of correct trails and the social behaviour of eight sixth graders (2 males ad 2 females in each study). The study revealed the following: (i) No functional relationship was found between the independent variable and ALT-PE, therefore, neither PACER and Jigsaw II-PE was more time-consuming than traditional instructions; (ii) PACER and Jigsaw II-PE each showed gender effects, in that low skilled students performed as well as their average and high skilled counterparts; and (iii) A functional relationship was found for both the strategies with social duration, but with no frequency of social interaction.

Karsch (2001) studied the effect of group training on cooperative learning teams of 105 ninth-graders in four heterogeneously mixed social-studies classes in sub-urban high school. Results showed that students in the trained condition did feel more personally supported in their groups than did their counterparts in the untrained
condition. In general, students in the trained condition had a more positive experience engaging in cooperative learning activities, and a more positive attitude towards their particular group. No significant difference was shown between the two conditions in the area of student achievement.

Neyshabour (2001) studied the effect of individual and cooperative learning in computer education on performance at knowledge, skill and application categories in relation to cognitive styles on a sample of 124 class X students and reported the following findings.

1. No difference was found between knowledge mean scores, application mean scores and skill mean scores yielded through individual and cooperative learning mode. Both modes were found to be equally effective.
2. No difference was found between the total performance mean scores yielded through individual and cooperative learning mode.
3. Mode of learning was found to interact with cognitive style in respect of knowledge scores. Performance of field-independent group was higher with cooperative learning than that of filed-independent group with individual learning.
4. Mode of learning was not found to interact with cognitive style in respect of application and skill scores.
5. There was no difference between the mean scores attained on knowledge, application and skill categories in respect of the interaction among learning mode cognitive style.

Vaughan (2002) examined the effect of cooperative learning on the achievement and attitudes towards mathematics of a group of 5th grade students of colour in a culture different from the United States (i.e. Bermuda) and found significant differences among the pre and post-test scores, suggesting that there were positive gains in attitudes and achievement levels of students of colour. Madrid, Canas and Medina (2007) studied the effects of Team competition versus Team cooperation in class-wide peer tutoring. Sixteen Hispanic Spanish/English bilingual children (6 boys and 10 girls) participated in a single-subject designed study. Their
chronological ages ranged from 8 to 9.5 years. Subjects were identified by the class teachers on the basis of history of poor academic performance in spelling and low scores on the Metropolitan Achievement tests. Three instructional innovations were (a) competitive team peer tutoring (b) cooperative team peer tutoring and (c) standard teacher-led instruction. The results of the students showed that although team competition and team cooperation resulted in higher levels of correct responding relative to the standard teacher-led condition, cooperative team peer tutoring resulted in the highest rate of correct responding.

Chen (2004) investigated the effectiveness of cooperative learning strategies in teaching English as a foreign language to a group of 110 college students (34 males and 76 females). Two cooperative learning strategies, Jigsaw and Student-Teams Achievement Division (STAD) were implemented in the experimental group and control group was instructed through traditional Grammar-Translation method. The study revealed that the experimental group outperformed the control group and the males performed better in cooperative structure than in the traditional competitive structure.

Kemal Doymus, Umit Simsek, Ataman Karacop and Sukru Ada (2009) conducted a study on the effect of two cooperative learning strategies on teaching and learning topics on thermo-chemistry. The aim of this study was to determine the effect of group investigation and jigsaw techniques on students’ achievement in the thermo-chemistry unit of a general chemistry course. The results indicated the instruction based on group investigation techniques, caused a significantly better achievement in term of thermo-chemistry achievement test and the particulate nature of matter evaluation test compared to jigsaw technique designed chemistry instruction.

Cooperative learning techniques showed significant increase in achievement in different subjects or areas other than mathematics, as supported by many studies. In brief, fifth and sixth graders in cooperative learning simulation in social studies presented pro-socially altruistic choice tasks, cooperative behaviour, group strategies and helpful attitude (Johnson et. al., 1976).
High school Educational Testing Service in terms of teacher workshops, multi-ethnic texts, minority history, race relations etc. had limited impact on social attitudes and behaviour but muti-racial sports teams participation did impact race relations (Slavin and Madden, 1979). English, Science and Geography cooperative learning VII graders receive cooperation from other ethnic and sex peers as well as give help and be friend the learning disabled peers across ethnicity, gender and ability (Cooper, Johnson, Johnson and Wilderson, 1980).

Seventh grade English students had no significant difference in achievement but did impact in favour of team reward and attitudes in cooperative learning (Slavin, 1978). College level cooperative learning Teams-Games-Tournament had no significant difference in achievement and attitude towards Economics (Lang, 1983). Cooperative learning methods in combination with traditional methods boost sixth grade social studies achievement (Nattiv, 1986). Cooperative learning self-instructional packages for high school Biology do improve achievement (Watson, 1988). Cooperative learning in VII grade boosts positive attitude and self-confidence in all subjects (Nederhood, 1986). Community college freshmen in English developed positive attitude towards cooperative learning and significant difference in achievement (Orlando, Joseph Edward, 1991). Cooperative learning caused positive gains in colour, attitude and achievement in mathematics of V graders (Vaughan, 2002).

Cooperative learning on XII graders showed no significant difference in achievement and attitude towards social studies (Armstrong, 1997). Cooperative learning trained vs untrained person showed no significant difference in achievement but improved support in the group as well as created positive attitude and experience (Karsch, 2001). No difference was found between individual and cooperative learning modes in X graders computer education (Neyshabour, 2001).

Race and sex differentials in intermediate social science classroom, white females felt more positive in self-esteem in group learning (Conwell et. al., 1988). Ninth graders multi-cultural cooperative learning in Biology causes significant difference in achievement irrespective of colour and sex (Kinney, 1989).
Cooperative learning VI graders found significant difference by ability levels but not otherwise High > Middle > Low (Sheng, 1990).

Cooperative learning improved IX-XI graders’ social skills and interaction (Earley, 1999). Cooperative learning in chemistry improved achievement in topics discussed and later in topics not discussed (Sparks, 1999). Cooperative learning strategies not more time consuming than traditional instruction in physical education of VI graders (Barett, 2000). STAD and jigsaw performed better among college graders in English as foreign language than Grammar-translation method and males performed better (Chen, 2004).

2.4.2 Studies made in India

Ahuja (1994) studied the effectiveness of the use of a cooperative learning instructional strategy on academic achievement, attitudes towards science class and process skills of seventh graders. The sample consisted of 116 students (48 in control group and 68 in experimental group). Findings from the ANCOVA on post-test scores indicated that the use of cooperative learning instructional strategy results in greater academic achievement and better attitudes towards science class. The process skills were not influenced by the instructional strategy. Responses from the interview of six students (who were purposefully selected on the basis of their responses on the attitudes checklist) corroborated the findings that a cooperative learning experience was looked upon more favorably by seventh class science students, who found that it improved their perceptions of science, made science learning more fun and improved their learning.

Pandey and Kaushal Kishore (2002) conducted a study on the effect of cooperative learning on cognitive achievement in science. This study examined the effect of one of the methods of cooperative learning—STAD on achievement in science of ninth grade students. Objective was to find out the difference between traditional method of teaching and STAD technique of cooperative learning method. Result of this study was that STAD was more effective than traditional method for knowledge level as defined by Bloom's taxonomy. However, both the methods were found to be equally effective for comprehension level.
Geed, Passi and Dube (2003) compared the overall achievement of students to the cooperative learning environmental group with those of the traditional learning environment group in English. The samples comprised of 70 students of class IX, 35 in each group. The achievement test included four sections namely- reading, writing, grammar and literature. Results indicated the following.

1. Experimental group scored better in the Reading section than the control group.
2. No significant difference was found between experimental and control group in writing section.
3. No significant difference was found between experimental and control literature when compared to the control group.
4. Experimental group showed better understanding and retaining in literature when compared to the control group.
5. Presentation of group work was better in experimental group when compared to control group who were assigned groups only for the project.
6. Overall achievement of experimental group was significantly higher than that of control group.

Prakash Satya C.V. and Patnaik S.P. (2005) conducted a study on the effect of co-operative learning on achievement motivation and achievement in Biology. Objectives were: to find out the effect of cooperative learning on achievement motivation and achievement in Biology. Findings were: there was a positive effect of co-operative learning on achievement motivation. Co-operative learning has a positive effect on achievement in Biology in terms of knowledge, understanding and application objectives as well as total achievement.

Yaibua (2005) studied the effect of multimedia CAI through cooperative and individualistic learning conditions on a sample of 50 students of Diploma Course in Electronics in relation to Persistence. The following conclusions were made:

i. The multimedia CAI in cooperative learning situation yielded higher achievement gain means that multimedia CAI in individualist learning situations;
The multimedia CAI in cooperative learning situation yielded higher achievement gain means than in conventional group learning, and

Through multimedia CAI in cooperative learning, the High, Average or Low Persistence students did not differ in their achievement gain means.

Hemant Lata Sharma and Savita Sharma (2009) studied the effectiveness of the learning in small groups i.e. STAD, under cooperative learning method over conventional method in learning Geography at elementary school level and also compared the achievement of High, Average and Low Achievers. The sample comprised of 80 pupils studying in two sections of the VII class of S.R.S. Sr. Sec. School, Rohtak. The two researchers studied the impact of cooperative learning strategy on learning outcomes, interpersonal relationships and self-esteem of elementary school students who studied Geography for 55 days. Results revealed the following:

i. The post test achievement mean scores of the experimental and control groups, controlling of intelligence and socio-economic status, differ significantly in favour of the experimental group. This implies that the students who were taught social studies through Student-Teams Achievement Division (STAD) under cooperative learning have shown significant improvement in their achievement in social studies than the students who received instruction through traditional method.

ii. The group of students taught social studies through Student-Teams Achievement Division (STAD) under cooperative learning have shown significantly higher mean gain in achievement than the group of students taught Social Studies through traditional method.

iii. The performance of High, Average and low Achievers were equal when taught through STAD under cooperative learning method than the group of students taught through traditional method.

In brief, cooperative learning improved VII grade students’ perception, attitude, achievement and learning of science as joyful (Ahuja, 1994). STAD was more effective for cognitive achievement in science but equal in comprehension
among ninth graders (Pandey and Kaushal Kishore, 2002). Cooperative learning found no difference in writing and literature but better for understanding, retaining literature, reading, group work and overall achievement (Geed, Passi and Dube, 2003). Cooperative learning improves achievement as well as achievement motivation in Biology in knowledge, understanding and application (Prakash Satya C.V. and Patnik S.P., 2005). CAI through cooperative learning yielded higher achievement in Diploma course in Electronics, irrespective of high, average and low persistence (Yaibua, 2005). STAD improves seventh grade students’ achievement in social studies (Hemant Lata Sharma and Savita Sharma, 2009).

2.4.3 Overview

A. Cooperative Learning in Mathematics


Whereas Suyanto (1999) reported no increase in mathematics achievement of third, fourth and fifth graders, which is supported by Alkhateeb, Haitham and Jumaa (2002) with 8th grade student’s performance in algebra, in United Arab Emirates.

B. Cooperative Learning in Other Subjects

B.1 English


B.2 Other Languages

Cooperative learning techniques showed significant increase in achievement in different languages other than English, as supported by Slavin (1980) in language mechanics, Anderson, Johnson, Johnson and Johnson (1976) in language arts, Ali (1999) in languages viz English, Hindi and Assamese, Madrid, Canas and Medina (2007) reported higher rate of language learning among primary students.

B.3 Social Studies/Science

In case of social studies, Armstrong (1997) and Karnaasch (2001) reported no significant increase in achievement.

B.4 Science


Doymus, Simsek, Karacop and Ada (2009) indicated the instruction based on group investigation techniques, caused a significantly better achievement in term of thermo-chemistry.

B.5 CAI/Electronics

Yaibua (2005) reported significant increase in achievement scores in Electronics of Diploma course students.

Neyashbour (2001) reported no significant increase in performance in computer education.

2.5 IMPLICATIONS OF COOPERATIVE LEARNING STRATEGIES/TECHNOLOGIES FOR FURTHER RESEARCH

Cooperative learning has several strategies and techniques for promoting an educational experience that facilitates students and teachers to move beyond standard classroom parameters. In cooperative learning, teams, each with students of different levels of ability, use a variety of learning activities to improve their understanding of the subject through a constructivist approach. In recent research studies, researchers used many of the cooperative learning strategies alone or with the cooperation of other methods, techniques and technologies to prove their points. Review of research
studies revealed that cooperative learning setting used by most of the researchers were found to be very common such as Student-Teams Achievement Divisions (STAD), Student-Team Games Tournament (TGT), Teams Assisted Individualization (TAI), Cooperative Integrated Reading and Composition (CIRC), Jigsaw, Learning Together and Group Investigation to improve the teaching learning pace and progress in the classroom. Recent research studies showed increase of favourable attitudes towards different subjects, cooperative learning and towards classroom environment.